 FACULTY OF SCIENCE
 HANDBOOK 1977

THE UNIVERSITY OF NEWCASTLE
NEW SOUTH WALES 2308

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Telephone — Newcastle 68 0401

One Dollar
FOREWORD

In bidding you "welcome" to the Faculty of Science, I also wish you a mentally stimulating and socially enjoyable sojourn at the University.

The time spent as an undergraduate should be a period in which preparation for a future career is intertwined with the development of a sense of responsibility and concern for the world around us.

By wisely balancing study and social activities it is possible to achieve both academic success and the social characteristics required for your roles in the future.

The role of the academic staff is to stimulate your sense of critical evaluation, guide your reading, advance your knowledge, excite your interest and act as general mentors. Their aim is to help you to help yourself.

The purpose of this handbook is to provide you with information about the Faculty of Science in a convenient form. If you have questions not clearly answered by other contents of this book don't hesitate to ask. Any member of the academic staff of the Faculty would be happy to advise you including, of course, the sub-dean and myself.

Your general development will be aided by adopting the University motto "LOOK AHEAD". During your undergraduate period think beyond the narrow confines of individual subjects and courses; try to relate the knowledge you are accumulating with the problems that surround us.

Broaden your outlook by joining one or more of the social clubs or societies that exist on the campus, and if possible have a circle of friends drawn from other Faculties and other walks of life.

With a balanced programme of work and play, coupled with sustained effort, your period at the University should prove to be both rewarding and enjoyable.

J. A. KEATS
Dean (1976)
Faculty of Science
The Faculty of Science comprises the Departments of Biological Sciences, Chemistry, Geology, Physics and Psychology. The Departments of Geography and Mathematics also offer major sequences of qualifying subjects for the degree of Bachelor of Science in the Faculty of Science.

The Faculty Board, Faculty of Science, consists of the Professors, Associate Professors, Readers, Senior Lecturers, Lecturers, Senior Tutors/Demonstrators and Tutors/Demonstrators of the Departments composing the Faculty together with the following representatives of the Departments offering services to the Faculty, as determined by Senate:—

six representatives of the Department of Geography;
six representatives of the Department of Mathematics;
two representatives of the Department of Metallurgy;
two representatives of the Faculty of Engineering;
two representatives of the Faculty of Arts;
a representative of the Department of Education; and
four student members elected from the Faculty of Science.

The Role of the Faculty Board is defined by By-law 2.4.8

"Each Faculty Board shall:—

(a) supervise the teaching and research activities of the Faculty and determine such examinations as may be held within the Faculty;
(b) make recommendations to the Admissions Committee on applications for admission to the Faculty under By-law 5.3.3;
(c) authorise students’ changes of courses and withdrawal from courses within the Faculty;
(d) deal with any matter referred to it by the Senate;
(e) make recommendations to the Senate on any matters affecting the Faculty; and
(f) exercise such other duties and powers as may from time to time be delegated to it by the Council".

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Professor C. D. Ellyett (1977-78)

Sub-Dean
Dr T. K. Roberts

Faculty Secretary
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Judy A. Halliday
Julie H. Latimer
Anne M. McKi
Vicki M. Piller
Information for Undergraduates

Students may choose subjects from the Departments of Geology, Physics, Chemistry, Biological Sciences, Psychology, Mathematics and Geography. A student may, with the permission of the Dean, count up to three subjects offered in other degree courses in the University as qualifying subjects.

Professional Employment and Professional Recognition

GEOLOGY

For employment as a geologist students must have at least an ordinary BSc degree but preferably an honours degree.

There are two professional organisations which graduates in geology may join — the Geological Society of Australia, Inc. and The Australasian Institute of Mining & Metallurgy which has several categories of membership according to qualifications and experience. The Australasian Institute of Mining & Metallurgy has a code of ethics for professional behaviour to which members are expected to adhere.

The Geological Society is currently working with the various State Governments and Federal Government to bring about legislation to provide for the registration of geologists.

PSYCHOLOGY

The Australian Psychological Society is the professional organisation of psychologists in this country.

The objects of the Society are the advancement and diffusion of a knowledge of psychology and especially the promotion of the professional standing of its members by setting up a high standard of training and conduct, and by requiring the observance of rules of professional conduct.

There are two categories of membership in the Australian Psychological Society — Fellowship and Membership. Provision is also made for Student Subscribers and Affiliates. Membership normally requires a four year degree in psychology.

