FACULTY OF SCIENCE—

HANDBOOK 1963

THE UNIVERSITY OF NEW SOUTH WALES

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Foreword

In renewing, for this 1963 edition of the Faculty of Science Handbook, my welcome to new students, I would like to express the hope that all of you will enjoy and profit from your studies here.

As students in the Faculty of Science, you will be sharing with all members of the Faculty and, indeed, all members of the University, the excitement of rapid growth and change. Knowledge is growing at an incredible rate and ever more students are seeking to enter Universities. You cannot but be affected by this forward surge, and if you are to gain the full benefit of a University education you will be required to develop enthusiasm, purpose, and diligence. An active approach to your studies is essential.

Success in University studies requires you to develop a special kind of attitude which may differentiate you from many of your friends, and even some of your family. You will have to learn to be independent, to cultivate an enquiring mind, to seek to understand rather than simply to memorise, or worse still, to acquire a vague technical jargon. To do all these things you will need to have confidence in yourselves, to feel secure in the University environment, to broaden your interests and to make a positive effort to grow intellectually and personally.

Proper recreation is essential and should be regular to avoid the mental stagnation which results from concentrated hours of study on a group of subjects closely related to one another. But do not allow yourself to indulge too freely in the many diverting activities associated with the modern University.

If you, in spite of honest effort, find difficulty in coping with your work, make your doubts known to the lecturing staff or seek specialised advice from the student counselling service. Do not let matters drift. If you are in trouble take immediate action.

Remember that you have special responsibilities for your own development. We will guide and assist you, but only you can convert attendance into a University education.

Only by making the most of your opportunities and working towards a goal which means something to you, will you get real satisfaction from being a University student.

There is no life more satisfying than one which is actively devoted to seeking greater understanding.

J. F. CLARK,
Dean.

December, 1962.

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Faculty of Science

SCHOOLS AND ADMINISTRATIVE OFFICERS, 1963

Dean:
Professor J. F. CLARK

Educational Officers —

Applied Chemistry Course:
Mr. W. J. DUNSTAN, (School of Chemistry)

Applied Psychology Courses:
Mr. J. C. MURRAY (School of Applied Psychology).

Optometry Courses:
Associate Professor J. LEDERER (Department of Optometry).

Science Degree Courses:
Mr. C. M. GRODEN (School of Mathematics).

School of Applied Psychology:

Head of School: Professor J. F. CLARK.
Associate Professor (Clinical Psychology): R. T. MARTIN
Educational Officer: Mr. J. C. MURRAY.

School of Biological Sciences:

Head of School: Professor B. J. RALPH.
Professor of Microbiology: M. R. J. SALTON.
Educational Officers: Mr. R. BARBOUR, Mr. A. WOOD.

School of Chemistry:

Head of School: Professor D. P. MELLOR.
Professor of Organic Chemistry: S. J. ANGYAL.
Associate Professor (Inorganic Chemistry): G. A. BARCLAY.
Associate Professor (Nuclear and Radiation Chemistry): J. H. GREEN.
Associate Professor (Organic Chemistry): G. W. K. CAVILL.
Associate Professor of Physical Chemistry: R. C. L. BOSWORTH.
Associate Professor (Physical Chemistry): R. L. WERNER.
Educational Officer: Mr. W. J. DUNSTAN.

School of Mathematics:

Professor of Applied Mathematics: J. M. BLATT.
Professor of Mathematics: G. BOSSON.
Associate Professor (Mathematical Statistics): J. B. DOUGLAS.
Executive Officer and Co-ordinator: Mr. S. A. SENIOR.
Educational Officer: Mr. C. KIRKPATRICK.

School of Physics:

Head of School: Professor C. J. MILNER.
Associate Professor of Physics: J. F. McCONNELL.
Associate Professor of Physics: J. J. O'DWYER.
Associate Professor (Optometry): J. LEDERER.

Educational Officers: Dr. R. E. LISHMUND; for courses majoring in Physics, Associate Professor J. J. O'DWYER; for servicing courses, Associate Professor J. F. McCONNELL; for Optometry courses, Associate Professor J. LEDERER.

Calendar of Dates

1963

First Term ..... **March 4th to May 11th**
Second Term ..... **May 27th to August 3rd**
Third Term ..... **August 26th to November 2nd**
Annual Examinations ..... **November 9th to 30th**

January —
Tuesday 29 to
Saturday 9 Feb. ..... Deferred examinations (all courses).

February —
Monday 18 ..... Enrolment Week commences for new First Year students.
Monday 25 ..... Enrolment Week commences for students re-enrolling.

March —
Monday 4 ..... Public holiday.
Tuesday 5 ..... Lectures commence .
Friday 29 ..... Last day for acceptance of enrolments.
Conferring of degrees — Wollongong College.

April —
Friday 5 ..... Conferring of degrees — Newcastle College.
Friday 12 to
Monday 15 ..... Easter Holidays.
Friday 19 ..... Conferring of Degrees — First ceremony.
Wednesday 24 ..... Conferring of Degrees — Second ceremony.
Thursday 25 ..... Anzac Day — Public Holiday.

May —
Wednesday 1 ..... Conferring of Degrees — Third ceremony.
Saturday 11 ..... First Term ends.
Monday 13 to
Saturday 25 ..... Vacation (2 weeks).
Monday 27 ..... Second Term commences.

June —
Monday 10 ..... Queen's Birthday — Public Holiday.

August —
Friday 2 ..... Last day for acceptance of applications for examinations — thirty-week courses.
Saturday 3 ..... Second Term ends.
Monday 5 to
Saturday 24 ..... Vacation (3 weeks).
Monday 26 ..... Third Term commences.

October —
Monday 7 ..... Six Hour Day — Public Holiday.

November —
Saturday 2 ..... Lectures cease.
Saturday 9 ..... Annual Examinations begin.
Saturday 30 ..... Annual Examinations end.

1964

January —
Tuesday 28 to
Saturday 8 Feb. .... Deferred examinations (all courses).

February —
Monday 17 ..... Enrolment Week commences for new First Year students.
Monday 24 ..... Enrolment Week commences for students re-enrolling.

March —
Monday 2 ..... First Term Lectures commence.

Introduction

One of the minor difficulties of a student's life is to find information about the courses he is taking, the fees he is required to pay and the people to whom he can go for guidance.

Much of this information can be found in the University Calendar, which should be consulted as the authority on many subjects. However, its pages contain much information which is not relevant to the more simple inquiries, and in some cases the detailed information requires a certain amount of practical knowledge in interpretation.

This Handbook is an attempt to bridge the gap between the Calendar and the student. In it are the courses offered by the Faculty of Science, and lists of the senior members of the academic staff of the various schools within the Faculty are given. The Admissions Office is in most cases the first point of contact between the student and the University. Its functions and the help it can give are outlined below.

The educational pre-requisites for entrance to the various courses, and the fees which are payable, are to be found in this handbook. Lists of text-books, scholarships and prizes are included under the headings of the schools.

Finally, the names of the people to consult on educational matters within the schools are given.

It should be noted that the University Calendar, published annually, has a full list of Courses and the conditions which apply to them and the handbook is a general guide rather than a final authority.

W. J. DUNSTAN,

For the Science Handbook Committee.

General Information

REQUIREMENTS FOR ADMISSION

Candidates may qualify for entry to undergraduate courses by complying with the matriculation requirements set out below at the Leaving Certificate Examination held by the Department of Education or the Matriculation Examination conducted by the University of Sydney.

The Leaving Certificate Examination is usually held in November, and entries must be lodged with the Department of Education during August.

The Matriculation Examination is held in February, and applications must be lodged at the University of Sydney during the first ten days of January, except by candidates who have taken the Leaving Certificate Examination in the previous November. The closing date for such candidates will be announced when the Leaving Certificate results are published.

The following matriculation requirements operate from 1st January, 1961, but candidates will be permitted to qualify for entry under the requirements which were current in 1960 until March, 1964; these requirements are set out below the new requirements.

New Requirements

(To operate from 1st January, 1961)

1. (i) A candidate for any first degree of the University must satisfy the conditions for admission set out hereunder before entering upon the prescribed course for a degree. Compliance with these conditions does not in itself entitle a student to enter upon a course.

   (ii) A candidate who has satisfactorily met the conditions for admission and has been accepted by the University shall be classed as a "matriculated student" of the University after enrolment.

   (iii) A person who has satisfactorily met the conditions for admission may on the payment of the prescribed matriculation fee be provided with a statement to that effect.

2. (i) For the purpose of matriculation approved subjects* are grouped as follows:—

   A. English.

   B. Latin, Greek, French, German, Italian, Hebrew, Chinese, Japanese, Russian, Dutch, Geography, Ancient History, Modern History, Economics.

* It should be noted that certain subjects taken for the Leaving Certificate are not approved subjects for admission to the University of New South Wales.

C. Mathematics I, Mathematics II, Mathematics III**.
D. Agriculture, Applied Mathematics, General Mathematics**, Biology, Botany, Chemistry, Physics, Geology, Physics and Chemistry, Physiology, Zoology.
E. Accountancy, Art, Descriptive Geometry and Drawing, Music, Theory and Practice of Music.

(ii) In order to satisfy the conditions for admission to undergraduate courses leading to a degree, candidates must pass the New South Wales Leaving Certificate Examination conducted by the Department of Education, or the University of Sydney Matriculation Examination in at least five approved subjects at the one examination; provided that:—

I. either—

(a) the five subjects include English and at least one subject from each of Groups B and C, but do not include more than one subject from Group E, except that candidates may qualify for admission to the Faculty of Arts only, by passing in one subject from Group D in lieu of the subject from Group C;

or (b) the five subjects include English, and at least one subject from either Group B or Group C, but do not include more than one subject from Group E, and provided further that the five passes include either one first class Honours and two A's or two Honours of which one is first class; and:—

II. (a) neither Physics nor Chemistry is offered with the combined subjects Physics and Chemistry;

(b) neither Botany nor Zoology is offered with Biology;

(c) neither Botany nor Zoology nor Biology is offered with Physiology;

(d) neither Mathematics I nor Mathematics II nor Mathematics III is offered with General Mathematics;

(e) neither Mathematics I nor Mathematics II is offered with Mathematics III;

(f) Mathematics I or Mathematics II may be counted as an approved subject only if the candidate presented himself for examination in both Mathematics I and Mathematics II;

** *Provisional* matriculation status may be granted to candidates who pass in General Mathematics at the 1962 Leaving Certificate Examination, the subject General Mathematics in this case being regarded as a Group C subject. This is a special concession and will not apply in subsequent years.

(g) Theory and Practice of Music is accepted only in cases where the pass was obtained at an examination in 1946 or subsequent years;

(h) Ancient History is acccepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years; and further, both Modern History and Ancient History may be offered as qualifying subjects at the examinations held at the end of 1951 and subsequent years;

(i) Agriculture is accepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years;

(j) Economics is accepted only in cases where the pass was obtained at an examination held in 1947 or subsequent years;

(k) Descriptive Geometry and Drawing is accepted only in cases where the pass was obtained at an examination held in 1954 or subsequent years.

(iii) Candidates who have satisfactorily met the matriculation requirements of the University of Sydney, but who have not obtained the requisite pass in Mathematics where prescribed for entrance to the University of New South Wales, will be permitted to complete their qualifications to enter the University of New South Wales by passing only in a Mathematics subject from Group C, at a subsequent Leaving Certificate or University of Sydney Matriculation Examination.

Old Requirements

(Current to March, 1964)

Compliance with these requirements will qualify for entry to the University until March, 1964.

I. Applicants for entry to undergraduate courses leading to a degree may satisfy entrance requirements by passing the New South Wales Leaving Certificate Examination or the University of Sydney Matriculation Examination in at least five subjects at one examination*, of which one must be English and one other must be Mathematics I, or Mathematics II, or Mathematics III**, three other subjects being chosen from the following groups, at least one of the three being from Group A:—

Group A.—Latin, French, Greek, German, Italian, Hebrew, Chinese, Japanese, Russian, Dutch, Geology,

* It should be noted that certain subjects taken for the Leaving Certificate are not approved subjects for admission to the University of New South Wales.

** *Provisional* matriculation status may be granted to candidates who pass in General Mathematics at the 1962 Leaving Certificate Examination. This is a special concession and will not apply in subsequent years.

Geography, Agriculture, Economics, Modern History, Ancient History, Combined Physics and Chemistry, Physics, Chemistry, Physiology, Biology, Botany and Zoology.

*Group B.—Applied Mathematics, Music, Theory and Practice of Music, General Mathematics, Mathematics I, Mathematics II, Mathematics III, or Descriptive Geometry and Drawing.

II. Candidates who have presented themselves for the Leaving Certificate Examination or the University of Sydney Matriculation Examination in five or six subjects selected in accordance with the requirements prescribed in I and who have passed in English and a Mathematics and two other of the subjects may be granted admission provided that they have been awarded A passes or passes with Honours in at least three of these four subjects.

The other provisions set out in the new requirements above also apply.

FEES FOR UNDERGRADUATE COURSES**

Course Fees

Where course fees are assessed on the basis of term hours of attendance the hours for each subject for purposes of fee assessment shall be those prescribed in the Calendar, irrespective of any variation from the prescribed hours which may be necessary in conducting the subject.

For the purpose of fee determination for courses in the Faculty of Science assessment is on a term basis. A full-time course fee will be charged for any term where more than 15 hours' per week instruction, etc., is involved.

(i) Full-time Course Fee (more than 15 hours' attendance per week)—£48 per term.

(ii) Part-time Course Fee (over four hours' and up to 15 hours' attendance per week)—£24 per term.

(iii) Part-time Course Fee (four hours' or less per week attendance)—£12 per term.

(iv) Thesis Fee—Students who have completed the final examinations but have a thesis still outstanding are required to pay £10 per annum (no term payment).

Miscellaneous Subjects

Undergraduate subjects taken as "miscellaneous subjects" (i.e., not for a degree or diploma) or to qualify for registration as a candidate for a higher degree are assessed on an hourly basis in accordance with the schedule above.

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* *Provisional* matriculation status may be granted to candidates who pass in General Mathematics at the 1962 Leaving Certificate Examination. This is a special concession and will not apply in subsequent years.

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

Students given approval to enrol in a miscellaneous subject or subjects in addition to being enrolled in a course are assessed according to the total hours of attendance as if the additional subject(s) formed part of the course.

Other Fees

In addition to the above course fees, all registered undergraduates are required to pay:

Matriculation Fee—£3—payable at the beginning of first year.

Library Fee—£5—payable yearly.

University of New South Wales Students' Union—£2—payable yearly.

University of New South Wales Sports Association—£1—payable yearly.

University Union—£6—payable yearly.

Graduation Fee—£3—payable at the completion of course.

Thesis Fee—£10—payable yearly by students who have completed the final examinations but still have a thesis outstanding (no term payment).

Chemistry Kit Deposit—£4 per kit. (Up to £3 refundable on return of kit in a satisfactory condition.)

Excursion Fee—£1 per subject (biology, botany, zoology, entomology).*

Special Examination Fees

Deferred examination—£2 for each subject.

Examinations conducted under special circumstances—£3 for each subject.

Review of Examination results—£3 for each subject.

Completion of Enrolment

All students are required to complete enrolment during the prescribed enrolment period**. Failure to do so will incur a late fee of £1.

First year students (including students repeating first year) must complete enrolment (including fee payment) before they are issued with class timetables or permitted to attend classes.

Fees should be paid during the prescribed enrolment period, but will be accepted without payment of a late fee during the first two weeks of first term. Fees paid between the beginning of the third week of term and the 31st March are subject to a late fee of £3. *Fees will not be accepted (i.e., enrolment cannot be completed) after 31st March* except with the express approval of the Registrar, which will be given in exceptional

* Students in the original Applied Biology degree course pay an excursion fee of 10/- per subject for Botany, Zoology or Entomology.

** The enrolment periods for Sydney students are prescribed annually in the leaflets "Enrolment Procedure for New Students" and "Enrolment Procedure for Students Re-enrolling".

circumstances only. Where this approval is given, a late fee of £5 applies.

Payment of Fees by Term

Students who are unable to pay their fees by the year may pay by the term, in which case they are required to pay first term course fees and other fees for the year within the first two weeks of first term. Students paying under this arrangement will receive accounts from the University for second and third term course fees. These fees must be paid within the first two weeks of each term: otherwise a late fee is incurred—£3 on fees paid in the third or fourth weeks of term and £5 on fees paid in the fifth or sixth weeks.

Assisted Students

Scholarship holders or Sponsored Students who have not received an enrolment voucher or appropriate letter of authority from their sponsor at the time when they are enrolling should complete their enrolment by paying their own fees. A refund of fees will be made when the enrolment voucher or letter of authority is subsequently lodged with the Cashier.

Extension of Time

Any student who is unable to pay fees by the due date may apply in writing to the Registrar for an extension of time. Such application must state year or stage, whether full-time or part-time and the course in which the applicant wishes to enrol, and must also state clearly and fully the reasons why payment cannot be made and the extension sought. This application must be lodged before the date on which a late fee becomes payable. Normally the maximum extension of time for the payment of fees is until 31st March for fees due in first term and for one month from the date on which a late fee becomes payable in second and third terms.

ENROLMENT PROCEDURE FOR UNDERGRADUATE COURSES

The enrolment procedure for the different classes of undergraduate students is as follows:

First Enrolment.—Students seeking to enrol in 1963 with the University for the first time should note the following:—

1. Preliminary applications for enrolment must be made where possible in person to the Student Enrolment Bureau, 1st Floor, Building F, Kensington, as soon as the results of the Leaving Certificate Examination are published, but not later than January 25.

   Country residents should write to the Registrar, P.O. Box 1, Kensington, for a form on which to make their preliminary application. This form should be returned not later than January 25.

2. *First Year Repeats.*—First Year students who failed in all subjects at the 1962 Annual Examinations who were not given any deferred examinations and who are not liable to be excluded, must attend the Student Enrolment Bureau between the date of publication of the Leaving Certificate results and the 25th January if they wish to re-enrol.
3. Enrolment Week for new students begins February 18. Each applicant will be given an appointment for a time in that week, when he will report to the Enrolment Bureau.*
4. *Late Enrolments.*—In special circumstances, and providing class places are still available, the University may accept late enrolments made before March 31. Late application should be made in person to the Admissions Office, Main Building, Kensington, as early in the first term as possible. Students enrolling late will normally be required to pay late fees in accordance with the details set out in the section on fees.

Complete details of the enrolment requirements are contained in the booklet "Enrolment Procedure for New Students", which may be obtained at the Enrolment Bureau when making application to enrol.

Later Year Enrolments.—All students enrolling other than for the first time should do so through the appropriate school. Full-time students, other than those in the Science course, must attend at the time and place during Enrolment Week as set out in the booklet published each year, "Enrolment Procedure for Later Year Students". Enrolment forms for these students will be prepared and available at the enrolment centre.

All part-time students in the Faculty of Science and all full-time and part-time students in the Science course are required to complete an enrolment form in the last fortnight of third term setting out the subjects they expect to take in the following year. The forms may be obtained from the graduate assistant to the Dean (Miss Ayre, School of Applied Psychology) or from the office of the School of Chemistry (Mr. A. Funnell). An appointment will then be made to complete enrolment during Enrolment Week at the beginning of the academic year in accordance with the special arrangements made by the individual schools. These arrangements are published in the booklet, "Enrolment Procedure for Later Year Students".

A late fee of £1 will be incurred by students failing to enrol during Enrolment Week.

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* Applicants who cannot keep their appointment should attend at the Enrolment Bureau on Thursday, 28th February, between 2 p.m. and 5 p.m. or 6 p.m. and 8 p.m. Students enrolling on this Thursday will incur a late fee of £1.

Conversion Course Enrolments.—Enrolment in conversion courses must commence with an application to the Registrar for admission, and the applicant will be notified of the subsequent procedure.

Students who have completed the final examinations but have a thesis still outstanding are required to enrol for the period necessary to complete the thesis and to pay the requisite fees.

While course details must be completed during Enrolment Week, fees may be paid without penalty by re-enrolling students up to the end of the second week of term. A late fee of £3 is charged where fees are paid between the beginning of the third week of the first term and the 31st March.

No enrolments will be accepted after the 31st March without the express approval of the Registrar, which will be given in exceptional circumstances only.

Student Registration Card

When enrolment forms have been submitted to the University Cashier he will return to the student a Registration Card. Students are required to carry this card with them as evidence that they are entitled to the rights and privileges afforded by the University.

RESTRICTION UPON STUDENTS RE-ENROLLING IN UNIVERSITY COURSES

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. These rules will be applied retrospectively from January, 1962, and the attention of students is drawn to them.

(i) As from 1st January, 1962, a student shall show cause why he should be allowed to repeat a subject in which he has failed more than once. (Failure in a deferred examination as well as in the annual examination counts, for the purpose of this regulation, as one failure).

(ii) Notwithstanding the provisions of Clause (i), a student shall be required to show cause why he should be allowed to continue a course which he will not be able to complete in the time set down in the following schedule:

Number of years in course	*Total time allowed from first enrolment to completion (years)*
3	5
4	6
5	8
6	9
7	11
8	12

(iii) No part-time student shall, without showing cause, be permitted to continue a course unless all subjects of the first two stages of his course are completed by the end of his fourth year of attendance and all subjects of the third and fourth stages of his course by the end of his seventh year of attendance.

(iv) A student who has a record of failure in a course at another University shall be required to show cause why he should be admitted to this University.

(v) Any student excluded under any of the Clauses (i)-(iii) may apply for re-admission after two academic years and such application shall be considered in the light of any evidence submitted by him.

(vi) A student wishing "to show cause" under these provisions shall do so in writing to the Registrar. Any such application shall be considered by the Professorial Board, which shall determine whether the cause shown is adequate to justify his being permitted to continue his course or re-enrol, as the case may be.

(vii) The Vice-Chancellor may, on the recommendation of the Professorial Board, exclude from attendance in any particular course any student who has been excluded from attendance in any other course under the rules governing re-enrolment and whose record at the University demonstrates, in the opinion of the Board and the Vice-Chancellor, the student's lack of fitness to pursue the course nominated.

SCHOLARSHIPS AND CADETSHIPS

Students undertaking courses in the Faculty of Science are eligible to apply for the following scholarships or cadetships:

University Scholarships

The University offers the following Scholarships:—

(1) *For students who have completed Trade Courses (Department of Technical Education).*

Ten scholarships tenable in degree or diploma courses may be awarded annually to students who have completed a trade course and have qualified for admission to a degree or diploma course within three years of the completion of the trade course. The scholarships shall be awarded on the results of the examination qualifying for entrance.

(2) *For part-time students who have taken the Qualifying and Matriculation Course of the Department of Technical Education.*

Ten scholarships tenable in degree or diploma courses may be awarded annually to part-time students who have taken the Qualifying and Matriculation course of the

Department of Technical Education, the awards to be made on the results of the Leaving Certificate Examination.

(3) *For candidates at the Leaving Certificate Examination.*

Fifteen scholarships tenable in degree or diploma courses may be awarded annually on the results of the Leaving Certificate Examination.

The scholarships shall be awarded under the following conditions:—

(a) A scholarship holder shall be eligible for enrolment in the course selected and will be exempt from payment of University course fees during the currency of the scholarship.

(b) A student may hold only one scholarship at a time.

(c) The University shall have the power to withhold the award of any scholarship if the applicants are of insufficient merit.

(d) Any scholarship may be withdrawn if the progress or conduct of the holder is unsatisfactory.

(e) The holder of a scholarship in any course of part-time instruction must be actively engaged in the relevant trade or profession for which the course has been established.

(f) A scholarship that has been forfeited or withdrawn may be offered to another candidate.

(g) Only results obtained in the year in which the scholarship competitions are conducted may be considered.

(h) Scholarships available on the Leaving Certificate Examination will be awarded in order of merit as shown by the highest aggregate marks in six papers, including those specified for the particular scholarships.

(i) Scholarships available to students who have taken the Qualifying and Matriculation Course of the Department of Technical Education will be open only to candidates at the Leaving Certificate Examination who have been bona fide part-time students during the year in which they have taken the examination and shall be awarded in order of merit as shown by the highest aggregate marks in five papers.

Application for these scholarships, on forms obtainable from the Registrar, must be lodged with the Registrar after publication of examination results and the announcement of the award of Commonwealth Scholarships, but not later than 31st January each year.

University Cadetships

The University may award annually up to six cadetships to students proceeding to a first degree with honours in Mathematics or Physics. The cadetships may be awarded either to matriculated students wishing to enrol in either of these courses or to students already enrolled in an appropriate course. The allowance for each cadetship is £440 per annum, the holder to be exempt from course fees. Compulsory miscellaneous fees, however, will be deducted from the allowance. On graduation a cadet may be required to take up an academic position with the University for up to three years, during which time he will have the opportunity to read for a higher degree, and cadets are required to enter into a bond to this effect. A cadetship may not be held concurrently with a Commonwealth Scholarship.

Mathematics: Three cadetships available for students wishing to specialise in Mathematics or Mathematical Statistics in the Science course.

Physics: Three cadetships available for students wishing to major in Physics in the Science course.

Commonwealth Scholarships

There are three types of scholarships, which are available for both Pass and Honours courses—

(a) *Open Entrance Scholarships:* These are awarded on the results of the Leaving Certificate Examination to students who are under 25 years of age on 1st January of the year in which the course is commenced and are available for full-time or part-time courses.

(b) *Scholarships for the Second or Later Years of a Course:* Full-time students who have completed at least the first year of their course without failure are eligible to apply.

Part-time students must have completed, without failure, at least the first two years of their part-time course equivalent to one year of full-time study. Applicants intending to proceed full-time are given preference over those who intend to proceed part-time.

Scholars who have had failures in the first year of a full-time course, or in the first two years of a part-time course, are not eligible for a Second or Third Year Scholarship, but they may apply for a Fourth Year Scholarship if they have retrieved their failure and maintained satisfactory progress in the second and third years of the course.

Age requirements are the same as for open entrance.

(c) *Mature Age Scholarships:* Applicants for these scholarships who desire to commence a course must be over

the age of 25 years and under the age of 30 years on the 1st January of the year for which the scholarship is desired. Applicants who have completed part of the desired course must have been under 30 years of age on 1st January in the year in which they commenced their course, and must be over the age of 25 years on or before 1st January of the year to which their scholarship will be applied.

In the case of each type of scholarship certain residential requirements must also be met by persons not of Australian birth.

Benefits

Scholars receive the following benefits:—

(a) tuition fees;
(b) examination fees;
(c) matriculation fees;
(d) degree fees;
(e) other compulsory fees such as union fees, sports union fees and non-refundable laboratory fees.

NOTE: The cost of instruments, books, excursions or accommodation is not covered.

Living Allowance

Full-time students may apply for a living allowance, which is subject to a means test. The maximum allowances are £234 per annum for students living at home and £364 per annum for students living away from home. Scholars may earn up to £2/10/- per week without effect on the living allowance.

Mature Age and other independent scholars may receive the maximum living allowance, plus additional benefits for dependants. Single scholars in this group may earn up to £3 per week, married scholars up to £6 per week, without effect on their living allowance. Amounts earned in excess of this permissible income are deducted from the living allowance.

The closing date for applications for Commonwealth Scholarships is November 30th of the year immediately preceding the year for which the scholarship is desired. Applications for renewal of scholarship must be made before 31st October each year. Further information, application forms and the Commonwealth Scholarship Handbook may be obtained from the Officer-in-Charge, University Branch Office, Department of Education, University Grounds, University of Sydney (telephone 68-2911).

The John Heine Memorial Scholarship

Students qualified to enrol in the third year of the full-time Applied Chemistry Course or in the Applied Chemistry Conversion Course, and who are employees of a member of

the Metal Trades Employers' Association are eligible to apply for the John Heine Memorial Scholarship.

The scholarship has a total value of £250, which is paid at the following rates:—

(i) Final two years of the Applied Chemistry Degree Course:
  1st year £100
  2nd year £150

(ii) Applied Chemistry Conversion Course:
  1 full-time year £250
  2 part-time years
    1st year £100
    2nd year £150

Application should be made not later than 31st January of each year to the Secretary, John Heine Memorial Foundation, c/o Metal Trades Employers' Association, 101 Walker Street, North Sydney.

State Bursaries and Exhibitions

A number of exhibitions and bursaries are awarded by the New South Wales Government on the results of the Leaving Certificate Examination.

The award of an exhibition exempts the student from payment of fees. Bursaries are awarded subject to the applicant holding an exhibition and satisfying a means test. They are tenable for the duration of one First Degree Course, and provide a living allowance of £65 per annum (£104 per annum if the student is living away from home), and a book allowance of £10 per annum. The permissible income of the applicant's family is £1400 if there are three or fewer dependants, with an increase in the permissible family income of £140 for each additional dependant. Bursary holders are allowed to engage in employment only when it is associated with the course, and the income from such employment must not exceed £300 per annum. Further information can be obtained from the Bursary Endowment Board, c/o Department of Education, Bridge Street, Sydney.

Traineeships and Cadetships

Traineeships and cadetships are offered by the N.S.W. Public Service Board and by the Commonwealth Public Service.

These traineeships make it possible for selected employees of the Commonwealth or State Public Services to undertake full-time University study.

Students receive a salary during their years at the University and are required to undertake their industrial training with the department in which they are employed. Full details of cadetships and traineeships available at any one time may be had, in the case of the State authorities, from the N.S.W. Public

Service Board, 19 O'Connell Street; and in the case of the Commonwealth authorities, from the Employment Officer, Commonwealth Public Service Inspector's Office, 119 Phillip Street, Sydney (telephone BW 5701).

Department of Railways Cadetships

The Department of Railways each year offers cadetships in Chemistry. Cadet chemists are enrolled in the appropriate part-time course leading to the degree of B.Sc. and are required to enter into a bond of £500 to remain in the employ of the Department for five years after completion of the cadetship. Cadets have their course fees paid and receive a salary in accordance with the award rates.

The following salaries were in effect in September, 1962:—

1st Year	2nd Year	3rd Year	4th Year	5th Year
£532	£643	£731	£806	£901

Upon reaching the age of 21, cadets receive a salary of £935.

Vacancies for cadets are advertised between November and January and full details are given in a brochure available during this period from the Employment Personnel Officer, Department of Railways, 509 Pitt Street, Sydney.

Sponsored Students

Many private industrial and commercial organisations sponsor students in Science courses. The conditions under which students are sponsored vary from company to company, but in general the company meets all compulsory fees. Industrial training is generally undertaken with the sponsoring company.

Students are advised to consult the Admissions Office or the Student Counsellor at Kensington, for further details concerning scholarships and cadetships and for information concerning companies sponsoring students.

ADMISSIONS OFFICE

The Admissions Office will provide intending students (both local and overseas) with information regarding courses, admission requirements, scholarships and enrolment.

Applications for special admission or admission with advanced standing to courses should be made at the Admissions Office. Local residents should apply prior to 31st December of the year preceding that in which admission is sought. Where applicable documentary evidence should be tendered with applications, and copies should accompany original documents, as this will allow the immediate return of the latter. Students applying from overseas for admission to undergraduate courses and to those post-graduate courses which require completion of formal lecture courses should lodge their applications prior to 1st November of the year preceding that in which admission is sought.

The Admissions Office 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 commencement 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 operates an Enrolment Bureau for undergraduate students enrolling in the University for the first time. Details of the procedure to be followed by such students will be published in the preamble to the Leaving Certificate Examination results (see section on enrolment procedure for undergraduate courses).

The Admissions Office is located in the Main Building at Kensington, telephone 663-0351. Office hours are from 9 a.m. to 5 p.m. Monday to Friday, although an evening service is provided during the enrolment period.

THE UNIVERSITY UNION

Warden—A. T. Cuningham, B.Ec. (Syd.)

The University Union is located near the entrance to the Kensington campus from Anzac Parade. The Union Building, of a striking circular design, was officially opened on 27th July, 1961, by Dr. J. Vernon, O.B.E., B.Sc., Ph.D., F.R.A.C.I., Member of the Australian Universities Commission. Membership of the Union is compulsory for all registered students of the University and is also open to all members of staff.

The full range of facilities provided by the Union include a cafeteria service and other dining facilities, a large shopping centre, cloak room, banking and hairdressing facilities, showers, a women's lounge, common rooms, games rooms, reading rooms, etc.

The constitutional objects of the Union are "to create opportunities to encourage the development of social and intellectual intercourse between members of the Union; to provide premises and other amenities which shall be the common meeting ground and social centre for members of the Union; to provide facilities for the refreshment, entertainment, recreation and convenience of members of the Union; to secure the co-operation of members of the Union in furthering the interests of the University; to generally organise and direct such activities as may be deemed appropriate for giving expression to the interests of members of the Union or for carrying out any of the objects aforesaid".

Life membership of the Union is available under certain conditions.

Courses in the Faculty of Science

The courses available within the Faculty of Science are of two types. The first is the Science Course, which allows a student to select sequences from a variety of the sciences. The regulations governing this course and the list of subjects available appear on page 30ff. The course is of three years' duration for a pass degree with an additional year for Honours. The course may also be taken on a part-time basis normally requiring a minimum of seven years' study.

The second type of course offered by the Faculty consists of the more specialised courses in Applied Chemistry, Applied Psychology and Optometry. The Applied Chemistry and Applied Psychology courses lead to the degree of Bachelor of Science and the Optometry course to the degree of Bachelor of Optometry. The Applied Chemistry course may be completed in three years of full-time study or six years of part-time study; additional time is required for Honours. The Applied Psychology course, formerly a part-time course only, was revised at the end of 1962, and in 1963 both full-time (four years) and part-time (six years) courses will be offered at Pass or Honours level. Only the first year of the new Applied Psychology courses will be offered in 1963, and for students who commenced prior to 1963 the old part-time course of five years (pass) or six years (honours) will continue to operate. The Optometry course is a four-year full-time course.

In previous year, the Faculty has offered courses in Applied Biology and Applied Physics. These courses have been withdrawn and students wishing to specialise in Physics or in the Biological Sciences must now do so within the framework of the Science course.

Details of the three special courses mentioned above are given under the titles of the Schools which provide them.

COMMON FIRST YEAR

All students in the Faculties of Science, Applied Science, Medicine and Engineering are required, in their first year to pass in Mathematics I, Physics I and Chemistry I, together with an elective subject. A great advantage of this system is that a student who is undecided as to which course he would ultimately like to follow may delay his decision for a year without any loss in seniority in his course. The range of possible courses open to a student depends on his choice of the elective, of which there are four: Engineering I, General Biology, Geology I, Psychology I.

The table below sets out the courses that a student may follow when he has chosen a particular elective subject.

Elective	Courses	
Engineering I	Applied Chemistry	Electrical Engineering
	Science	Fuel Technology
	Industrial Chemistry	Industrial Engineering
	Polymer Science	Mechanical Engineering
	Ceramic Engineering	Metallurgy
	Ceramics	Mining Engineering
	Chemical Engineering	Naval Architecture
	Aeronautical Engineering	Surveying
	Civil Engineering	Textile Technology
General Biology	Applied Chemistry	Medicine
	Science	Optometry
	Food Technology	Wool Technology
Geology I	Applied Chemistry	
	Science	
	Applied Geology	
Psychology I	Science	

Students seeking to transfer to the Faculty of Medicine at the end of first year should note that entry into second year of the medical course is selective and that successful completion of the four first year subjects does not guarantee a place in the course. Applications for entry to second year of the medical course must be lodged with the Registrar by 30th November of the year preceding that for which enrolment is being sought.

Rules Relating to Common First Year Subjects in the Faculties of Applied Science, Medicine, Science, and Engineering

1. Each student intending to follow any course leading to the degree of Bachelor in any of the Faculties of Science, Applied Science, Medicine or Engineering, must have satisfied the examiners in the subjects of 1.001 Physics I, 2.001 Chemistry I, 10.001 Mathematics I, and in a fourth subject (elective) chosen from 5.001 Engineering I, 7.511 Geology I, 12.011 Psychology I or 17.001 General Biology, before progressing further in his course, except that progression may be permitted with outstanding subjects if Faculty regulations permit.
2. Notwithstanding Faculty regulations to the contrary, full-time students will be required to complete the four subjects of Rule 1 in not more than two years' study and part-time students in not more than four years' study. The re-enrolment of students who have not complied with this rule shall be subject to the General Regulations governing re-enrolment.