The University of Newcastle Psychology Students' Association

The Association is open to all interested students of Psychology at a nominal cost of 50c annually. Members meet regularly to see films, hear recordings and to listen to speakers on a wide variety of topics. In addition, an important object of the Association listed in the Constitution is —

"To provide regular opportunities for social contacts among Psychology students, and Psychology students and staff."

You may join by leaving your name, address and telephone number with the Student Enquiries Office of the Department of Psychology (Room W204).

Subject Timetable Clashes

Students are strongly advised to check on possible timetable clashes before enrolling. Clashes may force students to take those subjects in different years. Although academic staff are always willing to advise students, it is the student's responsibility to ensure that chosen subjects may be studied concurrently. To help in this matter the following table of existing clashes has been compiled for Science Faculty subjects in 1977. However, Science students taking subjects from other faculties must examine the timetable to ensure that clashes do not exist in their proposed courses.

BIOLOGICAL SCIENCES

<table>
<thead>
<tr>
<th>Clashes</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIA with Chemistry IIA</td>
<td>Physics IIB</td>
</tr>
<tr>
<td>Biology IIB with Chemistry IIB</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Biology IIIA with Chemistry IIIA</td>
<td>Physics IIB</td>
</tr>
<tr>
<td>Biology IIIA with Chemistry IIIA</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Biology IIIB with Chemistry IIIA</td>
<td>Physics IIB</td>
</tr>
</tbody>
</table>

Because of the interchange of A and B timetables in alternate years, any subjects clashing with Biology IIA and IIIA in 1977 will clash with Biology IIB and IIIIB respectively in 1978 and vice versa.

CHEMISTRY

<table>
<thead>
<tr>
<th>Clashes</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry IIA with Physics IIB</td>
<td>Chemistry IIB</td>
</tr>
<tr>
<td>Chemistry IIB with Geology IIB</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Chemistry IIIA with Biology IIB</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Chemistry IIIA with Biology IIB</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Chemistry IIIA with Maths III (some topics)</td>
<td>Physics IIA</td>
</tr>
</tbody>
</table>
Student Academic Progress

All students are reminded of the need to maintain satisfactory progress and, in particular, attention is drawn to By-laws 5.4.1 and 5.4.2 (refer to the general supplement supplied with this handbook). The following should be borne in mind.

1. Pursuant to By-law 5.4.1.2, the Faculty Board requires that students shall pass at least one subject in their first year of full-time attendance or in their first two years of part-time attendance.

2. Pursuant to By-law 5.4.2.2, the Faculty Board has determined that at least four subjects be passed at the end of the first two years of full-time attendance or four years of part-time attendance.

3. Notwithstanding paragraphs 1 and 2, above, the Faculty Board, pursuant to By-law 5.4.1.2, may review the academic progress of a student in his later years of the course.

Advisory Prerequisite for entry to the Faculty

Prospective science degree students are advised to include four units of Science and two units of Mathematics in their H.S.C. programme. Although prerequisites are not prescribed, some subjects are currently presented on the assumption that students have previously studied to the level indicated below.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Assumed Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics IA, IB</td>
<td>Physics (2 unit course), grade 1, 2 or 3 or Multistrand (4 unit) Science, grade 1, 2 or 3.</td>
</tr>
<tr>
<td>Chemistry I</td>
<td>Chemistry (2 unit course), grade 1, 2 or 3 or Multistrand (4 unit) Science, grade 1, 2 or 3.</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>Mathematics (2 unit course), grade 1, 2 or 3.</td>
</tr>
</tbody>
</table>

Student Advice

Students who have problems should feel free to seek the advice of the DEAN, SUB-DEAN, the appropriate HEAD OF DEPARTMENT OR MEMBER OF TEACHING STAFF whose area of responsibility relates to the particular problem concerned.

THE UNIVERSITY COUNSELLING SERVICE is also available to help with broad educational problems on planning life goals as well as personal difficulties.

Prerequisites for Curriculum and Method Subjects offered in the Diploma in Education

Students who intend to proceed to a Diploma in Education should familiarise themselves with the prerequisites for curriculum and method subjects offered in the Diploma Course.
These prerequisites are stated in terms of subjects of the University of Newcastle. Applicants with qualifications from other universities, whose courses of study have included subjects which are deemed for this purpose to provide an equivalent foundation, may be admitted by the Dean on the recommendation of the Head of the Department of Education.