3. At enrolment, each student to whom Rule 1 applies will be required to nominate and apply for admission to the course which he desires to follow. Although application for transfer from one course to another within these Faculties may be made at any time, students are advised that such transfers are most readily effected prior to re-enrolment in the second year of full-time courses and the third stage of part-time courses. All such transfers will be subject to the regulations of relevant Faculties and the concurrence of the Professorial Board.

TRANSFERS AND CLAIMS FOR ADVANCED STANDING

Students wishing to transfer from a course conducted by one school to a course conducted by another must make application to the Admissions Office as soon as possible and preferably before Enrolment Week. The Admissions Office will give each applicant an acknowledgment of his application to transfer.

Having made application to the Admissions Office, students transferring are required to attend the School Enrolment Centre at the time set down for the year/stage of the new course in which they expect to enrol. They must present the letter granting approval of the transfer to the enrolling officer. However, students transferring to any year of the Science course are required to attend the Science Enrolment Centre between 6.00-8.30 p.m. on Friday, 1st March, 1963.

Students who have not received a letter granting approval to the transfer before the date on which they are required to enrol must present their acknowledgment to the enrolling officer, who will decide whether to permit them to attend classes provisionally in the new course. Students who are permitted to attend classes provisionally should not pay fees until they have received their letter granting formal approval to transfer.

Students claiming advanced standing (exemptions from subjects) by reason of courses completed in other places should do so by applying to the Registrar on the appropriate form. Copies of the form may be obtained from the Admissions Office.

HONOURS COURSES

In general, Honours degrees are awarded after one year of extra study for full-time students. The requirements of the School in which the student is to take Honours are, broadly, that (i) he apply in writing to the Head of the School in which he anticipates working, during the final year in his pass courses; and (ii) that he have a better than average record in his studies.

He will be required to complete in a satisfactory manner such courses as the Head of the School prescribes and engage in a programme of original research under the supervision of a staff member.

More precise details are given under the sections dealing with the various schools.

CONVERSION COURSES

A student who holds the Associateship of the Sydney Technical College may obtain a Bachelor's Degree by undertaking a course of study (Conversion Course) designed to bring him up to date in his subject. It will include generally Humanities and Mathematics as well as other related subjects.

Intending students for Conversion Courses should apply during the year prior to that in which they wish to take up their studies. Application should be made in writing to the Registrar, accompanied by details of his previous courses, and documentary evidence of any relevant studies taken at other institutions.

POST-GRADUATE COURSES

On completion of a first degree course (B.Sc.) the student may wish to proceed to a higher degree, usually a Master of Science degree. This usually entails two to three years' research under direction. 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.

HUMANITIES AND SOCIAL SCIENCE COURSES

All undergraduates in faculties other than Arts are required to complete a number of courses in the Humanities and Social Sciences. The Faculty of Arts is responsible for providing the courses and supervising the teaching.

A new pattern for Science students was introduced in 1961. Full-time students who began their Science course in 1961 or later will follow the programme outlined below:

Three Year Courses

First Year: No Humanities or Social Sciences.

Second Year: 50.011 English Language and Literature (60 hours).

Third Year: 51.011 History or 52.011 Philosophy (30 hours), and a Social Science Elective (30 hours).

Four Year Courses (*where applicable*)

An advanced stage in one of the following Humanities subjects must be taken, an earlier stage of the subject being a pre-requisite:

50.012	English	53.012	Sociology
51.012	History	54.012	Political Science
52.012	Philosophy	15.012	Economics
12.591	Psychology		

Part-time students will take the same programme in smaller units:—

Fourth Year: English (60 hours).
Fifth Year: History or Philosophy (30 hours).
Sixth Year: Social Science Elective (30 hours).

THE ENGLISH COURSE

The English language component will cover such subjects as the history of the English language, contemporary problems of usage, and the principles of literary criticism. The literature component will involve the critical reading of selected texts.

THE HISTORY COURSE

This is a general survey of Western civilisation from the Renaissance to the present day. The course will pay particular attention to revolutionary crises in European societies, and will analyse the contribution of these situations to modern attitudes and conditions.

THE PHILOSOPHY COURSE

A fairly detailed study of Hospers: *An Introduction to Philosophical Analysis.* The topics taken up will include such matters as the distinctions between empirical and rational knowledge, and the logical status of some important concepts, such as those of causation and free will.

The Social Science Elective

One course may be chosen from the following group: 12.191 Psychology; 53.011 Sociology; 54.011 Political Science; and 15.011 Economics.

THE PSYCHOLOGY COURSE

The aim of this course is to present a general introduction to the study of psychology as a science and to provide some understanding of human behaviour. The emphasis will be on the social and clinical aspects of the subject. Some of the more important issues revolving about the problem of personality will be selected for discussion.

THE SOCIOLOGY COURSE

The course in Sociology consists of a study of the nature of human society. The sociologist is directly concerned with the elements involved in the structure of society and its dynamic nature, and the underlying social interaction between people. During the course it will be shown that objective and scientific methods can be applied to the problems of human behaviour and human relations.

THE POLITICAL SCIENCE COURSE

This course will introduce students to the study of political institutions. (The examples of political institutions will be drawn chiefly from Australian experience.)

THE ECONOMICS COURSE

The aim of this course is to provide an introduction to elementary macro-economics.

National income accounting concepts are reviewed, the elements of employment theory are set out and some attention is given to the operation of monetary institutions and economic policy.

Advanced Elective

In four year courses an advanced stage in the Humanities must be taken and this may be selected from the following:—

50.012 English	53.012 Sociology
51.012 History	54.012 Political Science
52.012 Philosophy	15.012 Economics
12.591 Psychology	

The earlier stage of the subject chosen is a prerequisite.

The Science Course

Various arrangements of this course are available to students wishing to specialise in subjects offered by the relevant Schools. No concurrent industrial experience is required.

All subjects are available for study during the day, and most during the evening sessions.

A pass degree may be awarded after three years' full-time study and an honours degree after four years' full-time study. The normal time for a course leading to a pass degree by part-time study is seven years with an additional year full-time, or two years part-time, for a course leading to an honours degree. Some subject groupings cannot be completed in the minimum time due to the exigencies of the timetable.

Progression in the Science Course is normally permitted by subjects (but see Clause 2e below).

Any arrangements of subjects to be studied under these regulations must be approved by the Dean of the Faculty and the advice of his representatives must be sought.† A student who intends to seek admission to an Honours Course should consult the Head of the appropriate School on completion of the first year subjects. This is particularly important for those seeking Honours in Mathematics or Theory of Statistics since special studies will normally be prescribed to accompany their second year programmes. The normal requirements for admission to Honours studies in Schools of the Faculty may be found under the description of the courses offered by these Schools as set out below.

REGULATIONS GOVERNING THE SCIENCE COURSE

1. A student is required to select his course from the following groups of qualifying subjects in accordance with the provisions set out in subsequent clauses.*

		Term 1 lec. lab./tut.	*Term 2* lec. lab./tut.	*Term 3* lec. lab./tut.
(A) HUMANITIES—				
50.011	English	2 — 0	2 — 0	2 — 0
51.011	H story *or*			
52.011	Philosophy	1 — 0	1 — 0	1 — 0
12.191	Psychology *or*			
15.011	Economics *or*			
53.011	Sociology *or*	1 — 0	1 — 0	1 — 0
54.011	Political Science			

† A table of recommended patterns of subjects is given below.

* A student who selects an unusual combination of subjects, or selects subjects from more than one group in one year, may be required, owing to the exigencies of the timetable, to attend for more than the minimum number of years (this may sometimes be avoided by attendance at night classes).

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Additional for an Honours Degree				
Advanced Elective (Humanities or Social Science)		2 — 0	2 — 0	2 — 0
(B) SCIENCE SUBJECTS				
	Group I			
2.001	Chemistry I	3 — 3	3 — 3	3 — 3
10.001	Mathematics I	4 — 2	4 — 2	4 — 2
1.001	Physics I	3 — 3	3 — 3	3 — 3
7.511	Geology I	2 — 4	2 — 4	2 — 4
12.011	Psychology I	3 — 2	3 — 2	3 — 2
17.001	General Biology	2 — 4	2 — 4	2 — 4
5.001	Engineering I	3 — 3	3 — 3	2 — 4
	Group II			
2.002	Chemistry II	4 — 5	4 — 5	4 — 5
10.111	Pure Mathematics II	3 — 2	3 — 2	3 — 2
10.211	Applied Mathematics II	3 — 4	3 — 4	3 — 4
10.121	Pure Mathematics II (Higher)	6 — 0	6 — 0	6 — 0
10.221	Applied Mathematics II (Higher)	4 — 3	4 — 3	4 — 3
1.112	Physics II	4 — 4	4 — 4	4 — 4
7.512	Geology II	4 — 5	4 — 5	4 — 5
12.012	Psychology II	3 — 5	3 — 5	3 — 5
10.311	Theory of Statistics I	4 — 3	4 — 3	4 — 3
10.321	Theory of Statistics I (Higher)	5 — 3	5 — 3	5 — 3
2.042	Chemistry IIA	3 — 6	3 — 6	3 — 6
17.101	Biochemistry I	3 — 6	3 — 6	3 — 6
17.301	Botany I	3 — 6	3 — 6	3 — 6
17.401	Zoology I	3 — 6	3 — 6	3 — 6
73.011	Physiology I	3 — 6	3 — 6	3 — 6
	Group III Part (a)			
2.003	Chemistry III	4 — 10	4 — 10	4 — 10
10.112	Pure Mathematics III	4 — 1	4 — 1	4 — 1
10.122	Pure Mathematics III (Higher)	6 — 1	6 — 1	6 — 1
10.212	Applied Mathematics III	3 — 4	3 — 4	3 — 4
10.222	Applied Mathematics III (Higher)	5 — 3	5 — 3	5 — 3
1.113	Physics III	4 — 8	4 — 8	4 — 8
1.133	Mathematical Physics	5 — 1	5 — 1	5 — 1
7.513	Geology III	7 — 6	7 — 7	6 — 6
12.013	Psychology III	4 — 7	4 — 7	4 — 7
17.102	Biochemistry II	3 — 10	3 — 10	3 — 10
17.302	Botany II	3 — 10	3 — 10	3 — 10
17.402	Zoology II	4 — 9	4 — 9	4 — 9
17.201	Microbiology I	4 — 8	4 — 8	4 — 8
17.501	Entomology I	4 — 9	4 — 9	4 — 9
73.012	Physiology II	3 — 9	4 — 10	4 — 10

	Part (b)									
10.312	Theory of Statistics II	4	—	4	4	—	4	4	—	4
10.322	Theory of Statistics II (Higher)	5	—	4	5	—	4	5	—	4
2.053	Chemistry III (Supplementary)	3	—	7	2	—	8	2	—	8
1.120	Physics III (Applied)	4	—	4	4	—	4	4	—	4
7.521	Geology III (Supplementary)	4	—	8	4	—	8	4	—	8

2. (a) In order to qualify for admission to the degree of Bachelor of Science under these regulations a candidate must attend the classes and satisfy the examiners in the following subjects:

(i) the Humanities subjects listed under section 1(A),

(ii) nine Science subjects selected from the list in section 1(B).

(b) The proposed course must be approved by the Dean of the Faculty of Science or his representative during enrolment and for full-time students must include the study of Physics I, Mathematics I, Chemistry I and one other subject from Group I in the first year. In special circumstances, the Dean may grant the student permission to defer enrolment in one of the Group I subjects 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.

(c) The nine Science subjects must include:

(i) Mathematics I, Physics I, and Chemistry I.

(ii) Either one or two other subjects from Group I.

(iii) At least one subject from Group III Part (a).

(d) The following combinations of subjects may **not** be included in the course selected:

(i) both Chemistry II and Chemistry IIA;

(ii) both Pure Mathematics II and Pure Mathematics II (Higher);

(iii) both Applied Mathematics II and Applied Mathematics II (Higher);

(iv) both Pure Mathematics III and Pure Mathematics III (Higher);

(v) both Applied Mathematics III and Applied Mathematics III (Higher);

(vi) both Theory of Statistics I and Theory of Statistics I (Higher);

(vii) both Theory of Statistics II and Theory of Statistics II (Higher);

(viii) both Chemistry IIA and Biochemistry I;

(ix) both Psychology I and 12.191 Psychology (Social Science Elective).

(e) Full-time students are required to complete Mathematics I, Chemistry I, Physics I and one other Group I subject in the first two years of attendance or else show cause to the satisfaction of the Professorial Board why they should be allowed to re-enrol. The remaining subjects of the course may be completed in any order consistent with the requirements concerning pre-requisite and co-requisite subjects as set out in Section 4.

3. In general a full-time student should complete his course as follows. In particular cases, however, the Dean of the Faculty of Arts has discretion to vary the order in which the Humanities subjects are taken:

First Year

Chemistry I, Mathematics I, Physics I, and one other subject from Group I.

Second Year

(a) English

(b) Three subjects from Group II,
OR two subjects from Group II and one from Group I.

Third Year

(a) Philosophy or History; Social Science Elective

(b) Two subjects from Group III Part (a)
OR one subject from Group III Part (a) and one from Group III Part (b)
OR one subject from Group III Part (a) and one from Group II.

4. *Pre-requisites and Co-requisites**

(a) Before enrolling for any subject listed in Group II, the student shall have attended the classes and satisfied the examiners in the corresponding subject in Group I, and before enrolling for any subject listed in Group III, the student shall have attended classes and satisfied the examiners in the corresponding subject listed in Group II.

(b) Before enrolling in any subject listed in the left-hand column below, the student shall have attended the classes and satisfied the examiners in the subjects stated as pre-requisites in the right-hand column.

* In exceptional cases the Dean may, on the recommendation of the Head of the appropriate School, vary the pre-requisites and/or co-requisites set out in this section.

Subject	*Pre-requisite*
Group II—	
Chemistry IIA	Chemistry I and General Biology.
Physics II	Mathematics I.
Botany I	General Biology.
Zoology I	General Biology.
Physiology I	Physics I and Chemistry I.
Biochemistry I	General Biology and Chemistry I.
Pure Mathematics II —Either level Applied Mathematics II —Either level Theory of Statistics I —Either level	Mathematics I.
Group III—	
Physics III	*Either* Pure Mathematics II *or* Applied Mathematics II.
Botany II	Chemistry IIA or Biochemistry I or Chemistry II.
Zoology II	Chemistry IIA or Biochemistry I or Chemistry II.
Microbiology I	Either Chemistry IIA; or Biochemistry I; or Chemistry II and General Biology.
Biochemistry II	Chemistry II.
Theory of Statistics II—Either level	Pure Mathematics II—Either level.
Pure Mathematics III (Higher)	Pure Mathematics II (Higher) and one other Group II subject of the School of Mathematics.
Physics III (Applied)	Physics II.
Mathematical Physics	Pure Mathematics II and Physics II.
Entomology I	Zoology I and one of Chemistry IIA, Chemistry II or Biochemistry I.
Physiology II	Physics II.

(c) Enrolment in the subject in the left-hand column shall not be approved unless the corresponding subject or subjects listed in the right-hand column are taken concurrently or have been completed.

Subject	*Co-requisite*
Group III—	
Chemistry III (Supplementary)	Chemistry III.
Theory of Statistics II	Pure Mathematics III or Pure Mathematics III (Higher).
Geology III (Supplementary)	Geology III.

Part-time Study

5. For part-time as for full-time students subjects are offered as whole units, with the exception of Physics III and Mathematical Physics. These two subjects from Group III are still offered in sections during the evening, and the hours per week allocated to them are shown below:

	Hours for week for 30 weeks			
	lec.	lab./tut.	lec.	lab./tut.
Physics III	Part I 2	— 4	Part II 2	— 4
Mathematical Physics	Part I 2½	— ½	Part II 2½	— ½

For the benefit of part-time students who have already completed the first part of any other Science subject the second section will be offered in 1963.

6. A part-time student must select his subjects in compliance with the regulations set out above for full-time students. However, a part-time student is required to complete Chemistry I, Mathematics I, Physics I and one other Group I subject in the first four years of enrolment.

Honours Course

7. (a) A suitably qualified candidate may be admitted to an Honours course in one of the following subjects. An extra year of full-time work, or two extra years of part-time work, is required.

(i) Biochemistry
(ii) Botany
(iii) Chemistry
(iv) Geology
(v) Mathematics
(vi) Microbiology
(vii) Entomology
(viii) Physics
(ix) Psychology
(x) Theory of Statistics
(xi) Zoology
(xii) Physiology.

(b) A student desiring admission to the Honours course must apply to the Head of the appropriate School on completion of the pass degree requirements.

(c) A student proceeding to Honours in any School must attend lectures, read and engage in laboratory work as may be required by the Head of the School.

RECOMMENDED PATTERNS OF SUBJECTS IN THE SCIENCE COURSE

Chemistry Courses*

The recommended patterns of courses for a Chemistry major are:

COURSE I

Year I	**Year II**	**Year III**
Chemistry I	Chemistry II	Chemistry III
Physics I	Physics II	Chemistry III (Supplementary)
Mathematics I	Pure Mathematics II	
Geology I		
or Psychology I		
or General Biology		
or Engineering I		

* Students wishing to take Chemistry as a major subject may alternatively take the Applied Chemistry Course which also leads to a B.Sc. degree. Details are given below under "School of Chemistry".

COURSE II

Year I	Year II	Year III
Chemistry I	Chemistry II	Chemistry III
Physics I	Biochemistry I	Chemistry III (Supplementary)
Mathematics I	Botany I	
General Biology		

In addition, several variants are possible in second year, and Biochemistry II *or* Pure Maths III, etc., can replace Chemistry III (Supplementary) in third year.

Physics Courses

The recommended patterns of courses for a Physics major are:

Year I	Year II	Year III
Chemistry I	Physics II	Physics III
Physics I	Pure Mathematics II	Mathematical Physics *or* Physics III (Applied) *or* Pure Mathematics III
Mathematics I	Chemistry II *or* Theory of Statistics I *or* Applied Mathematics II	
Geology I *or* Psychology I *or* General Biology *or* Engineering I		

The Biological Sciences

The recommended patterns of courses for a major in one of the Biological Sciences are:

(a) Biochemistry

COURSE I

Year I	Year II	Year III
Chemistry I	Biochemistry I	Biochemistry II
Physics I	Chemistry II	Chemistry III
Mathematics I	Botany I	
General Biology		

COURSE II

Year I	Year II	Year III
As above	Biochemistry I	Biochemistry II
	Chemistry II	Chemistry III
	Zoology I	

(b) Microbiology

COURSE I

Year I	Year II	Year III
As above	Biochemistry I	Microbiology I
	Chemistry II	Biochemistry II
	Botany I	

COURSE II

Year I	Year II	Year III
As above	Biochemistry I	Botany II
	Chemistry II	Microbiology I
	Botany I	

(c) Botany

COURSE I

Year I	Year II	Year III
As above	Botany I	Botany II
	Biochemistry I	Biochemistry II
	Chemistry II	

COURSE II

Year I	Year II	Year III
As above	As above	Botany II
		Microbiology I

COURSE III

Year I	Year II	Year III
As above	As above	Botany II
		Chemistry III

(d) Zoology

COURSE I

Year I	Year II	Year III
As above	Zoology I	Zoology II
	Biochemistry I	Biochemistry II
	Chemistry II	

COURSE II

Year I	Year II	Year III
As above	Zoology I	Zoology II
	Biochemistry I	Botany II
	Botany I	

(e) Entomology

COURSE I

Year I	Year II	Year III
As above	Zoology I	Entomology I
	Biochemistry I	Biochemistry II
	Chemistry II	

COURSE II

Year I	Year II	Year III
As above	Zoology I	Zoology II
	Biochemistry I	Entomology I
	Botany I	

Mathematics Courses

Following are recommended patterns of courses for students taking mathematics as their major subject:

COURSE I

Year I	Year II	Year III
Chemistry I	Pure Mathematics II	Pure Mathematics III
Physics I	Applied Mathematics II	Applied Mathematics III
Mathematics I	Physics II	
Geology I		
or Psychology I		
or General Biology		
or Engineering I		

COURSE II

Year I	Year II	Year III
Chemistry I	Pure Mathematics II	Pure Mathematics III
Physics I	Theory of Statistics I	Theory of Statistics II
Mathematics I	Physics II	
Geology I		
or Psychology I		
or General Biology		
or Engineering I		

COURSE III

Year I	Year II	Year III
Chemistry I	Pure Mathematics II	Pure Mathematics III
Physics I	Physics II	Physics III
Mathematics I	Chemistry II	
Geology I		
or Psychology I		
or General Biology		
or Engineering I		

COURSE IV

Year I	Year II	Year III
Chemistry I	Pure Mathematics II	Pure Mathematics III
Physics I	Applied Mathematics II	Physics III
Mathematics I	Physics II	
Geology I		
or Psychology I		
or General Biology		
or Engineering I		

Courses III and IV are also recommended by the School of Physics.

Geology Courses

The recommended patterns of courses for a Geology major are:

First Year	Second Year	Third Year
Chemistry I	Geology II *and* any two	Geology III *and* any one
Physics I	(2) of the following:	(1) of the following:
Mathematics I	Physics II	Geology III (S)
Geology I	Pure Mathematics II	Physics III
	Chemistry II	Chemistry III*

Psychology Courses

The recommended patterns of courses for a Psychology major are:

COURSE I

Year I	Year II	Year III
Chemistry I	Psychology II	Psychology III
Physics I	Pure Mathematics II	Theory of Statistics I
Mathematics I	General Biology	
Psychology I		

COURSE II

Year I	Year II	Year III
Chemistry I	Psychology II	Psychology III
Physics I	Chemistry II	Zoology I
Mathematics I	General Biology	
Psychology I		

* Chemistry III will require some practical work outside the normal day course.

REQUIREMENTS FOR HONOURS IN THE SCIENCE COURSE

School of Applied Psychology

A student wishing to proceed to Honours in Psychology must have completed three full-time or five part-time years of psychology in his pass degree course, and have obtained at least Credit standard in Psychology II and Psychology III in order to be admitted to Honours study.

School of Biological Sciences

Students may read for Honours in the School of Biological Sciences in the subjects of Botany, Zoology, Entomology, Biochemistry and Microbiology. Students wishing to do so must apply to the Head of the School not later than 31st December of the year in which the third year of the full-time course is completed. A student who is admitted to Honours study should have achieved a generally high standard throughout the course and must have majored in the particular discipline in which the study is to be carried out.

It is desirable, but not imperative, for a student to decide as early as possible that he wants to do Honours and should consult appropriate members of staff for advice on the best course structure for his particular interests.

Honours courses will include research work, lectures and seminars, advanced reading and such additional work as may be prescribed by the Head of the School.

School of Chemistry

Students desiring to take Honours must apply to the Head of the School not later than 31st December of the year in which the third year of the full-time (sixth 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. It is desirable but not essential for admission to the Chemistry Honours course that a student should have taken both Chemistry III and Chemistry III (Supplementary) in the final year.

The major part of the work for Honours will consist of a research project which may be undertaken in any one of the six departments by arrangement with the Head of the School. Honours will, however, not be awarded in any particular branch of the subject but in the subject as a whole. Attendance will be required at such lectures and seminars as the Head of the School directs.

School of Mathematics

There are three different fourth year Honours courses in the School of Mathematics, namely, Pure Mathematics, Applied Mathematics and the Theory of Statistics.

1. Permission must be obtained to enter the fourth year course in Pure Mathematics. Such permission will not usually be granted unless the applicant has passed in Pure Mathematics III (Higher). This work should be supplemented by some extra work in Applied Mathematics or in the Theory of Statistics.
2. Permission must be obtained to enter the fourth year course in Applied Mathematics. Such permission will not usually be granted unless the applicant has passed in Applied Mathematics III (Higher) and in Pure Mathematics III or Pure Mathematics III (Higher).
3 Permission must be obtained to enter the fourth year course in the Theory of Statistics. Such permission will not usually be granted unless the applicant has passed in Theory of Statistics II (Higher) and Pure Mathematics III (Higher).

School of Physics

Students wishing to read for Honours in Physics must complete the major sequence, Physics I, Physics II and Physics III, and for acceptance into the Honours course will be expected to have attained a majority of graded passes ("Credit" or "Distinction") in these subjects. Adequate supporting performance in mathematical subjects will also be expected. In preparation for the Honours year, students would be expected to take the subjects Physics III and Mathematical Physics in their third year.

Intending candidates for Honours should apply to the Head of the School not later than 31st December in the year in which the third year is completed.

Department of Geology

Students in the Faculty of Science who have completed the two third year Geology subjects, in the case of full-time students; or the course requirements up to the end of the sixth year and whose programme includes the two third year geology subjects, in the case of part-time students, may apply to the Head of the School of Mining Engineering and Applied Geology to read for an Honours Degree in Geology. Students who have taken only one third year geology subject may also be admitted but will be required to take the equivalent of Geology III Supplementary as part of their Honours work, i.e., in lieu of (1) and (3) below. This should be regarded as a special provision for students whose two third year subjects are either Geology III and Physics III or Geology III and Chemistry III and who wish to specialise in either geophysics or geochemistry. Thesis work for such students would be restricted to a laboratory project.

The Honours course will consist of:

(1) An advanced laboratory assignment on one of the subjects taken in the third year of the course and a dissertation thereon.

(2) A field assignment together with a graduation thesis on the results of the field work.

(3) Such other work, including advanced lectures and seminars, as may be from time to time required.

Full-time students will cover the work in the fourth year of the course. Part-time students will be required to commence their field thesis work at the end of the sixth year of their course and the advanced laboratory assignment will be done in the eighth year along with the further work necessary to complete their graduation (field) thesis work.

It may be stated in addition, that students seeking to do Honours in Geology will have to satisfy the Head of the School that they have attained a sufficient standard in their pass course work as to indicate their ability to undertake geological studies at a more advanced level.

School of Physiology

Students wishing to do an honours year in Physiology should consult the Head of the School while they are doing Physiology II in the third year of their course—as early in the year as possible but certainly not later than the beginning of the third term.

The requirement for admission to the honours course is a good academic record during the pass degree course.

The honours course will include advanced training in experimental physiology and participation in one of the research projects of the School.

School of Applied Psychology

It has become a platitude that modern civilisation can command the technical power to produce all that is needed to destroy hunger, want, and fear, but it has failed to develop the social organisation and skills needed to use this power satisfyingly and effectively. There is a lag in knowledge of how to create and control a social structure which can maintain stability and its highest values whilst adapting its form to the ceaseless advance of material invention. To make an industrial society work, we must understand its human as well as technical aspects. Applied Psychology is one of the technologies concerned with such a study of human behaviour. It seeks principles to explain, understand and predict human action. It deals with practical situations but it is based on, and makes its own contributions to, a solid theoretical framework which it shares with academic psychology. It is thus both a technology and a social science.

There are increasing demands for professional psychologists in the fields of industrial psychology, personnel management, "human" engineering (the design of machines and processes allowing for the qualities of the human operator), educational and vocational guidance, clinical psychology, child development, selection and placement in the Armed Services, and teaching and research.

The School provides a four year full-time or a six year part-time course in Applied Psychology leading to the degree of Bachelor of Science with electives in clinical psychology and industrial psychology.

In addition, Psychology may be taken as a major sequence in the Science course (Subject Nos. 12.011, 12.012 and 12.013).

APPLIED PSYCHOLOGY COURSES

Prior to 1963, the B.Sc. course in Applied Psychology was offered as a part-time course over five years (pass) or six years (honours). In 1963 and subsequent years this course will continue to operate for students who commenced their course prior to 1963. Details of the course are set out in the 1962 Calendar pages 312-314 and 540-548. Students commencing their study in 1963 or subsequent years will follow the course outlined below.

The course in Applied Psychology leading to the degree of Bachelor of Science is offered on both full-time (four years) and part-time (six years) bases. It is designed to meet the needs of professional training for psychologists—it provides a firm background of psychological theory and such other sciences as are required for further study (e.g., Mathematics and Biology),

and a leavening of humanities subjects. The later years of the course lead to increasing specialisation in either industrial psychology or clinical psychology.

The elective in industrial psychology involves a study of the individual worker and of the organisations in which he works —job success and failure, job satisfaction and dissatisfaction, industrial motivation, employer-employee relations, acquisition of job skills, conditions affecting job efficiency, personnel techniques, and other matters of concern to the psychologist in industry. These will be the subject of both theoretical and practical training.

The elective in clinical psychology includes basic theoretical and practical training in some of the more common areas of clinical psychology. The various aspects of the specialisation will be concerned with professional training in the diagnosis and assessment of personality and behaviour disorders and their treatment in various fields of counselling. Training in case studies, preventative and therapeutic team work, and research in clinical psychology is also dealt with.

APPLIED PSYCHOLOGY — FULL-TIME COURSE

FIRST YEAR
(30 weeks day course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
12.011	Psychology I	3	—	2
17.011	General Biology	2	—	4
10.001	Mathematics I	4	—	2
52.151	Scientific Thought I	3	—	0
	or			
53.111	Sociology I	3	—	0
		12	—	8

SECOND YEAR
(30 weeks day course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
12.012	Psychology II	3	—	5
12.042	Psychology IIA	3	—	4
17.601	Physiology and Genetics	2	—	3
	or		or	
10.111	Pure Mathematics II	3	—	2
	or		or	
10.311	Theory of Statistics I	4	—	3
	Humanities	2	—	0
		10–12	—	11–12

THIRD YEAR
(30 weeks day course)

		Hours per week for 3 terms Lec.	Lab./Tut.
12.013	Psychology III	4	— 7
12.044	Psychology IIIA	3	— 7
	Humanities	2	— 0
		9	— 14

FOURTH YEAR
(30 weeks day course)
Industrial Course Elective

		Hours per week for 3 terms Lec.	Lab./Tut.
12.045	Psychology IV (Industrial):		
	Industrial Psychology	2	— 5
	Personnel Techniques	2	— 5
	Counselling Practice	1	— 2
	Humanities	2	— 0
		7	— 12

Clinical Course Elective

		Hours per week for 3 terms Lec.	Lab./Tut.
12.055	Psychology IV (Clinical):		
	Clinical Psychology	2	— 5
	Diagnostic Theory and Procedures	2	— 5
	Counselling Practice	1	— 2
	Humanities	2	— 0
		7	— 12

APPLIED PSYCHOLOGY — PART-TIME COURSE

FIRST YEAR
(30 weeks part-time course)

		Hours per week for 3 terms Lec.	Lab./Tut.
10.001	Mathematics I	4	— 2
52.151	Scientific Thought	3	— 0
	or		or
53.111	Sociology I	3	— 0
	Humanities	2	— 0
		9	— 2

SECOND YEAR
(30 weeks part-time course)

		Hours per week for 3 terms Lec.	Lab./Tut.
12.011	Psychology I	3	— 2
17.001	General Biology	2	— 4
	Humanities	2	— 0
		7	— 6

THIRD TO SIXTH YEARS

Details of the third, fourth, fifth and sixth years of the part-time course are under consideration.

Prizes in Psychology

The British Psychological Society Australian Branch Prize in Psychology is awarded annually to a third or later year student. Prize value is £5.

PSYCHOLOGY TEXT-BOOKS

12.011 Psychology I

Munn: *Psychology* (Houghton Mifflin), 1961, 4th ed.
Drever: *A Dictionary of Psychology* (Penguin), 1952.
and either
Crafts, et al.: *Recent Experiments in Psychology*, 1950.
or
Valentine and Wickens: *Experimental Foundations of General Psychology*, 1956.

12.012 Psychology

Hall and Lindzey: *Theories of Personality* (Wiley), 1957.
Bugelski: *A First Course in Experimental Psychology* (Holt), 1951.
or
Townsend: *Introduction to Experimental Method* (McGraw-Hill), 1953.
McGuigan: *Experimental Psychology* (Prentice-Hall), 1960.
or
Brown and Ghiselli: *Scientific Method in Psychology* (McGraw-Hill), 1955.
Hilgard: *Theories of Learning* (Appleton), 1956.
Nunnally: *Tests and Measurements* (McGraw-Hill), 1959.
Guilford: *Fundamental Statistics in Psychology and Education* (McGraw-Hill), 1956.
Asch: *Social Psychology* (Prentice-Hall), New Jersey, 1952.

12.012/1 Psychology

See 12.012 Psychology.

12.012/2 Psychology

See 12.012 Psychology.

12.013 Psychology

Osgood: *Method and Theory in Experimental Psychology* (Oxford University Press), 1953.
Brown: *Motivation of Behaviour* (McGraw-Hill), 1961.
Eysenck: *The Dynamics of Anxiety and Hysteria* (Kegan Paul), 1957.
McNemar: *Psychological Statistics* (Wiley), 1962.
or
Guilford: *Fundamental Statistics in Psychology and Education* (McGraw-Hill, 1956.
and
Thorndike: *Personnel Selection* (Wiley), 1949.
Hutt and Gibby: *Patterns of Abnormal Behaviour* (Boston Allyn and Bacon), 1958.
Guntrip: *Personality, Structure and Human Interaction* (Hogarth Press).
Cronbach: *The Essentials of Psychological Testing* (Harper), 1949.
Vernon: *Personality Tests and Assessments* (Methuen), 1953.

12.043 Psychology

See 12.013 Psychology.

12.322 Psychological Assessment

Cronbach: *The Essentials of Psychological Testing* (Harper), 1949.
Vernon: *Personality Tests and Assessments* (Methuen), 1953.

12.511 Social Psychology

Asch: *Social Psychology* (Prentice-Hall), New Jersey, 1952.

Siegal: *Non-parametric Statistics for the Behavioral Sciences* (McGraw-Hill), New York, 1956.

12.512 Social Psychology

March and Simon: *Organizations* (Wiley), New York, 1958.

12.611 Counselling Procedures

No set Text-book.

12.621 Industrial Psychology and Personnel Techniques

Van Haller Gilmer: *Industrial Psychology* (McGraw-Hill), 1961.

Brown: *Social Psychology of Industry.*

Partin: *Surveys, Polls and Samples* (Harper), 1950.

Deming: *Sample Design in Business Research* (Wiley), 1960.

Chernoff and Moses: *Elementary Decision Theory* (Wiley), 1959.

12.721 Principles of Counselling

Rogers: *Client Centred Therapy* (Houghton Mifflin), 1951.

Callis, Polmantier and Roeber: *A Casebook of Counselling* (Appleton-Century-Crofts), New York, 1955.

or

Snyder, et al.: *Casebook of Non-Directed Counselling* (Houghton Mifflin), Boston, 1947.

or

Standal and Cannell: *Critical Incidents in Psychotherapy* (Prentice-Hall), New Jersey, 1959.

12.731 Abnormal and Clinical Psychology

Hutt and Gibby: *Patterns of Abnormal Behaviour* (Boston Allyn and Bacon), 1958.

Guntrip: *Personality, Structure and Human Interaction* (Hogarth Press).

12.191 Psychology (First Social Science Elective)

Knight and Knight: *An Introduction to Modern Psychology.*

or

Munn: *Psychology.*

or

Lingren and Byrne: *Psychology.*

12.111 Psychology

Munn: *Psychology* (Houghton Mifflin), 1961, 4th ed.

12.591 Psychology (Advanced Elective)

Brown: *The Social Psychology of Industry* (Pelican).

Sprott: *Human Groups* (Pelican), 1958.

Allport: *Prejudice.*

Bowlby: *Child Care and the Growth of Love.*

Fromm: *Man for Himself.*

Packard: *The Hidden Persuaders.*

Packard: *The Status Seekers.*

Riesman: *The Lonely Crowd.*

Sargent: *Battle for the Mind.*

West: *Homosexuality.*

Whyte: *The Organisation Man.*

NOTE: Text-books for courses not listed above, and reference books for all courses will be listed during the lecture course.

School of Biological Sciences

The past few decades have witnessed spectacular development of those disciplines concerned with living organisms and with the explanation and understanding of the phenomena which they display. Not only are such basic processes as the hereditary mechanisms, the adaption of organisms to the environment, and the interconversions of matter and energy better understood, but considerable progress has been made in the rational exploitation and control of the life phenomena in a wide range of community activity. The availability of employment for the graduate in one or other of the biological sciences has expanded in a spectacular manner in recent years and may well become the most active area of scientific and technological activity in the near future.