(a) English — (i) A Part I and a Part II subject in English: and
(ii) one additional subject from English, Linguistics or Drama.

(b) History — A Part II subject in History

(c) Modern Languages — A Part III subject in French or German

(d) Classics — A Part III subject in Greek or Latin

(e) Geography — A Part II subject in Geography

(f) Commerce/Economics — B.A. including Economics IIA or B.Com. including Microeconomics and Macroeconomics

(g) Social Science/Studies — Out of Economics, Geography, History, Psychology, Sociology, Legal Studies and Economic History:
(i) one subject at Part II level; and
(ii) two other subjects at Part I level

(h) Mathematics — (i) At least four subjects in Mathematics for the degree of B.A., B.Math., or B.Sc.; or
(ii) a degree in a field of applied science, with experience in the application of mathematics.

(i) Science — (i) Three subjects from the disciplines of Biology, Chemistry, Geology and Physics, or related fields of applied science, such subjects to be drawn from at least two of the disciplines of Biology, Chemistry, Geology and Physics; and
(ii) at least one other subject drawn from any of the above or from Mathematics, Geography, or Psychology.

(j) Primary — No specific prerequisites.

N.B. A Part II subject assumes as a prerequisite a pass in a Part I subject in the same discipline. A Part III subject assumes a pass in a Part I subject and a Part II subject in the same discipline.
8. **Withdrawal**
   (a) A candidate may withdraw from a subject or course only by informing the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.
   (b) A candidate who withdraws from any subject after the sixth Monday in second term shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty.

9. **Relaxing Clause**
   In order to provide for exceptional circumstances arising in particular cases, the Senate, on the recommendation of the Faculty Board, may relax any requirement.

10. **Expected Work Load**
    In the Faculty of Science students are expected to spend at least one hour in private study for every contact hour. For example, if a full-time student in the Faculty has 24 contact hours per week, he would be expected to spend a minimum of another 24 hours in private study.

THE ORDINARY DEGREE

11. **A Subject**
    (a) To complete a subject qualifying towards the degree, hereinafter called a subject, a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written work as the Department concerned shall require.
    (b) To pass a subject, a candidate shall satisfy the requirements of sub-clause (a) of this Clause and pass such examinations as the Faculty Board shall require.

12. **Subjects Offered**
    (a) Qualifying subjects are listed in the Schedule of Subjects appended to these Requirements.
    (b) A candidate may, with the permission of the Dean, count up to three subjects offered in other degree courses in the University as qualifying subjects, the status of any such subject in relation to the Parts set out in the Schedule of Subjects to be as determined by the Dean at the time when approval is granted.

13. **Degree Patterns**
    To qualify for admission to the ordinary degree a candidate shall pass nine subjects, chosen in terms of Clause 12, provided that:
    (i) one of the following degree patterns is chosen:
       (a) 4 subjects from Part I, 3 subjects from Part II, 2 subjects from Part III.
       (b) 4 subjects from Part I, 4 subjects from Part II, 1 subject from Part III.
       (c) 4 subjects from Part I, 2 subjects from Part II, 3 subjects from Part III.
       (d) 5 subjects from Part I, 2 subjects from Part II, 2 subjects from Part III.
    (ii) the subjects passed shall include at least three of the following:
        Biology I, Chemistry I, Geography I, Geology I, Mathematics I, Physics IA or Physics IB, and Psychology I;
    (iii) the subjects passed shall include at least:
       (a) one Part III subject and two Part II subjects:
       OR
       (b) two Part III subjects and one Part II subject chosen from the Schedule of Subjects in the Requirements for the degree of Bachelor of Science;
    (iv) (a) only one of Physics IA and Physics IB may be counted;
       (b) not more than four Mathematics subjects may be counted;
       (c) not more than 5 subjects from any one Department may be counted.

14. **Prerequisites**
    Before enrolling in a subject a candidate shall:
    (i) if the subject concerned is either a Part II or a Part III subject have passed in the corresponding subject in either Part I or Part II respectively; and
    (ii) have passed at the standard specified for any prerequisite subject prescribed in the Schedule of Subjects.

15. **Corequisites**
    A candidate shall not be permitted to enrol in a subject for which a corequisite subject is prescribed in the Schedule of Subjects, unless he concurrently enrols in or has previously passed that subject.