As with other groups of related scientific disciplines, the biological sciences increasingly display a convergence and overlap of their boundaries, a situation which has been long realised in this University and assisted by the close administrative ties and the physical proximity of the principal departments concerned with their development. The principal courses offered by the School lie within the framework of the Science course and major sequences to honours level are available in Botany, Zoology, Entomology, Microbiology and Biochemistry. Post-graduate study for the Master of Science degree and for the Doctorate in Philosophy is available in each of the principal areas mentioned above. The regulations of the Science course provide a considerable degree of flexibility in the choice of subjects and the particular vocational interests of students can be met in a large degree. The advice of members of the staff should be sought concerning the best choice of subjects for particular interests.

All the biological major sequences are based on the common triad of Mathematics, Physics and Chemistry, and General Biology in the first year, and students are advised to bear in mind the increasing dependence of the biological sciences upon the physical sciences. Combinations at advanced levels of Chemistry and Biochemistry with Botany, Zoology, Entomology and Microbiology, enhance the possibilities of subsequent employment of a stimulating and interesting nature, whether it be in pure or applied research, or in the very wide range of technological fields such as public health, the food industries or agriculture.

BIOLOGICAL SCIENCES TEXT-BOOKS

17.001 General Biology

Abercrombie, Hickman and Johnson: *A Dictionary of Biology*.
Besley and Meyer: *Field Work in Animal Biology*.
Weisz: *The Science of Biology*, 1959.

17.101 Biochemistry I

Fruton and Simmonds: *General Biochemistry*, Latest Ed.

17.102 Biochemistry II

Edsall and Wyman: *Biophysical Chemistry,* Vol. 1.
Fruton and Simmonds: *General Biochemistry,* Latest Ed.
Neilands and Stumpf: *Outlines of Enzyme Chemistry,* 2nd Ed.

17.201/1 Microbiology I Part I
17.201/2 Microbiology I Part II

1. Alexopoulos: *Introductory Mycology.*
2. Burrows: *Textbook of Microbiology.*

or

Stanier, Doudoroff and Adelberg: *General Microbiology.*

17.301/1 Botany I Part I

1. Eames and McDaniels: *Introduction to Plant Anatomy,*

or

Esau: *Anatomy of Seed Plants.*

2. Daubenmire: *Plants and Environment.*

17.301/2 Botany I Part II

Daubenmire: *Plants and Environment.*
Lyon, Buckman and Brady: *The Nature and Properties of Soils.*
Meyer, Anderson and Bohning: *An Introduction to Plant Physiology.*

17.302 Botany II

Bold: *Morphology of Plants.*
Meyer, Anderson and Bohning: *An Introduction to Plant Physiology.*
Sinnott, Dunn and Dobzhansky: *Principles of Genetics.*
Walker: *Plant Pathology,* 2nd Ed.

17.401 Zoology I

Andrewartha: *Introduction to the Study of Animal Populations* (1961).
Borradaile, Eastham, Potts and Saunders: *The Invertebrata*—Revised by Kerkut, 4th Ed., 1961.
Simpson, Roe and Lewontin: *Quantitative Zoology,* 1960.
Thorpe: *Learning and Instinct in Animals,* 1956.

17.402 Zoology II

Huettner: *Fundamentals of Comparative Embryology of the Vertebrates.*
Romer: *The Vertebrate Body.*
Sinnott, Dunn and Dobzhansky: *Principles of Genetics,* 5th Ed., 1958.
Yapp: *Animal Physiology,* 2nd Ed., 1961.
Young: *The Life of Vertebrates,* 2nd Ed., 1962.

17.501 Entomology I

Imms: *A General Text Book of Entomology,* 9th Ed., 1957.
Ross: *Text Book of Entomology.*
Wigglesworth: *Principles of Insect Physiology.*

Parasitology

Cameron: *Parasites and Parasitism,* Latest Ed.

School of Chemistry

Chemistry enters into a great many phases of human activity. In primary industry it plays an essential role in the understanding of the chemistry of plants and animals and in the discovery and manufacture of fertilisers, weedicides and insecticides. Its applications in secondary industry are too numerous to classify with any degree of simplicity ranging as they do from the extraction of metals to the manufacture of drugs, dyes, plastics, glass, paints and synthetic fibres. The chemist may be concerned with matters of public health by way of the analysis of foods and drugs, with defence through a study of rocket fuels, explosives and in many other ways; with the law in relation to the patenting of chemical processes. In short, all things material fall within the purview of chemistry. The needs of chemical industry for men competent to devise and develop new processes and to improve existing ones and for men competent to operate these can best be met by different types of training.

Chemistry forms a part of many undergraduate courses offered by this University. On a full-time basis it is studied for only a year in some courses, but in others it is studied for two, three or even four years. (These figures are doubled for part-time courses.) Courses which include a study of chemistry in excess of one year (full-time) or two years (part-time) are arranged in diminishing order of their basic chemistry content, as follows: Applied Chemistry, Science (Chemistry Major), Industrial Chemistry, Polymer Science, Ceramic Engineering, Food Technology and Chemical Engineering. Textile Technology, Fuel Technology and Metallurgy courses also include chemistry in the first two years, but since the courses are not essentially chemical in nature, they will not be considered further here. A student whose main interest is chemistry is likely to be a little puzzled when first confronted with this array of courses in which chemistry is a major component and may well be uncertain which course he should do.

The School provides two main undergraduate courses whereby a specialised training in Chemistry may be obtained:

1. The Applied Chemistry Course;
2. The Chemistry Major in Science.

Both courses lead to the B.Sc. degree.

In the emphasis it places on Chemistry, the Applied Chemistry course is unique in Australian Universities. The core of the course consists of instruction in the fundamental principles of inorganic, physical, organic and analytical chemistry at a level which satisfies the requirements for professional chemists. One of the basic aims of the course is to show how the fundamental principles of

chemistry are applied to solve the problems of industry. Towards the end of the course students are given an opportunity to develop their particular interests which may be in any one of the six departments. Through its Departments of Analytical Chemistry, of Nuclear and Radiation Chemistry, and of Applied Organic Chemistry, the School provides unusual opportunities for courses of training in these specialised fields.

The Applied Chemistry Course may be taken either full-time (three years for the pass degree, four years for honours) or part-time (six years for the pass degree, eight years for the honours degree). The subject matter of each full-time year is identical with that of the two corresponding part-time years and transfer from full-time to part-time, or vice-versa, is possible. No industrial training is required for either the full-time or part-time course though it is customary for students taking the part-time course to find employment in some branch of chemical industry. **Students who intend to find a career in industry are strongly advised to do the Applied Chemistry Course.**

Graduates of the School of Chemistry who have taken the Applied Chemistry Course find employment in all the scientific and technical departments of chemical industry and are particularly well suited to employment in the research, control, development and management sections. They also find employment in universities, the C.S.I.R.O., Australian Atomic Energy Commission, Defence Research, Customs, Public Health and other State and Commonwealth Government organisations.

The School also provides courses in Chemistry which form part of the requirements of the Science Course. By taking a double major in Chemistry in the third year of the Science Course (Chemistry III and Chemistry III Supplementary), it is possible to reach a high degree of specialisation in the subject and at the same time to obtain a substantial background of supporting science subjects. Another possibility is to combine Chemistry III with a second third-year science subject such as Mathematics III, Biochemistry II or Geology III. Chemistry III combined with Mathematics III will provide a useful basis for research in X-ray crystallography or theoretical chemistry; combined with Geology III, it will be of assistance to those who later wish to specialise in geochemistry. On a full-time basis, the Science Course like the Applied Chemistry Course may be taken in three years (pass) and four years (for honours). On a part-time basis, however, the Science Course may, according to the choice of subjects, require one year longer (seven years) than the Applied Chemistry Course.

The avenues of employment are substantially the same as those listed under Applied Chemistry with one addition, namely, teaching. Of the two, the Science Course is more suitable for

teachers. This course is also more suitable for those who wish to acquire advanced knowledge of two fields of study or of borderline subjects.

The highest degree of specialisation in chemistry at the undergraduate level may be gained by taking an honours course (in either Applied Chemistry or in Science) which is aimed mainly at those whose interest is in pure or applied research and/or teaching. For students in Science, it is desirable but not essential that they should do the double major in Chemistry in order to do honours in Chemistry. Combinations of Chemistry III and Biochemistry II, Mathematics III or Geology III do, however, form a satisfactory foundation for an honours degree in Chemistry. The honours course, which is taken preferably in one full-time year, is devoted mainly to research and leads to an honours B.Sc. degree.

The first year of the Applied Chemistry course is identical with other courses in the Faculties of Applied Science, Engineering, Medicine, and Science in that the student must take Chemistry I, Physics I, Mathematics I and one other subject from Engineering I, Geology I, General Biology.

Of these four, Engineering I would give the student the widest choice of courses in his second year, should he decide to change his field of study. This applies both to full-time and part-time students.

APPLIED CHEMISTRY — FULL-TIME COURSE

This course 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 course.

FIRST YEAR

(30 weeks day course)

		Hours per week for 3 terms Lec.	Lab./Tut.
1.001	Physics I	3	— 3
2.001	Chemistry I	3	— 3
10.001	Mathematics I	4	— 2
Plus one of			
5.001	Engineering I	3	— 3
7.511	Geology I		
17.001	General Biology		
		13	— 11

SECOND YEAR
(30 weeks day course)

		Hours per week for 3 terms Lec.	Lab./Tut.
2.311	Physical Chemistry	2	3
2.341	Chemical Instrumentation*	2	1†
2.351	Chemical Calculations	1	0
2.411	Inorganic Chemistry	1	2
2.441	History of Chemistry	1	0‡
2.511	Analytical Chemistry	2	3§
2.611	Organic Chemistry	2	3
10.031	Mathematics	1	1
50.011	English	2	0
		14	13

* Alternative subject 1.212 Physics.
§ Only one hour lecture in Term 2. ‡ Term 2 only.
† Hours for Term 1 only. Terms 2 and 3: 1½ — 1½ 1 — 2

THIRD YEAR
(30 weeks day course)

		Hours per week for 3 terms Lec.	Lab./Tut.
2.322	Physical Chemistry	2	3
2.361	Applied Chemistry	1	0
2.422	Inorganic Chemistry	1	2
2.522	Analytical Chemistry	1	2
2.622	Organic Chemistry	2	5
22.131	Industrial Chemistry	2	0
51.011 / 52.011	History or Philosophy	1	0
	Social Science Elective	1	0
Plus one of			
2.211	Applied Organic Chemistry		
2.221	Applied Organic Chemistry (Food)		
2.331	Applied Physical Chemistry		
2.433	Inorganic Chemistry III	1	3
2.533	Analytical Chemistry III		
2.811	Nuclear and Radiation Chemistry		
		12	15

FOURTH YEAR (HONOURS)
(30 weeks day course)

		Hours per week for 3 terms Lec.	Lab./Tut.
2.014	Chemistry IV	3	0
	*Humanities (Advanced Elective)	2	0
	Project	0	20
		5	20

* May be chosen from the list on p. 29, provided that a previous course in the same subject has been successfully completed.

A student desiring admission to the Honours Course should apply in writing to the Head of the School as soon as possible after the completion of the pass degree requirements.

The applicant must have passed the final year of the Applied Chemistry Course and have a good academic record.*

The applicant should set out his academic record in detail and indicate in which of the following branches of the subject he would prefer to undertake research:

(1) Analytical
(2) Applied Organic
(3) Inorganic
(4) Nuclear and Radiation
(5) Organic
(6) Physical Chemistry.

APPLIED CHEMISTRY — PART-TIME COURSE

The part-time course in 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 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.

FIRST AND SECOND YEARS
(30 weeks day course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
1.001	Physics I	3	—	3
2.001	Chemistry I	3	—	3
10.001	Mathematics I	4	—	2
Plus one of				
5.001	Engineering I	3	—	3
7.511	Geology I			
17.001	General Biology			
		13	—	11

* For admission to the Honours Chemistry Course in Science, the applicant must have passed Chemistry III.

THIRD YEAR

(30 weeks part-time course)

		Hours per week for 3 terms Lec.		Lab./Tut.
2.311	Physical Chemistry	2	—	3
2.351	Chemical Calculations	1	—	0
2.441	History of Chemistry	1	—	0*
2.511	Analytical Chemistry	2	—	3†
10.031	Mathematics	1	—	1
		7	—	7

* Term 2 only.
† Only 1 hour lecture in Term 2.

FOURTH YEAR

(30 weeks part-time course)

		Hours per week for 3 terms Lec.		Lab./Tut.
2.341	Chemical Instrumentation*	2	—	1†
2.411	Inorganic Chemistry	1	—	2
2.611	Organic Chemistry	2	—	3
50.011	English	2	—	0
		7	—	6

* Alternative subject—Physics 1.212.
* Hours for Term 1 only.
Hours for Terms 2 and 3: 1½ — 1½ 1 — 2.

FIFTH YEAR

(30 weeks part-time course)

		Hours per week for 3 terms Lec.		Lab./Tut.
2.322	Physical Chemistry	2	—	3
2.422	Inorganic Chemistry	1	—	2
2.522	Analytical Chemistry	1	—	2
22.131	Industrial Chemistry (Processes)	1½	—	½
51.011 or 52.011	History or Philosophy	1	—	0
		6½	—	7½

SIXTH YEAR

(30 weeks part-time course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
2.361	Applied Chemistry	1	—	0
2.622	Organic Chemistry	2	—	5
	Social Science Elective	1	—	0
Plus one of				
2.211	Applied Organic Chemistry			
2.221	Applied Organic Chemistry (Food)			
2.331	Applied Physical Chemistry			
2.433	Inorganic Chemistry III	1	—	3
2.533	Analytical Chemistry III			
2.811	Nuclear and Radiation Chemistry			
		5	—	8

Honours in Applied Chemistry

Students desiring to take Honours must apply to the Head of the School not later than 31st December of the year in which the third year of the full-time (sixth 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 which may be undertaken in any one of the six departments by arrangement with the Head of the School. Honours will, however, not be awarded in any particular branch of the subject but in the subject as a whole. Attendance will be required at such lectures and seminars as the Head of the School directs.

Applied Chemistry Prizes

In past years it has been the custom of the School of Chemistry to award prizes for various stages and subjects of the Applied Chemistry Course. This practice will be continued this year.

The list of donors, to whom we express our gratitude, includes the following organisations:

The N.S.W. Department of Technical Education.
Australian Chemical Holdings Ltd.
Australian Glass Manufacturers Co. Pty. Ltd.
Chamber of Manufactures of N.S.W.
Drug Houses of Australia (N.S.W.) Pty. Ltd.
Holbrooks A/asia Pty. Ltd.

Inglis Hudson Bequest.
Merck Sharp and Dohme (Aust.) Pty. Ltd.
Nestle's Food Specialities.
Tooheys Limited.
Tooth and Company Ltd.
Unilever Australia Pty. Ltd.
University of New South Wales Chemical Society.
University of New South Wales Science Association.

We trust this interest and generosity will continue.

CHEMISTRY TEXT AND REFERENCE BOOKS

2.001 Chemistry I

(One text book from each group required)

Text-books

Group A

Hildebrand and Powell: *Principles of Chemistry*
Latimer and Hildebrand: *Reference Book of Inorganic Chemistry* } Combined Volume; *or*

Sienko and Plane: *Chemistry; or*
Pauling: *General Chemistry; or*
Quagliano: *Chemistry.*

Group B

Brown: *A Simple Guide to Modern Valency Theory.*

Group C

Vogel: *Text Book of Qualitative Analysis.*

Group D

Fieser and Fieser: *Organic Chemistry Course; or*
Getchell: *Organic Chemistry: a Brief Course; or*
Behr, Fuson and Snyder: *Brief Course in Organic Chemistry; or*
Smith: *A Modern Introduction to Organic Chemistry.*

Reference Books

Hiller and Herber: *Principles of Chemistry.*
Moeller: *Inorganic Chemistry.*
Moore: *Physical Chemistry.*
Vogel: *Textbook of Quantitative Analysis.*

2.001/1 Chemistry I Part I

Text-books

Group A (2.001)
Group B (2.001)

Reference Books

As for 2.001

2.001/2 Chemistry I Part II

Text-books

Groups A, B, C and D (2.001)

Reference Books

As for 2.001.

2.002 and 2.022 Chemistry II

Text-books

Vogel: *Text Book of Qualitative Analysis.*
Graddon: *An Introduction to Co-ordination Chemistry.*

Reference Books

Bailar: *Chemistry of the Co-ordination Compounds.*
Pauling: *Nature of the Chemical Bond.*
Emeleus and Anderson: *Modern Aspects of Inorganic Chemistry.*
Sidgwick: *Chemical Elements and their Compounds*, Vols. I and II.
Remy: *Treatise on Inorganic Chemistry*, Vols. I and II.
Grinberg (Trans. I.R. Leech): *Introduction to the Chemistry of Complex Compounds* (Pergamon Press).