1 Candidates who enrolled in the BSc degree course prior to 1977 may proceed under these provisions or those in existence in 1976 (see 1976 Faculty Handbook).
2 Candidates who enrolled in the course prior to 1972 are exempt from this proviso.
16. **Preparatory Subjects**
Preparatory subjects are those which students are strongly advised to have completed before enrolling in the subject for which the preparatory subject is recommended.

A candidate enrolling in a subject for which a preparatory subject is prescribed in the Schedule of Subjects shall, before enrolling, consult with the Head of the Department offering the subject if he has not passed the Preparatory Subject.

17. In order to provide for exceptional circumstances arising in particular cases, the Dean, after consultation with the Heads of Departments concerned, may relax any requirement of Clauses 14, 15, 16.

18. **Progression**
(a) Progression in the course shall be by subject.
(b) A candidate shall be liable to exclusion from the course if he has not passed four subjects at the completion of two years full-time enrolment or four years part-time enrolment.
Where a candidate has transferred from full-time to part-time enrolment, or vice-versa, two part-time years shall be taken as the equivalent of one full-time year for the purpose of this clause.
(c) A candidate may not enrol in more than four subjects in any one academic year.
(d) A candidate enrolling in four subjects in any one academic year shall not include a Part III subject nor more than two Part II subjects in the four in which he is enrolling.
(e) A candidate enrolling in three subjects in any one academic year shall not include more than one Part III subject in the three in which he is enrolling.
(f) For the purpose of these Requirements the following shall be regarded as the normal programme:

<table>
<thead>
<tr>
<th>Year</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Four Part I subjects</td>
</tr>
<tr>
<td>II</td>
<td>Three Part II subjects; or Two Part II and one Part I subject</td>
</tr>
<tr>
<td>III</td>
<td>Two Part III subjects; or One Part III and one Part II subject</td>
</tr>
</tbody>
</table>

The Dean may, in individual cases relax restrictions (c), (d), (e) but only if he is satisfied that the academic merit of the candidate warrants such relaxation.

19. **Standing**
(a) A candidate may be given standing in qualifying subjects in recognition of work completed in another faculty or tertiary institution and be deemed to have passed in these subjects for the purpose of Clause 13. If the candidate is a graduate such standing shall be limited to a maximum of four subjects.
(b) Standing may be granted in subjects not offered in the University. Any such subject shall be regarded for the purpose of these Requirements as being a subject in the Part in the Schedule of Subjects as determined by the Dean at the time such standing is granted.

**HONOURS DEGREE**

20. **Honours**
(a) A candidate seeking to complete an honours degree shall consult with the Head of the Department concerned before enrolling in Part II subjects. Such a candidate may be required to complete concurrently with the study prescribed for the ordinary degree such additional work as the Department may prescribe.
(b) A candidate for the honours degree, before enrolling in the honours subject shall:
(i) have completed the requirements for admission to the ordinary degree;
(ii) have been granted approval to enrol in the honours subject from both the Head of the Department concerned and the Dean.
(c) The honours subjects offered shall be:

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<th>Subject</th>
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<td>Biology IV</td>
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<td>Chemistry IV</td>
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<td>Physics IV</td>
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<td>Psychology IV</td>
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(d) To qualify for admission to the honours degree a candidate, in addition to satisfying the other provisions of these Requirements, shall:
(i) complete the requirements of the honours subject in one year's full-time study or two years' part-time study; and
(ii) pass the honours subject.

1 Please refer to the Notes to the Degree Requirements.
21. **Combined Honours**

(a) A candidate seeking to complete a combined honours degree shall consult with the Heads of the Departments concerned before enrolling in Part II subjects. Such a candidate may be required to complete, concurrently with the study prescribed for the ordinary degree, such additional work as the Departments may prescribe.

(b) A candidate for the combined Honours degree in the Faculty of Science, before enrolling in the combined Honours subject shall:

(i) have completed the Requirements for admission to the ordinary degree and have included in his degree course such prerequisite subjects as prescribed by Faculty Board for admission to the combined Honours subject;

(ii) have been granted approval to enrol in the combined Honours subject from the Heads of the Departments concerned and the Dean.