2.003 Chemistry III

Reference Books

Bailar: *Chemistry of the Co-ordination Compounds.*
Pauling: *Nature of the Chemical Bond.*
Wells: *Structural Inorganic Chemistry.*
Sidgwick: *Chemical Elements and their Compounds*, Vols. I and II.
Remy: *Treatise on Inorganic Chemistry*, Vols. I and II.
Emeleus and Anderson: *Modern Aspects of Inorganic Chemistry.*
Ketelaar: *Chemical Constitution.*
Van Arkel: *Molecules and Crystals.*
Grinberg (Trans. I. R. Leech): *Introduction to the Chemistry of Complex Compounds* (Pergamon Press).
Durrant and Durrant: *Advanced Inorganic Chemistry* (Longmans, 1962).
Rossotti and Rossotti: *Stability Constants.*

2.053 Inorganic Chemistry III

Reference Books

Cartmell and Fowles: *Valency and Molecular Structure.*
Pauling: *Nature of the Chemical Bond.*
Emeleus and Anderson: *Modern Aspects of Inorganic Chemistry.*
Ketelaar: *Chemical Constitution.*
Van Arkel: *Molecules and Crystals.*
Seaborg and Katz: *Chemistry of the Actinide Elements.*
Basolo and Pearson: *Mechanics of Inorganic Reactions.*
Lewis and Wilkins: *Modern Co-ordination Chemistry.*
Progress in Inorganic Chemistry, Vol. I and II—Edited by Kahn.
Recent Advances in Inorganic and Radiochemistry, Vols. I and II.
Coulson: *Valence.*
Durrant and Durrant: *Advanced Inorganic Chemistry* (Longmans, 1962).
Rossotti and Rossotti: *Stability Constants.*

2.411 and 2.032 Inorganic Chemistry

Text-books

Graddon: *An Introduction to Co-ordination Chemistry.*
Vogel: *Textbook of Qualitative Analysis.*

Reference Books

Bailar: *Chemistry of the Co-ordination Compounds.*
Pauling: *Nature of the Chemical Bond.*
Emeleus and Anderson: *Modern Aspects of Inorganic Chemistry.*
Wells: *Structural Inorganic Chemistry.*
Sidgwick: *Chemical Elements and their Compounds.* Vols. I and II.

Remy: *Treatise on Inorganic Chemistry*, Vols. I and II.
Ketelaar: *Chemical Constitution.*
Van Arkel: *Molecules and Crystals.*
Grinberg (Trans. I. R. Leech): *Introduction to the Chemistry of Complex Compounds* (Pergamon Press).

2.422 Inorganic Chemistry III (Applied Chemistry)

Reference Books
Bailar: *Chemistry of Co-ordination Compounds.*
Wells: *Structural Inorganic Chemistry.*
Basolo and Pearson: *Mechanism of Inorganic Reactions.*
Sidgwick: *Chemical Elements and their Compounds*, Vols. I and II.
Remy: *Treatise on Inorganic Chemistry*, Vols. I and II.
Seaborg and Katz: *Chemistry of the Actinide Elements.*
Grinberg (Trans. I. R. Leech): *Introduction to the Chemistry of Complex Compounds* (Pergamon Press).
Durrant and Durrant: *Advanced Inorganic Chemistry* (Longmans, 1962).
Rossotti and Rossotti: *Stability Constants.*

2.433 Inorganic Chemistry III (Special) (Applied Chemistry)

Reference Books
Cartmell and Fowles: *Valency and Molecular Structure.*
Lewis and Wilkins: *Modern Co-ordination Chemistry.*
Emeleus and Anderson: *Modern Aspects of Inorganic Chemistry.*
Sidgwick: *Chemical Elements and their Compounds.* Vols. I and II.
Remy: *Treatise on Inorganic Chemistry*, Vols. I and II.
Coulson: *Valence.*
Wells: *Structural Inorganic Chemistry.*
Progress in Inorganic Chemistry, Vol. I (1959).
Emeleus and Sharpe: *Advances in Inorganic and Nuclear Chemistry*, Vols. I and II.
Durrant and Durrant: *Advanced Inorganic Chemistry* (Longmans, 1962).
Rossotti and Rossotti: *Stability Constants.*

2.211 Applied Organic Chemistry

Reference Books
Weissberger: *Techniques of Organic Chemistry Series.*
Gibbs: *Optical Methods of Analysis.*
Dehalay: *Instrumental Analysis.*
Keulmans: *Gas Chromatography.*
Kolthoff and Lingane: *Polarography.*
Markley: *The Fatty Acids.*
Bailey: *Industrial Oil and Fat Products.*
Ralston: *Fatty Acids and Their Derivatives.*
Hilditch: *The Chemical Constitution of Natural Fats.*
Holman et al: *Progress in the Chemistry of Fats and Related Products Series.*
Guenther: *The Essential Oils.*
Rodd: *The Chemistry of Carbon Compounds.*
Suter: *Medicinal Chemistry Series.*
Manske and Holmes: *The Alkaloids Series.*
Henry: *The Plant Akaloids.*
Evers and Smith: *Analysis of Drugs and Chemicals.*
Bamford, Elliott and Hanley: *Synthetic Polypeptides.*
High Polymer Series.
Simmonds and Ellis: *Handbook of Plastics.*

Schmidt and Marlies: *Principles of High Polymer Theory and Practice.*
American Society for Testing Materials: *Standards on Plastics.*
Frear: *The Chemistry of Insecticides and Fungicides.*
West and Campbell: *D.D.T. and New Persistent Insecticides.*
Harris and Thimann: *Vitamins and Hormones—Advances in Research and Applications.*
British Pharmocopoeia and Pharmacopoeia of the United States.
Tobolsky and Mesrobian: *Organic Peroxides.*
Rochow: *Introduction to the Chemistry of the Silicones.*
D'Alelio: *Fundamental Principles of Polymerization.*
Challenger: *Aspects of the Organic Chemistry of Sulphur.*
Kharasch: *Organic Sulphur Compounds.*
Allen: *Organic Electrode Processes.*

2.221 Applied Organic Chemistry (Food)

Reference Books

Gibbs: *Optical Methods of Analysis.*
Dehalay: *Instrumental Analysis.*
Wright: *The Measurement of Colour.*
Deuel: *Lipids, I, II and III.*
Shoppee: *Chemistry of the Steroids.*
Bates and Associates: *Polarimetry, Saccharimetry and the Sugars.*
Browne and Zerban: *Sugar Analysis.*
Walton: *Principles and Methods of Chemical Analysis.*
Winton and Winton: *Structure and Composition of Foods.*
Cox: *Chemical Analysis of Foods.*
Leach: *Food Inspection and Analysis.*
Kertesz: *The Pectic Substances.*
Joslyn: *Methods in Food Analysis.*
Ling: *Dairy Chemistry.*
Davies: *The Chemistry of Milk.*
Neurath and Benley: *Proteins.*
Advances in Protein Chemistry Series.
Advances in Carbohydrate Chemistry Series.
Karrer and Jucker: *Carotenoids.*
Nutchell and Smith: *Aquammetry—Applications of the Karl Fischer Reagent.*
Goodwin: *Comparative Biochemistry of the Carotenoids.*
Kent-Jones and Amos: *Modern Cereal Chemistry.*
Rosenberg: *Chemistry and Physiology of the Vitamins.*
Sebrell and Harris: *The Vitamins Series.*

2.611 Organic Chemistry
2.002 Chemistry II (Organic Section)
2.032 Chemistry II (Organic Section)
2.042 Chemistry IIA (Organic Section)

Text-books: One of the following—
Noller: *Chemistry of Organic Compounds.*
Morrison and Boyd: *Organic Chemistry.*
Finar: *Organic Chemistry.* Vol. I.
And one of the following—
Vogel: *Elementary Practical Organic Chemistry.* Part II—*Qualitative Organic Analysis.*
Wild: *Characterisation of Organic Compounds.*
Oppenshaw: *Laboratory Manual of Qualitative Organic Analysis.*
Reference Books
Geissman: *Principles of Organic Chemistry.*
Barnett: *Mechanism of Organic Chemical Reactions.*
Horwood Tucker: *An Electronic Outline of Organic Chemistry.*

2.622 Organic Chemistry
2.003 Chemistry III (Organic Section)

Text-books

Finar: *Organic Chemistry*, Vol II.

And one of the following—

Vogel: *Elementary Practical Organic Chemistry.* Part II — *Qualitative Organic Analysis.*

Wild: *Characterisation of Organic Compounds.*

Oppenshaw: *Laboratory Manual of Qualitative Organic Analysis.*

2.622 Organic Chemistry
2.003 Chemistry III (Organic Section)
2.053 Chemistry III (Supplementary) (Organic Section)

Reference Books

Wheland: *Advanced Organic Chemistry.*

Hine: *Physical Organic Chemistry.*

Barnett: *Mechanism of Organic Chemical Reactions.*

Horwood Tucker: *An Electronic Outline of Organic Chemistry.*

Baker: *Electronic Theories of Organic Chemistry.*

Walling: *Free Radicals in Solution.*

Albert: *Heterocyclic Chemistry.*

Acheson: *An Introduction to the Chemistry of Heterocyclic Compounds.*

Geissman: *The Chemistry of Flavanoid Compounds.*

De Mayo: *Chemistry of Natural Products.*

Vol. II—*Mono and Sesquiterpenoids.*

Vol. III—*The Higher Terpenoids.*

2.341 Chemical Instrumentation

Text-books

Martin and Johnson: *Practical Microscopy* (3rd Edition).

Kinnard: *Applied Electrical Measurements.*

Millman and Seely: *Electronics.*

Reference Books

Spreadbury: *Electronic Measurements and Measuring Instruments.*

Lion: *Instrumentation in Scientific Research.*

Dunlap: *Introduction to Semiconductors.*

Chamot and Mason: *Handbook of Chemical Microscopy.*

Hartshorne and Stuart: *Crystals and the Polarising Microscope.*

2.311 Physical Chemistry I
2.002 Chemistry II
2.042 Chemistry IIA
2.032 Chemistry II

Text-books

Barrow: *Physical Chemistry* (Mc-Graw-Hill).

Findlay: *Practical Physical Chemistry* (Longmans).

Reference Book

Glasstone: *Textbook of Physical Chemistry* (Van Nostrand).

2.34 Physical Chemistry
2.322 Physical Chemistry

Text-books

(A) Linnett: *Wave Mechanics and Valency* (Methuen).

(B) Frost and Pearson: *Kinetics and Mechanism* (Wiley).
or
Laidler: *Chemical Kinetics* (McGraw-Hill).

(C) Klotz: *Chemical Thermodynamics* (Prentice Hall).
or
Wall: *Chemical Thermodynamics* (W. H. Freeman & Co.).

(D) Harvey: *Introduction to Nuclear Physics and Chemistry* (Prentice Hall).
or
Friedlander and Kennedy: *Nuclear and Radiochemistry* (Wiley).

Reference Books

Coulson: *Valence* (Oxford).
Kauzman: *Quantum Chemistry* (Academic Press).
Glasstone, Laidler and Eyring: *Theory of Rate Processes* (McGraw-Hill).
Moellwyn-Hughes: *Physical Chemistry* (Pergamon).
Hildebrand and Scott: *Regular Solutions* (Prentice Hall), 1962.

2.003 Chemistry III (Physical Chemistry Section)

Text-books

(A) Barrow: *Physical Chemistry* (McGraw-Hill).

(B) Linnett: *Wave Mechanics and Valency* (Methuen).

(C) Frost and Pearson: *Kinetics and Mechanism* (Wiley).
or
Laidler: *Chemical Kinetics* (McGraw-Hill).

(D) Klotz: *Chemical Thermodynamics* (Prentice Hall).
or
Wall: *Chemical Thermodynamics* (W. H. Freeman and Co.).

(E) Glasstone: *Source Book of Atomic Energy*.
or
Friedlander and Kennedy: *Nuclear and Radiochemistry* (Wiley).

Reference Books

Coulson: *Valence* (Oxford Press).
Kauzman: *Quantum Chemistry* (Academic Press).
Glasstone, Laidler and Eyring: *Theory of Rate Processes* (McGraw-Hill).
Glasstone: *Physical Chemistry* (Van Nostrand).

2.331 Applied Physical Chemistry
2.053 Chemistry III (Supplementary) (Physical Chemistry)

Text-books

Brand and Speakman: *Molecular Structure* (Arnold).
Le Fevre: *Dipole Moments* (Methuen).

Reference Book

Brugel: *Infrared Spectroscopy* (Methuen).

2.351 Chemical Calculations

Text-books

Swinoourne: *Mathematical Chemistry I Notes* (University of New South Wales).

Lark: *Mathematical Chemistry II Notes* (University of New South Wales).

Moroney: *Facts from Figures.*

Reference Books

Bennett and Franklin: *Statistical Analysis in Chemical Industry.*

Mode: *Elements of Statistics* (Prentice Hall).

2.361 Applied Chemistry

Reference Book

Bosworth: *Transport Processes in Applied Chemistry* (Wiley).

2.511 Analytical Chemistry I
2.032 Chemistry II (Analytical Section)
2.022 Chemistry II (Analytical Section)
2.002 Chemistry II (Analytical Section)

Text-books

Vogel: *A Textbook of Quantitative Inorganic Analysis.*

or

Kolthoff and Sandell: *A Textbook of Quantitative Inorganic Analysis.*

or

Willard, Furman and Bricker: *Elements of Quantitative Analysis.*

Reference Book

Walton: *Principles and Methods of Chemical Analysis.*

2.522 Analytical Chemistry II

Text-book

Willard and Diehl: *Advanced Quantitative Analysis.*

2.003 Chemistry III (Analytical Section)

Reference Books

Hildebrand, Lundell, Bright and Hoffman: *Applied Inorganic Analysis.*

Sandell: *Colorimetric Determination of Traces of Elements.*

American Society for Testing Materials: *Methods of Chemical Analysis of Metals.*

Lingane: *Electrochemical Analysis.*

Laitinen: *Chemical Analysis.*

2.533 Analytical Chemistry III

Reference Books

Moeller: *Inorganic Chemistry.*

Berl: *Physical Methods in Chemical Analysis.* Vols. 1, 2, 3.

Luder and Zuffanti: *Electronic Theory of Acids and Bases.*

Fritz and Hammond: *Quantitative Organic Analysis.*

Kolthoff and Lingane: *Polarography.* 2 Vols.

Samuelson: *Ion Exchanges in Analytical Chemistry.*

Cassidy: *Weissbergers' Organic Techniques.* Vol. X—*Fundamentals of Chromatography.*

B.D.H.: *Handbook of Non-Aqueous Titrations.*

Schwarzenbach: *Complexometric Titrations.*

Meites: *Polarographic Techniques.*

Laitinen: *Chemical Analysis.*

2.811 Nuclear and Radiation Chemistry

Text-books

Friedlander and Kennedy: *Nuclear and Radiochemistry* (Wiley, New York), 1955.

or

Harvey: *Introduction to Nuclear Physics and Chemistry* (Prentice Hall), 1962.

Reference Books

Haissinsky: *La Chimie Nucleariė et ses Applications* (Masson 2 Cie, Paris), 1957.

Bleuler and Goldsmith: *Experimental Nucleonics* (Pitman), 1952.

Glasstone: *Source Book on Atomic Energy.*

Farley: *Elements of Pulse Circuits* (Methuen), 1955.

Swallow: *Radiation Chemistry of Organic Compounds* (Pergamon), 1961.

Allen: *Radiation Chemistry of Water and Aqueous Solutions* (Wiley), 1961.

Chemistry III (Supplementary)

Text-books

As above.

Reference Books

Katz and Seaborg: *The Chemistry of the Actinide Elements* (Wiley), 1957, and as above.

School of Mathematics

Throughout Australia and, in fact, throughout the world, there is an extreme shortage of mathematicians in universities, in industry, in research establishments and in schools. Employment can be found for mathematicians with almost every type of qualification.

In the past the employment of mathematicians in Australian industry and commerce was rather uncommon; however, over the last few years there has been a remarkable change, corresponding to the general recognition of the desirability of making quantitative what was previously merely qualitative. The possibility of carrying out mathematical analyses of situations as complicated as those which occur in practice has been made possible in most cases only by the development of high speed electronic computers and it is to the development of these, as yet in its infancy, rather than to any other single factor that the change in the employment picture is due.

For example, it is now generally recognised that every reasonably large concern should employ a statistician or team of statisticians. There must be efficient and well designed supervision of the quality and testing of products. The analysis of sales and business methods must be in the hands of experts. Statisticians are also found in many research establishments, in government departments, in industry, in the C.S.I.R.O., and in the Universities, where they are concerned with the design of experiments and analyses of the results obtained. Further, mathematically oriented statisticians may spend their time on the invention of important mathematical descriptions of physical and social phenomena. Mathematical relations governing the behaviour of electricity, energy and satellites, for example, are well known; it is not so well known, however, that other mathematical theories are being developed in nearly every field of endeavour by persons trained in statistical theory and probability: for example, in public works for statistical models to assist in the design of dams; in sociology for theories explaining migration; and in biology for theories of inheritance. Students interested in working in these fields should study the courses in Theory of Statistics.

Applied Mathematics consists of the application of mathematical methods to the study of nature. In different Australian universities, different fields of study are emphasised, but in each case the study of nature and her laws is the main purpose, the mathematical technique being means to this end. In this Department, the main field of study is modern theoretical physics, with an emphasis on quantum mechanics, nuclear theory, and statistical mechanics. However, other branches of Applied

Mathematics are included in the course, such as electro-magnetic theory, classical dynamics, mathematical hydrodynamics and aerodynamics, theory of elasticity and solid state theory. In this general field, the normal qualification for independent research and for university employment, is a Ph.D. degree, following upon an Honours B.Sc. degree. The Department of Applied Mathematics includes provision for this full course. Furthermore, it is highly desirable for young graduates in this field who have recently qualified for a Ph.D. degree to go overseas for some time in order to widen their experience. Overseas contacts exist, and every effort is made to place graduates suitably.

One of the spectacular aids to industry and research is the high-speed computer. The small machines costing a hundred or so pounds can be managed by relatively unskilled persons, but it requires skilled training to maintain and programme for a high-speed machine costing many hundreds of thousands of pounds. The number of persons in Australia qualified to take charge of a large machine is quite small. A graduate with satisfactory attainments in machine operation is assured of a well-paid and interesting position.

The courses in Applied Mathematics include training in programming for the digital computers and in numerical analysis. Students will have considerable practice on the university's computer UTECOM. The courses, in addition to computer work, contain a considerable body of work dealing with the application of mathematics to physical theory.

It must not be thought that an honours degree is necessary for success in all these fields. Pass degrees are satisfactory for positions in government departments, insurance companies and laboratories, but, of course, an honours degree would in almost all cases give priority.

The growth of population in Australia has resulted in a large increase in the enrolments of Australian universities. At the moment the shortage of mathematicians in the universities is desperate. A student who graduates with a B.Sc. degree with honours should find little difficulty in becoming a university lecturer after, perhaps, two or three years as a teaching fellow while working for a higher degree.

The present avenues of employment for Pure Mathematicians in Australia are in the universities, C.S.I.R.O., other research establishments, and the teaching services. It is pleasing to note that Australian industry is at last commencing to employ Pure Mathematicians. In the past, very many of our best Pure Mathematicians have been lost to overseas appointments. Future employment prospects in Australia are improving. Students who wish to specialise in Pure Mathematics and who wish to work in industry are strongly advised to supplement their studies by some work involving programming for computers.