(c) The combined honours subjects offered shall be:

- Physics/Mathematics IV
- Psychology/Mathematics IV

(d) To qualify for admission to the combined Honours degree a candidate, in addition to satisfying the other provisions of these requirements, shall:

(i) complete the requirements of the combined Honours subject in one year’s full-time study or two years’ part-time study;

and

(ii) pass the combined Honours subject.

22. There shall be three classes of Honours or Combined Honours, namely Class I, Class II and Class III. Class II shall have two divisions.

23. In each Honours subject or Combined Honours subject, the candidate or candidates at the head of Honours Class I in any year may, if of sufficient distinction, be awarded a University Medal.

**COMBINED DEGREE COURSES**

24. A candidate may complete the Requirements for the degree of Bachelor of Science in conjunction with another Bachelor’s degree by completing a combined course approved by the Faculty Board of the Faculty of Science and the other Faculty Board concerned provided that:

(i) admission to a combined course shall normally be at the end of the first year and shall be subject to the approval of the Deans of the two Faculties concerned;

(ii) admission to combined courses will be restricted to students with an average of at least Credit level;

(iii) the Deans of both Faculties shall certify that the work in the combined degree course is no less in quantity and quality than if the two courses were taken separately.

**Science/Arts**

A candidate who has enrolled in a combined course shall comply with all the provisions of the Requirements for the degree of Bachelor of Arts other than Clause 12 and with all the Requirements for the degree of Bachelor of Science other than Clauses 13(i) and 18, and shall qualify for admission to the ordinary degrees of Bachelor of Arts and Bachelor of Science by passing fourteen subjects chosen from the Schedules of Subjects approved for the two degrees, provided that:

(a) at least six subjects including at least one Part III subject, shall be chosen from Group I of the Schedule of Subjects approved for the degree of Bachelor of Arts;

(b) at least six subjects, including at least one Part III subject and one Part II subject in a different department, shall be chosen from the Schedule of Subjects approved for the degree of Bachelor of Science (the Part III subject elected must be from a department different from that providing the Part III subject mentioned in (a));

(c) the maximum total number of Arts Part I subjects and Science Part I subjects shall not exceed six.

**Science/Mathematics**

A candidate who has enrolled in such a combined course shall qualify for admission to the ordinary degrees of Bachelor of Science and Bachelor of Mathematics by passing fourteen subjects, as follows:

(a) five subjects, being Mathematics I, Mathematics IIA, Mathematics IIC, Mathematics IIIA and either Mathematics IIIB or a Part III subject chosen from Schedule B of the Schedule of Subjects approved for the degree of Bachelor of Mathematics

and

(b) six subjects chosen from the other subjects listed in the Schedule of Subjects approved for the degree of Bachelor of Science

and

(c) three subjects chosen, with the approval of the Deans of the Faculties of Mathematics and Science, from the subjects approved for any of the degree courses offered by the University.
provided that:
(a) the number of Part I subjects shall not exceed six;
(b) the minimum number of Part III subjects shall be three;
(c) a candidate counting Psychology IIC shall not be entitled to count either Psychology IIA or Psychology IIIB;
(d) a candidate counting Psychology IIIC shall not be entitled to count either Psychology IIIA or Psychology IIIB;
(e) a candidate counting Economics IIIC shall not be entitled to count either Economics IIIA or Economics IIIB.

Science/Engineering
A candidate who has enrolled in such a combined course shall complete all requirements for the Bachelor of Engineering in any specialisation and comply with the Requirements for the degree of Bachelor of Science, with the provision that Engineering I is recognised as a Science Part I subject (and that a subject taken for the Science degree course may be accepted as Elective III) for the Engineering degree course. Normally the requirements for the degree of Bachelor of Science shall be completed before the candidate enrols for the final year of the Engineering degree course.

EQUIVALENT HONOURS
25. (a) On the recommendation of a Head of Department in the Faculty and with the permission of the Dean, a graduate who, in the discipline concerned, has not completed the fourth year honours subject either as a full-time or a part-time student at this or at any other Australian university, may enrol in the fourth year honours subject either as a full-time or a part-time student.
(b) Such a graduate who has completed all of the requirements of the fourth year honours subject shall be issued with a statement to this effect by the Secretary; the Statement shall indicate the honours level equivalent to the standard achieved by the student in completing the fourth year honours subject.

SCHEDULE OF SUBJECTS

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<tr>
<th>Subject</th>
<th>Remarks, Prerequisites, Corequisites, Preparatory Subjects</th>
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Remarks, Prerequisites, Corequisites, Preparatory Subjects

- **Prerequisite**: Biology I
- **Prerequisite**: Chemistry I
- **Prerequisite**: Mathematics I & either Physics IA or Physics IB
- **Prerequisite**: Physics IA or IB
- **Prerequisite**: Geology I
- **Prerequisite**: Geology I
- **Prerequisite**: Mathematics I
- **Prerequisite**: Mathematics IIIA
- **Prerequisite**: Mathematics IIIA, Mathematics IIIA
- **Remarks**: Before enrolling in Chemistry IIIB, the student must obtain the approval of the Head of the Department of Chemistry or his representative
- **Prerequisite**: Geology IIA or IIB
- **Prerequisite**: Geology IIA or IIB
- **Corequisite**: Geography IIIB (for full-time students)
- **Prerequisite**: Geology IIIB
- **Prerequisite**: Chemistry I & either Physics IA or Physics IB
- **Prerequisite**: Geology IIIB
- **Corequisite**: Geology IIIA

Only one of these subjects may be taken.
**Subject** | **Remarks, Prerequisites, Corequisites, Preparatory Subjects**
---|---
Mathematics IIIA | Prerequisite: Mathematics II & IIC
Mathematics IIIIB | Corequisite: Mathematics IIIA
Physics IIIA | Prerequisite: Physics II, Mathematics IIIA or IIB or IIC— the topics C, E, G and H or B and D are recommended. It is possible to achieve this combination with either Mathematics IIII alone, or Mathematics IIIB with Mathematics IIIC.
Physics IIIIB | Prerequisite: Physics II
Corequisite: Physics IIIA
This subject will not be offered in any one year unless there are three or more enrolments.
Psychology IIIA | Prerequisite: Psychology IIA
Psychology IIIIB | Prerequisite: Psychology IIIB

**Progress Requirements for Students in the Faculty of Science**

Students enrolled in the Faculty of Science are required to meet the following standards to maintain satisfactory progress.

1. In the first year of enrolment as a full-time student or in the first two years of enrolment as a part-time student—to pass at least one subject.
2. In the first two years of enrolment as a full-time student or in the first four years of enrolment as a part-time student—to pass at least four subjects.

Where there is a change in classification of a student from full-time to part-time or vice versa, two part-time years will be taken as the equivalent of one full-time year.

**Combined Degree Courses**

Sample programmes for students wishing to enrol for a combined degree course under Section 24 of the Requirements for the degree of Bachelor of Science are:

**Science/Arts**

Normally the joint degree programme would be pursued as in either (a) or (b):

(a) **Year I** Four Science Part I subjects passed with an average performance of credit level or higher.

(b) **Year II** Three Science Part II subjects and an additional subject which will be an Arts Group I Part I subject if no Arts Group I subject has been passed.

1 Note Section 13 (iv)(b) of the Degree Requirements.
Faculty Policy in Regard to the 
Granting of Standing for Diploma 
Courses Completed through the CAE

The Faculty Board is willing to grant standing to Diplomates of 
Teachers Colleges and Colleges of Advanced Education who have 
taken an approved amount of Science in their course. The minimum 
requirements for the award of the ordinary degree of Bachelor of 
Science would be satisfied by the completion of a major sequence, 
I.e. part I, II and III in an approved Science discipline, and a minor 
sequence, I.e. part I and II in a different approved Science discipline.

POSTGRADUATE COURSES
Studies may be undertaken at a postgraduate level in the following 
courses:

Diploma in Psychology
Master of Psychology (Educational)
Master of Science
Doctor of Philosophy

The Department of Psychology also offers a Master of Science degree 
course in the discipline of Clinical Psychology.

REQUIREMENTS FOR THE DIPLOMA IN PSYCHOLOGY

GENERAL

1. There shall be a Diploma in Psychology.

2. In these Requirements, unless the context or subject-matter other-

wise indicates or requires, “the Faculty Board” means the Faculty 
Board of the Faculty of Science, “the Board of Studies” means 
the Board of Studies in Psychology, and “the Dean” means the 
Dean of the Faculty of Science.

3. A candidate for the Diploma shall register in one of the following 
specialisations:

(a) Clinical Psychology; or 
(b) Educational Psychology.

4. The Diploma shall be awarded in one grade only.

5. A candidate may withdraw from the course only by informing the 
Secretary to the University in writing and the withdrawal shall 
take effect from the date of receipt of such notification.