The student will notice from the comments following this preamble that the courses in Theory of Statistics and Applied Mathematics may be so linked with the Pure Mathematics course that a change from one of these to Pure Mathematics is possible at any stage.

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 and Theory of Statistics. Full details of the subjects and their relations with other subjects in the Science Course appear in the University Calendar (1963). Any student who feels that he does not understand the situation should consult one of the enrolment officers of the school.

HONOURS COURSES IN MATHEMATICS

The Honours courses require four years of study. In the fourth year the student must devote his full time to his chosen subject and to a course in Humanities.

There are three different fourth year Honours courses in the School of Mathematics, namely: Pure Mathematics, Applied Mathematics and the Theory of Statistics. The requirements for entry to fourth year mathematics courses are indicated below.

(a) Pure Mathematics

Permission must be obtained to enter the fourth year course in Pure Mathematics. Such permission is not likely to be granted unless the applicant has passed in Pure Mathematics III (Higher). This work should be supplemented by courses in Applied Mathematics or Theory of Statistics.

(b) Applied Mathematics

Permission must be obtained to enter the fourth year course in Applied Mathematics. Such permission is not likely to be granted unless the applicant has passed in Applied Mathematics III (Higher) and in Pure Mathematics III.

(c) Theory of Statistics

Permission must be obtained to enter the fourth year course in the Theory of Statistics. Such permission is not likely to be granted unless the applicant has passed in Theory of Statistics II (Higher) and Pure Mathematics III (Higher).

If a student is studying for an Honours degree in either Theory of Statistics or Applied Mathematics and for some reason finds this is unsuitable, he may turn his interest to Pure Mathematics.

All students, whether studying for Honours or not, will attend Mathematics I during the first year. Any student interested in gaining an Honours degree should consult one of the professors in the School of Mathematics during his first year. He should certainly have an interview before enrolling in the second year.

It should be noted that transfer from the Higher level to the

ordinary level of the various mathematical subjects can be made at any time if the student feels that he has made a mischoice. Transfer from ordinary courses to Higher courses will leave the student with an almost impossible task and could only be made in exceptional circumstances.

PASS COURSES

Except for students who wish to take Theory of Statistics II, there are few restrictions on the choice of subjects. Naturally, there is the general rule that the first stage of a sequence of subjects must precede later stages.

The course of study for a student wishing to graduate at the Pass level in Theory of Statistics must include Mathematics I, Pure Mathematics II, Pure Mathematics III, Theory of Statistics I and Theory of Statistics II.

Though there is no regulation to demand it, students who wish to specialise in Applied Mathematics are strongly advised to take Pure Mathematics III if they wish to attempt Applied Mathematics III in the third year. This would mean, of necessity, the inclusion of five mathematical subjects for the degree.

MATHEMATICS AS A SUBSIDIARY SUBJECT

It is the opinion of the School of Mathematics that in order to gain a major in Mathematics, five subjects should be completed by graduation. Students whose main interests lie in other fields will not desire to include so much Mathematics.

If it is intended that only three mathematical subjects are to be taken, then Mathematics I, Pure Mathematics II and Pure Mathematics III would be a sequence providing some depth. However, consideration should be given to the inclusion of Theory of Statistics I or Applied Mathematics II. These are second year (Group II) subjects. The combination of at least one of these with Pure Mathematics II gives a broader coverage at somewhat less depth than Pure Mathematics III. Both Theory of Statistics I and Applied Mathematics II can be attempted without the inclusion of Pure Mathematics II.

SCHOOL TEACHERS

There is no doubt that in order to be fully qualified as a High School teacher of Mathematics, it is desirable that Mathematics I, Pure Mathematics II and Pure Mathematics III should be passed. It is recommended that two other subjects 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 work.

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.

STUDENTS WITH LOW MATHEMATICAL QUALIFICATIONS

Students who have only General Mathematics at the Leaving Certificate or who have been inadequately prepared even though they have passed both Mathematics I and II, should see that they do not fall behind the class. Tutorial time is provided by the School in Mathematics I. Students should use these tutorial periods to obtain advice on supplementary reading to make up any deficiencies in their pre-university training. If, after receiving this advice, the student cannot keep up with class, he should consult a senior member of the staff of the School of Mathematics.

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 SUBSIDUARY TO MATHEMATICS

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

MATHEMATICS TEXT AND REFERENCE BOOKS

10.001 Mathematics I

Text-books

Birkhoff and MacLane: *A Brief Survey of Modern Algebra* (McMillan, New York).

*Keane and Senior: *Complementary Mathematics* (Science Press).

Thomas: *Calculus and Analytic Geometry, Part I* (Addison Wesley).

*For tutorial use.

10.111 Pure Mathematics II

Text-books

Halmos: *Finite Dimensional Vector Spaces* (Van Nostrand).

Kaplan: *Advanced Calculus (Addison Wesley).*

Keane and Senior: *Mathematical Methods* (Science Press).

Reference Books

Birkhoff and MacLane: *A Survey of Modern Algebra* (Macmillan).

Burkill: *Theory of Ordinary Differential Equations* (Oliver and Boyd).

10.112 Pure Mathematics III

Text-books

Halmos: *Finite Dimensional Vector Spaces* (Van Nostrand).

Klein: *Famous Problems in Elementary Geometry* (Dover).

Willmore: *An Introduction to Differential Geometry* (Oxford University Press).

Young (ed.): *Monographs on Topics of Modern Mathematics* (Dover).

Churchill: *Modern Operational Mathematics in Engineering* (McGraw-Hill), 2nd ed.

Reference Books

Birkhoff and MacLane: *A Survey of Modern Algebra* (Macmillan).

Bourbaki: *Elements de Mathematique* (Herman).

Churchill: *Fourier Series and Boundary Value Problems* (McGraw-Hill).

Copson: *Theory of Functions of a Complex Variable* (Oxford University Press).

Jacobson: *Lectures in Abstract Algebra* (Vol. I, II), (Van Nostrand).

Sneddon: *Elements of Partial Differential Equations* (McGraw-Hill).

Van der Waerden: *Modern Algebra* (Ungar).

10.121 Mathematics

Text-books

Fulks: *Advanced Calculus* (Wiley).

Halmos: *Finite Dimensional Vector Spaces* (Van Nostrand).

Miller: *Advanced Complex Calculus* (Harper).

Reference Books

Artin: *Geometric Algebra* (Interscience).

Birkhoff and MacLane: *A Survey of Modern Algebra* (Macmillan).

Burkill: *Theory of Ordinary Differential Equations* (Oliver and Boyd).

Bourbaki: *Elements de Mathematique* (Herman).

Hall and Spencer: *Elementary Topology* (Wiley).

Jacobson: *Lectures in Abstract Algebra.* (Vols. I and II) (Van Nostrand).

Kelley: *General Topology* (Van Nostrand).

Nickerson, Steenrod and Spencer: *Advanced Calculus* (Van Nostrand).

Todd: *Projective and Analytic Geometry* (Pitman).

Van der Waerden: *Modern Algebra* (Ungar).

10.122 Mathematics

Text-books

Halmos: *Measure Theory* (Van Nostrand).

Hilton and Wylie: *Homology Theory, an Introduction to Algebraic Topology.*

Kelley: *General Topology* (Van Nostrand).

Klein: *Famous Problems in Elementary Geometry* (Dover).

Willmore: *An Introduction to Differential Geometry.*

Young (ed.): *Monographs on Topics of Modern Mathematics* (Dover).

Reference Books

Birkhoff and MacLane: *A Brief Survey of Modern Algebra* (Macmillan).

Bourbaki: *Elements de Mathematique* (Hermann).

Copson: *Theory of Functions of a Complex Variable* (Oxford).

Chevalley: *Fundamental Concepts of Algebra* (Academic Press).

Eilenberg and Steenrod: *Foundations of Algebraic Topology* (Princeton).

Hall: *The Theory of Groups* (Macmillan).

Hodge and Pedoe: *Methods of Algebraic Geometry.* Vols. I, II, III (Cambridge).

Ince: *Ordinary Differential Equations* (Dover).

Munroe: *Introduction to Measure and Integration* (Addison Wesley).

Northcott: *Ideal Theory* (Cambridge Math. Tracts).

Sneddon: *Elements of Partial Differential Equations* (McGraw-Hill).

Titchmarsh: Theory of Functions (Oxford University Press).

Van der Waerden: *Modern Algebra* (Ungar).

Walker: *Algebraic Curves* (Princeton).

10.211 Applied Mathematics II

Text-books

Hartree: *Numerical Analysis* (Oxford University Press).

McCuskey: *Introduction to Advanced Dynamics.*

Sagan: *Boundary and Eigenvalue Problems in Mathematical Physics* (John Wiley and Sons).

10.221 Applied Mathematics II (Higher)

Text-books

As for 10.211 Applied Mathematics II together with—

Abraham and Becker: *Theory of Electricity.* Vol I.

Goldstein: *Classical Mechanics.*

10.212 Applied Mathematics III

Text-books

Abraham and Becker: *Theory of Electricity.* Vol. I.

Courant and Hilbert: *Methods of Mathematical Physics.* Vol. II.

Landau and Lifeschitz: *Theory of Elasticity* (Permagon).

Prandtl and Tietjens: *Fundamentals of Hydro and Aero-mechanics.*

Rossi: *High Energy Particles.*

Schiff: *Quantum Mechanics.* (McGraw-Hill).

10.311 Theory of Statistics I
10.321 Theory of Statistics I (Higher)

Introductory Reading

Huff: *How to Lie with Statistics* (Gollancz).

Moroney: *Facts from Figures* (Pelican).

Tippett: *Statistics* (Oxford University Press).

Text-books

Hogg and Craig: *Introduction to Mathematical Statistics* (Macmillan).

Statistical Tables (Union Store).

Reference Books

Anderson and Bancroft: *Statistical Theory in Research* (McGraw-Hill).

Dixon and Massey: *Introduction to Statistical Analysis* (McGraw-Hill).

Goldberg: *Probability: An Introduction* (Prentice Hall).

Kendall and Stuart: *The Advanced Theory of Statistics.* Vols. I and II. (Griffith).

Mood: *Introduction to the Theory of Statistics* (McGraw-Hill).

Parzen: *Modern Probability Theory and its Applications* (Wiley).

Pearson and Hartley: *Biometrika Tables for Statisticians* (Ed.) (Cambridge).

Rao: *Advanced Statistical Methods in Biometric Research* (Wiley).

10.312 Theory of Statistics II

10.322 Theory of Statistics II (Higher)

Introductory Reading

Cox: Planning of Experiments (Wiley).

Text-books

Graybill: *An Introduction to Linear Statistical Models* (McGraw-Hill).

Kendall and Stuart: *The Advanced Theory of Statistics.* Vols. I and II. (Griffin.)

Pearson and Hartley: *Biometrika Tables for Statisticians* (Cambridge).

Reference Books

Anderson: *An Introduction to Multivariate Statistical Analysis* (Wiley).

Cochran: *Sampling Techniques* (Wiley).

Cochran and Cox: *Experimental Designs* (Wiley).

Feller: *An Introduction to Mathematical Probability and its Applications* (Wiley).

Gass: *Linear Programming—Methods and Applications.*

Kempthorne: *The Design and Analysis of Experiment* (Wiley).

Mood: *Introduction to the Theory of Statistics* (McGraw-Hill).

Rao: *Advanced Statistical Methods in Biometric Research* (Wiley).

10.323 Theory of Statistics III

Text-books

As for 10.322 plus

Feller: *An Introduction to Mathematical Probability and its Applications* (Wiley).

Reference Books

Anderson: *An Introduction to Multivariate Statistical Analysis* (Wiley).

Bartlett: *Stochastic Processes* (Cambridge).

Bharucha-Reid: *Elements of the Theory of Markov Processes and their Applications* (McGraw-Hill).
Cochran and Cox: *Experimental Designs* (Wiley).
Davies (ed.): *Design and Analysis of Industrial Experiments* (Oliver and Boyd).
Fisher: *Contributions to Mathematical Statistics* (Wiley).
Fraser: *Non-Parametric Methods* (Wiley).
Girshick and Blackwell: *Theory of Games and Statistical Decisions* (Wiley).
Gumbel: *Statistics of Extremes* (Columbia University Press).
Karlin: *Mathematical Methods and Theory in Games, Programming and Economics.* Vol. I. (Addison Wesley).
Kempthorne: *The Design and Analysis of Experiment* (Wiley).
Kullback: *Information and Statistics* (Wiley).
Lehmann: *Tests of Hypotheses* (Wiley).
Rao: *Advanced Statistical Methods in Biometric Research* (Wiley).
Savage: *Foundations of Statistics* (Wiley).
Wald: *Sequential Analysis* (Wiley).

School of Physics

It may be fitly said that the science of Physics underlies all experimental science. It is by the work of physicists that the deepest present understanding of the inanimate world around us has been attained; and it is only with comprehension of their physical aspects that the nature and qualities of living (and of thinking) beings can be properly appreciated. Moreover, principles and techniques of Physics are to be seen everywhere incorporated in the technology on which modern civilisation is based.

Thus a study of Physics leading to some acquaintance with its elements is suitable for inclusion in any curriculum of study. A good working knowledge of at least the older-established parts of Physics is an essential item for engineers and technologists and indeed for those pursuing any other branch of experimental pure science. This school has, therefore, as one of its principal functions, the provision of such courses for the benefit of those not intending to follow a professional career in Physics.

However, the main objective of the School is the education and professional training of physicists. The pass degree course offered is one which seeks to give a broad and balanced treatment of all branches of Physics, without specific emphasis on any branch or topic which may be temporarily prominent. This course precedes an honours course in which the student's work will be to some extent specialised in certain fields. These studies are provided for within the framework of the Science Course, as sequences which are appropriate for students seeking qualification as professional physicists, whether they intend to engage in research or industrial practice, or to become teachers of Physics.

For a pass degree with a major in Physics it is necessary to complete Physics I, Physics II, and Physics III. Mathematics I is pre-requisite for Physics II, and Pure Mathematics II for Physics III. The Science Course regulations also require the student to complete four other science subjects for a pass degree. The common First Year regulations require Chemistry I and one other Group I subject to comprise two of these four; the remaining two would normally be one other Group II subject plus one other Group III subject.

The following programmes show typical alternatives, any of which, together with the prescribed humanities subjects, complete requirements for a pass degree.

First Year	Second Year	Third Year
Physics I	Physics II	Physics III
Mathematics I	Pure Mathematics II	Mathematical Physics
Chemistry I	Chemistry II	or
Engineering I	or	Physics III (Applied)
or	Theory of Statistics I	or
General Biology		Pure Mathematics III

The normal preparation for Physics IV (Honours) is the study of Physics III and Mathematical Physics in the Third Year. Students intending to study for Honours and/or proceed to a higher degree should include these subjects in their programme.

Physics Prizes

A prize of £25 is offered annually by the lecturing staff of the School of Physics to the student who most distinguishes himself in the subject Physics III.

The G. P. Falls Prize of £10 is offered annually by Mrs. Falls (in memory of her husband who was a lecturer in the School of Physics) to the student who most distinguishes himself in the subject of Mathematical Physics.

PHYSICS TEXT AND REFERENCE BOOKS

1.001 Physics I

1.001/1 Physics I/1

1.001/2 Physics I/2

Text-book

Resnick and Halliday: *Physics for Students of Science and Engineering.* Vols. I and II or combined volume. (Particularly recommended for students with a good background in Physics and Mathematics.)

or

Ference, Lemon and Stephenson: *Analytical Experimental Physics.*

or

Champion: *University Physics.*

Reference Books

Richards, Sears, Wehr and Zemansky: *Modern University Physics.*
Stephenson: *Mechanics and Properties of Matter.*
Loney: *Dynamics.*
Starling and Woodall: *Physics.*
Synge and Griffith: *Principles of Mechanics* (3rd ed.).

1.212 Physics II

1.212S Physics II T

Text-books

Halliday and Resnick: *Physics for Students of Science and Engineering, Vol II.*

or

Bitter: *Currents, Fields and Particles.*

Reference Books

Wehr and Richards: *Physics of the Atom.*
Kronig: *Textbook of Physics.*
Jenkins and White: *Fundamentals of Physical Optics.*

1.011 Physics I T

Text-book

Physical Science Study Committee: *Physics.*

1.112 Physics II

Text-books

Bleaney and Bleaney: *Electricity and Magnetism.*
or
*Fewkes and Yarwood: *Electricity and Magnetism.*
Zemansky: *Heat and Thermodynamics.*
or
*Sears: *Thermodynamics.*
Jenkins and White: *Fundamentals of Optics.*
Kaplan: *Nuclear Physics.*
or
*Wehr and Richards: *Physics of the Atom.*
Frank: *Introduction to Electricity and Optics.*
*Suitable for Students not proceeding to Physics III.

Reference Books

Richtmyer, Kennard and Lauritsen: *Introduction to Modern Physics.*
Mitchell: *Fundamentals of Electronics.*

1.113 Physics III

Text-books

Eisberg: *Fundamentals of Modern Physics.*
Panofsky and Phillips: *Classical Electricity and Magnetism.*
Pippard: *Classical Thermodynamics.*
or
Zemansky: *Heat and Thermodynamics.*
von Engel: *Ionized Gases.*
Farley: *Elements of Pulse Circuits.*

Reference Books

Leighton: *Principles of Modern Physics.*
Richtmyer, Kennard and Lauritsen: *Introduction to Modern Physics.*
Hill: *Introduction to Statistical Thermodynamics.*
Landau and Lifschitz: *Statistical Physics.*
Slater and Frank: *Electromagnetism.*
Bohm: *Quantum Mechanics.*
Arnot: *Collision Processes in Gases.*
Emeleus: *Conduction of Electricity in Gases.*
Dekker: *Solid State Physics.*
Ditchburn: *Light.*
Bleaney and Bleaney: *Electricity and Magnetism.*
Harnwell: *Principles of Electricity and Electromagnetism.*
Powell and Craseman: *Quantum Mechanics.*
McCrea: *Relativity Physics.*
Kaplan: *Nuclear Physics.*

1.133 Mathematical Physics

Text-books

Goldstein: *Classical Mechanics.*
Nye: *Physical Properties of Crystals.*
Landau and Lifschitz: *Theory of Elasticity.*
Powell and Craseman: *Quantum Mechanics.*
Mood: *Introduction to the Theory of Statistics.*
Panofsky and Phillips: *Classical Electricity and Magnetism.*

Reference Books

Pugh and Pugh: *Principles of Electricity and Magnetism.*
Corben and Stehle: *Classical Mechanics.*
Phillips: *An Introduction to Crystallography.*
Dekker: *Solid State Physics.*
Rayleigh: *Theory of Sound.*
Bullen: *An Introduction to the Theory of Seismology.*
Sommerfeld: *Mechanics of Deformable Bodies.*
Bohm: *Quantum Mechanics.*
Spiegel: *Vector Analysis.*
Smythe: *Classical Electricity and Magnetism.*
Kendall and Stuart: *Advanced Theory of Statistics.*
Whittaker: *Analytical Dynamics.*

Department of Optometry

The Department of Optometry is located at Ultimo on the second floor of the main administrative building of the Sydney Technical College in Mary Ann Street.