6. In exceptional circumstances, the Senate may, on the recommend-
ation of the Faculty Board, relax any provision of these 
Requirements.

CLINICAL SPECIALISATION

7. An applicant for registration as a candidate for the Diploma in 
the Clinical Specialisation shall:

(a) have satisfied all of the requirements for admission to a 
Bachelor's degree with honours in Psychology in the 
University of Newcastle or to such a degree in another 
university approved for this purpose by the Faculty Board; and

(b) be selected for admission to the course by the Board of 
Studies which shall, in making this determination, take 
account of the applicant's academic qualifications, experience, 
and the report of an interview which shall be conducted by 
a selection committee which the Board shall appoint.

8. (a) Notwithstanding the provision of subsection (a) of Section 7, 
the Faculty Board, on the recommendation of the Board of 
Studies, may permit to register as a provisional candidate a 
person who has satisfied all of the requirements for admission 
to a degree of the University of Newcastle or another 
university approved for this purpose by the Faculty, provided 
that the course completed for that degree by the applicant 
included a major study in Psychology.

(b) A candidate permitted to register provisionally under the 
provisions of subsection (a) of this Section shall complete 
such work and pass such examinations at Bachelor's degree 
honours level as may be prescribed by the Faculty Board 
before his registration may be confirmed by the Faculty 
Board.

9. A candidate for the Diploma in the Clinical Specialisation shall, 
in not less than two years of part-time enrolment, attend such 
lectures, seminars and tutorials; complete such written and prac-
tical work; and pass such examinations as may be prescribed by 
the Board of Studies.

EDUCATIONAL SPECIALISATION

10. An applicant for registration as a candidate for the Diploma in 
the Educational Specialisation shall:

(a) (i) have satisfied all of the requirements for admission to 
a Bachelor's degree in the University of Newcastle and 
have included in the qualifying course for that degree at 
least one Part III Psychology subject; 
or 
(ii) have satisfied all of the requirements for admission to an 
equivalent qualification in another university recognised 
for this purpose by the Faculty Board;
(b) have satisfied all of the requirements for the award of the Diploma in Education in the University of Newcastle or another teaching qualification approved for this purpose by the Faculty Board;

(c) to have at least two years teaching or other relevant practical experience approved by the Board of Studies; and

(d) be selected for admission to the course by the Board of Studies which shall, in making this determination, take account of the applicant's academic qualifications; experience; and the report of an interview which shall be conducted by a selection committee which the Board shall appoint.

11. A candidate for the Diploma in the Educational Specialisation shall, in not less than two years of full-time enrolment or an equivalent period of part-time enrolment, attend lectures, seminars and tutorials; complete such written and practical work; and pass such examinations as may be prescribed by the Board of Studies.

REQUIREMENTS FOR THE DEGREE OF MASTER OF PSYCHOLOGY (EDUCATIONAL)

1. The degree of Master of Psychology (Educational) shall be awarded in one grade only.

2. In these Requirements, unless the context or subject matter otherwise indicates or requires, the Faculty Board means the Faculty Board of the Faculty of Science, the Board of Studies means the Board of Studies in Psychology, and the Dean means the Dean of the Faculty of Science.

3. An Application to Register as a candidate for the degree of Master of Psychology (Educational) shall be made on the prescribed form which shall be lodged with The Secretary at least one full calendar month prior to the commencement of the first term of any calendar year.

4. An applicant for registration shall:
   (a) (i) have satisfied all of the Requirements for admission to a Bachelors degree in the University of Newcastle and have passed at least one Part III Psychology subject within or subsequent to that degree course; or
   (ii) have satisfied all of the Requirements for admission to an equivalent qualification in another University recognised for this purpose by the Faculty Board;
   (b) have satisfied all of the Requirements for the award of the Diploma in Education in the University of Newcastle or another teaching qualification approved for this purpose by the Faculty Board;
   (c) have at least two years teaching or other relevant practical experience approved by the Board of Studies; and
   (d) be selected for admission to the course by the Board of Studies which shall, in making this determination, take into account all the applicant's academic qualifications; experience; and the report of an interview which shall be conducted by a Selection Committee which the Board shall appoint.

5. In every case, before permitting an applicant to register as a candidate, the Faculty Board shall be satisfied that adequate supervision and facilities are available.