The courses in Optometry offered at the University of New South Wales are the only courses of professional training for optometrists given in this State. The Department of Optometry provides instruction in the Optometry degree course and in the Optometry conversion course for holders of the A.S.T.C. diploma in Optometry.

Under an agreement reached between the University and the Department of Technical Education the majority of A.S.T.C. diploma courses, including the course in Optometry, previously offered by the University on behalf of the Department, have been withdrawn and replaced by courses leading to a University degree. The A.S.T.C. diploma course in Optometry has now been replaced by a full-time four-year course leading to the degree of Bachelor of Optometry (B.Optom.), so that there will be no more enrolments in the diploma course. Holders of the diploma in Optometry may proceed to the conversion course with full credit for their diploma studies. The conversion course leads to the degree of Bachelor of Science, Pass or Honours, and may be completed in two or three years of part-time study. Full details of this course are set out in the Department of Optometry handbook.

In the full-time (B.Optom.) course, extending over four years, students in their first year will take General Biology and, in common with other students in the Faculty of Science, Chemistry I, Physics I, Mathematics I. In the remaining three years, students will take six professional subjects, special courses in psychology and statistics and, in addition, a number of subjects from the Humanities group.

The degree of Bachelor of Optometry may be awarded at Pass or Honours level.

Suitably qualified graduates wishing to pursue their studies in Optometry beyond the Bachelor of Optometry or Bachelor of Science level may enrol with the University as candidates for the degree of Master of Science or Doctor of Philosophy. The regulations setting out the conditions for the award of these degrees are printed in the University Calendar.

SCHOLARSHIPS AND PRIZES

Students are reminded that they may apply to the University Branch Office, Department of Education, University Grounds, University of Sydney, for the award of a Commonwealth Scholarship. Application must be made before 30th November of the year immediately preceding the year in which the scholarship is desired.

A number of prizes are awarded each year for students displaying proficiency in certain subjects of the course.

BACHELOR OF OPTOMETRY DEGREE COURSE

The course leading to the degree of Bachelor of Optometry (B.Optom.) extends over four years of full-time study. The timetables in the professional years (2nd, 3rd and 4th years) have been arranged so that students will be required to attend the University on five half-days only per week. This arrangement will give students the opportunity to engage in part-time employment with practising optometrists if they so desire. In addition, where students are unable to take the first year as a full-time year, they may complete the subjects of the first year of the course in two part-time years.

FIRST YEAR

(30 weeks full-time course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
1.001	Physics I	3	—	3
2.001	Chemistry I	3	—	3
10.001	Mathematics I	4	—	2
17.001	General Biology	2	—	4
		12	—	12

SECOND YEAR

(30 weeks full-time course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
1.811	Optometry I	4	—	4
1.821	Special Anatomy and Physiology	4	—	4
12.101	Psychology I*	3	—	0
50.011	English	2	—	0
		13	—	8

* This subject is identical with the theory part of the Psychology I course taken by students in the Arts, Science and B.Sc. (Applied Psychology) courses.

THIRD YEAR

(30 weeks full-time course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
1.812	Optometry II	6	—	6
1.831	Diseases of the Eye	3	—	1
10.331	Statistics	1½	—	½
51.011 / 52.011	History or Philosophy	1	—	0
	Social Science Elective*	1	—	0
		12½	—	7½

FOURTH YEAR

(30 weeks full-time course)

		Hours per week for 3 terms		
		Lec.		Lab./Tut.
1.813	Optometry III	6	—	0
1.841	Clinical Optometry	0	—	12
12.741	Psychology II (Special)	2	—	0
	Advanced Elective (Humanities)	2	—	0
		10	—	12

* One of:

15.011 Economics.
53.011 Sociology.
54.011 Political Science.

Geology for Students in the Science Course

Students may major in Geology 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 Geology will complete the following subjects:—

First Year—7.511/1 and 7.511/2 Geology I, Parts I and II (as for the Applied Geology degree course).

Second Year—7.512/1 and 7.512/2 Geology II, Parts I and II (as for the Applied Geology degree course).

Third Year—7.513/1, 7.513/2 and 7.513/3 Geology III, Parts I, II and III (as for the Applied Geology degree course).

In addition, students in this course may take a second Geology subject in their third year, 7.521/1 and 7.521/2 Geology III (Supplementary), Parts I and II. Geology III (Supplementary) will consist of four subjects to be chosen from: Palaeontology II, Stratigraphy III, Mineralogy III, Petrology III, Structural Geology II, Geophysics II, Geochemistry and Mineragraphy.

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 Mining Engineering and Applied Geology to read for an honours degree in Geology. Students who have taken only one third year Geology subject may also be admitted, but will be required to take the equivalent of Geology III (Supplementary) as part of their honours work, i.e., in lieu of (1) and (3) below. This should be regarded as a special provision for students whose two third year subjects are either Geology III and Physics III or Geology III and Chemistry III, and who wish to specialise in either geophysics or geochemistry. Thesis work for such students would be restricted to a laboratory project.

The honours course will consist of:—

(1) An advanced laboratory assignment on one of the subjects taken in the third year of the course and a dissertation.

(2) A field assignment together with a graduation thesis on the results of the field work.

(3) Such other work, including advanced lectures and seminars, as may be required from time to time.

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

Students seeking to do honours in Geology will have to 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.

GEOLOGY TEXT AND REFERENCE BOOKS

7.511 Geology I

Preliminary Background Reading
Read: *Geology* (Home University Library).

(a) 7.511/1 PHYSICAL AND HISTORICAL GEOLOGY

Text-books
Holmes: *Principles of Physical Geology.*
Clarke, Prider and Teichert: *Elements of Geology.*
Dunbar: *Historical Geology.*
Blyth: *Geology for Engineers.*
Reference Books
McElroy: *Explanatory Notes to Accompany the Sydney 4-Mile Geological Map.*
Matthews: *Fossils, An Introduction to Prehistoric Life.*
Beerbower: *Search for the Past.*
Morley Davies: *An Introduction to Palaeontology.*

(b) 7.511/2 MINERALOGY

Text-book
Read: *Rutley's Elements of Mineralogy.*
Reference Books
Phillips: *An Introduction to Crystallography.*
Ford: *Dana's Textbook of Mineralogy.*

7.512 Geology II

Text-books
Kerr: *Optical Mineralogy.*
William, White and Gilbert: *Petrography.*

(a) PETROLOGY I

Reference Books

Harker: *Petrology for Students.*
Hatch, Wells and Wells: *The Petrology of the Igneous Rocks.*
Tyrrell: *The Principles of Petrology.*
Turner and Verhoogen: *Igneous and Metamorphic Petrology.*
Harker: *Metamorphism.*

(b) PALAEONTOLOGY I

Text-books

Moore, Lalicker and Fischer: *Invertebrate Fossils* (McGraw-Hill).

Reference Books

Woods: *Palaeontology Invertebrate* (Cambridge University Press).
Schrock and Twenhofel: *Principles of Invertebrate Palaeontology* (McGraw-Hill).

(c) STRATIGRAPHY I

Text-book

Krumbein and Sloss: *Stratigraphy and Sedimentation* (1951).

Reference Books

Kuenen: *Marine Geology.*
Weller: *Stratigraphic Principles and Practice.*
David and Browne: *Geology of the Commonwealth of Australia* (3 vols.) (Arnold & Co.), 1950.
Schrock: *Sequence in Layered Rocks.*

(d) MINERALOGY II

Text-books

Phillips: *An Introduction to Crystallography.*
Ford: *Dana's Textbook of Mineralogy.*

Reference Books

Henry, Lipson and Wooster: *Interpretation of X-ray Diffraction Photographs,* 1951.
Wahlstrom: *Optical Crystallography,* 3rd. ed.

7.513 Geology III

(a) PETROLOGY II

Text-book

William, White and Gilbert: *Petrography.*

Reference Books

Turner and Verhoogen: *Igneous and Metamorphic Petrology.*
Milner: *Sedimentary Petrography.*
Harker: *Metamorphism.*
Grim: *Clay Mineralogy.*
Pettijohn: *Sedimentary Rocks.*

(b) STRATIGRAPHY II

Reference Books

Gignoux: *Stratigraphic Geology* (English Translation).
Kummel: *The History of the Earth.*
David and Browne: *Geology of the Commonwealth of Australia* (3 vols.), 1950.

(c) GEOPHYSICS I

Text-book

Dobrin: *Introduction to Geophysical Prospecting,* 1952.

Reference Books

Jakosky: *Exploration Geophysics,* 2nd. ed., 1950.
Howell: *Introduction to Geophysics,* 1959.
Dix: *Seismic Prospecting for Oil,* 1952.

(d) STRUCTURAL GEOLOGY I

Text-books

Hills: *Outlines of Structural Geology,* 3rd ed., 1953.
Phillips: *Use of Stereographic Projection in Structural Geology,* 1954.

Reference Books

De Sitter: *Structural Geology,* 1956.
Billings: *Structural Geology,* 1954.

(e) ECONOMIC GEOLOGY

(*i*) *Coal.*

Text-book

Raistrick, Marshall: *The Nature and Origin of Coal and Coal Seams,* 1952.

Reference Book

Francis: *Coal, Its Formation and Composition.*

(*ii*) *Oil*

Text-book

Levorsen: *Petroleum Geology,* 1954.

Reference Book

LeRoy: *Subsurface Geologic Methods.*

(*iii*) *Ore Deposits*

Text-book

Edwards: *Textures of the Ore Minerals,* 2nd. ed., 1954.

Reference Book

Lindgren: *Mineral Deposits,* 4th. ed., 1933.
Fiftieth Anniversary Volume of Economic Geology, Vol. I, Society of Economic Geologists, Urbana, Illinois.

7.514 Geology IV

(a) MINING GEOLOGY

Text-book

McKinstry: *Mining Geology.*

(b) PHOTOGEOLOGY

Reference Books

Miller: *Photogeology* (McGraw-Hill), 1961.
Lueder: *Aerial Photo Interpretation* (McGraw-Hill), 1959.
Manual of Photographic Interpretation (Am. Soc. of Photogrammetry, Washington, 1960).

(c) GEOPHYSICS II

Text-book

Dobrin: *Introduction to Geophysical Prospecting,* 1952.

Reference Books

Encyclopedia of Physics: *Geophysics I* (Vol. 47).
Jakosky: *Exploration Geophysics,* 2nd ed., 1950.
Howell: *Introduction to Geophysics,* 1959.
Dix: *Seismic Prospecting for Oil,* 1952.

(d) ENGINEERING GEOLOGY

Text-book

Blyth: *Geology for Engineers* (4th ed.)

Reference Books

Dapples: *Basic Geology* (John Wiley, New York), 1959.
Krynine and Judd: *Principles of Engineering Geology and Geotechnics* (McGraw-Hill, New York), 1957.
Schultz and Cleaves: *Geology in Engineering* (John Wiley, New York), 1952.
Application of Geology to Engineering Practice (Geol. Soc. of America, New York), 1950.

(e) PETROLEUM ENGINEERING

Reference Book

Uren: *Petroleum Production Engineering Development.*

7.521 Geology III (Supplementary)

(a) PALAEONTOLOGY II

Text-book

Moore, Lalicker and Fischer: *Invertebrate Fossils* (McGraw-Hill), 1952.

Reference Books

Twenhofel and Schrock: *Principles of Invertebrate Palaeontology,* 1953.
Colbert: *Evolution of the Vertebrates* (Wiley), 1955.
Moore (ed.): *Treatise on Invertebrate Palaeontology* (Geol. Soc., Amer.), 1953.
Shimer and Schrock: *Index Fossils of North America.*
Cushman: *Foraminifera* (Harvard U.P.), 1950.
Glaessner: *Principles of Micro-palaeontology* (Melbourne U.P.), 1945.
Arnold: *An Introduction to Palaeo-botany* (McGraw-Hill), 1947.
Romer: *Vertebrate Palaeontology* (Chicago U.P.).

(b) STRATIGRAPHY III

Text-book

Gignoux: *Stratigraphic Geology*

Reference Books

See list for Stratigraphy II (7.513).

(c) MINERALOGY III

Text-books

As for Mineralogy II in Geology II.

Reference Books

Rankama and Sahama: *Geochemistry,* 1950.
Azaroff and Buerger: *The Powder Method* (McGraw-Hill).
Buerger: *X-ray Crystallography* (John Wiley & Sons).

Henry, Lipson and Wooster: *The Interpretation of X-ray Diffraction Photographs* (Macmillan & Co. Ltd).
Bunn: *Chemical Crystallography* (Oxford: Clarendon Press).

(d) PETROLOGY III

Text-books
As for Petrology II in Geology III.

Reference Books
Bowen: *Evolution of Igneous Rocks.*
Plus reference books for Petrology II (7.513).

(e) STRUCTURAL GEOLOGY

Text-book
De Sitter: *Structural Geology,* 1956.

(f) GEOPHYSICS II

Text and Reference Books
As for Geophysics II in Geology IV.

(g) GEOCHEMISTRY

Text-book
Mason: *Principles of Geochemistry,* 2nd ed.
Reference Books
Abelson: *Researches in Geochemistry,* 1959.
Bankama and Sahama: *Geochemistry,* 1950.
Goldschmidt: *Geochemistry.*
Smales and Wager: *Methods in Geochemistry,* 1960.

(h) MINERAGRAPHY

Text-books
Edwards: *Textures of the Ore Minerals,* 2nd ed., 1954.
Hallimond: *1953 Manual of the Polarizing Microscope.*
Cameron: *Ore Microscopy,* 1961.

Physiology for Students in the Science Course

Courses in Physiology for students in the Faculty of Science will commence in 1963. During the second and third years of their B.Sc. course, students may take Physiology I and Physiology II. Students reaching an adequate standard in these subjects may proceed to a B.Sc. degree with Honours by taking Physiology III during the fourth year of the course. For the present, Physiology will only be available as a day course.

Physiology I is designed as a course in General Physiology, and uses as its main source of illustration examples from the field of mammalian physiology. This course is self-contained and apart from serving as an introductory course to Physiology II, should be useful for students in other biological fields. Students wishing to enrol in Physiology I must have completed Chemistry I and Physics I. Students who have not done General Biology may do Physiology I only in special circumstances by arrangement with the Head of the School.

Physiology II is a more advanced course in physiology, and is orientated towards the more biophysical aspects of physiology. Students taking Physiology II should have passed in the subject of Physics II. Any student who wishes to proceed to Physiology II and has not done Physics II can proceed only in special circumstances by arrangement with the Head of the School.

Lecture, laboratory and tutorial arrangements for Physiology subjects are as follows:—

73.011 Physiology I

	Hours per week for 3 terms
Lectures	3
Laboratory	5
Tutorials	1
	9

73.012 Physiology II

	Hours per week for 10 weeks (Term 1)	Hours per week for 20 weeks (Terms 2 and 3)
Lectures	3	4
Laboratory	8	8
Tutorials	1	2
	12	14

PHYSIOLOGY TEXT AND REFERENCE BOOKS

73.011 Physiology I

Text-books

Davson: *Text Book of General Physiology,* 2nd ed., 1959.

Ruch and Fulton: *Medical Physiology and Biophysics,* 18th ed.

or

Bard: *Medical Physiology,* 11th ed.

Reference Books

Best and Taylor: *Physiological Basis of Medical Practice,* 7th ed., 1961.

Winton and Bayliss: *Human Physiology* 5th ed., 1962.

Starling and Lovatt Evans: *Principles of Human Physiology,* edited by H. Davson and M. Grace Eggleton, 13th ed.

Rushmer: *Cardiovascular Dynamics,* 2nd ed., 1959.

Comroe, Forster, Dubois, Briscoe and Carlsen: *The Lung: Clinical Physiology and Pulmonary Function Tests* (Year Book Publishers), 2nd ed., 1960.

The American Physiological Society's Handbook of Physiology (Vol. 1, Section 2, Circulation).

Smith: *Principles of Renal Physiology,* 1956.

Spector: *Handbook of Biological Data* (Saunders), 1956.

Dittmer and Grebe: *Handbook of Respiration* (Saunders), 1958.

Dittmer and Grebe: *Handbook of Circulation* (Saunders), 1959.

Eccles: *The Physiology of Nerve Cells* (Oxford University Press), 1957.

The American Physiological Society's Handbook of Physiology (Vols. 1, 2, 3, Section 1, Neurophysiology).

Pitt-Rivers and Tata: *The Thyroid Hormones* (Pergamon), 1959.

Williams (ed.): *Text Book on Endocrinology,* 3rd ed.

Yoffey and Courtice: *Lymphatics, Lymph and Lymphoid Tissue,* 1956.

Davenport: *Physiology of the Digestive Tract.*

James: *The Physiology of Gastric Digestion.* Monograph of the Physiological Society (Edward Arnold).

Prosser and Brown: *Comparative Animal Physiology,* 2nd ed., 1961.

Davenport: *The ABC of Acid-Base Chemistry.*

Ramsay: *Physiological Approach to the Lower Animals* (Cambridge University Press), 1952.

73.012 Physiology II

Text-books to be announced later.