6. A candidate shall register as either a full-time or part-time student.

7. A candidate shall pursue over a period of not less than two years of full-time (or equivalent part-time) attendance a course of formal study by attending such lectures, seminars, tutorials; complete such written and practical work; submit a thesis embodying the results of an investigation or design; and pass such examinations as may be prescribed by the Board of Studies.

8. The investigation or design and other work as provided in paragraph 7 shall be conducted under the direction of a Supervisor appointed by the Faculty Board or under such conditions as the Faculty Board may determine.

9. Every candidate shall submit three copies of the thesis as provided under paragraph 7. All copies of the thesis shall be in double-spaced typescript, shall include a summary of approximately 200 words, and a certificate signed by the candidate to the effect that the work has not been submitted for a higher degree to any other university or institution. The ORIGINAL copy of the thesis for deposit in the Library shall be prepared and bound in a form approved by the University. ¹ The other two copies of the thesis shall be bound in such manner as allows their transmission to the examiners without possibility of their disarrangement.

10. It shall be understood that the University retains the three copies of the thesis and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act (1968) the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

11. For each candidate there shall be two examiners appointed by the Senate, one of whom shall be an external examiner.

¹ Separate sheet on the preparation and binding of higher degree thesis is available on application.
12. The progress of each candidate shall be reviewed on the completion of three terms of full-time study (or equivalent part-time study) and if the candidate is deemed not to have achieved a standard equivalent to Honours Class II, he may be requested to "Show Cause" why he should be allowed to continue in his course.

REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

1. An application to register as a candidate for the degree of Master of Science shall be made on the prescribed form which shall be lodged with the Secretary at least one full calendar month before the commencement of the term in which the candidate desires to register.

2. An applicant for registration for the degree of Master of Science shall either:
   (a) have satisfied all the requirements for admission to the degree of Bachelor of Science with Honours Class I or Class II in the University of Newcastle or to an appropriate degree of this or any other university approved for this purpose by the Faculty Board of the Faculty of Science; or
   (b) have satisfied all the requirements for admission to the degree of Bachelor of Science in the University of Newcastle or other approved university; or
   (c) in exceptional cases produce evidence of possessing such other qualifications as may be approved by the Faculty Board on the recommendation of the Head of the Department concerned.

3. Before registration as a candidate for the degree is confirmed, an applicant desiring to register under Clause 2(b) or 2(c) above, shall be required to carry out such work and to sit for such examinations as the Faculty Board may determine and to achieve a standard at least equivalent to that required for the award of a Bachelor's degree with second class honours in an appropriate subject.

4. In every case, before permitting an applicant to register as a candidate, the Faculty Board shall be satisfied that adequate supervision and facilities are available.

5. An applicant approved by the Faculty Board shall register in one of the following categories:
   (i) Student in full-time attendance at the University.
   (ii) Student in part-time attendance at the University.

6. (i) Every candidate for the degree shall be required to submit a thesis embodying the results of an investigation or design, to take such examinations and to perform such other work as may be prescribed by the Faculty Board. The candidate may submit also for examination any work he has published, whether or not such work is related to the thesis.

   (ii) The investigation or design and other work as provided in paragraph 6 (i) shall be conducted under the direction of a supervisor appointed by the Faculty Board or under such conditions as the Faculty Board may determine.

   (iii) A part-time candidate shall, except in special circumstances —
      i. conduct the major proportion of the research or design work in the University; and
      ii. take part in research seminars within the Department in which he is working.

   (iv) Every candidate shall submit annually a report on his work to his supervisor for transmission to the Higher Degree Committee.

   (v) Every candidate shall submit three copies of the thesis as provided under paragraph 6 (i). All copies of the thesis shall be in doublespaced typescript, shall include a summary of approximately 200 words and a certificate signed by the candidate to the effect that the work has not been submitted for a higher degree to any other university or institution. The ORIGINAL copy of the thesis for deposit in the Library shall be prepared and bound in a form approved by the University. The other two copies of the thesis shall be bound in such manner as allows their transmission to the examiners without possibility of their disarrangement.

   (vi) It shall be understood that the University retains the three copies of the thesis and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act (1968) the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

7. No candidate shall be considered for the award of the degree until the lapse of six complete terms from the date from which the registration becomes effective, save that in the case of a candidate who has obtained the degree of Bachelor with Honours or a qualification deemed by the Faculty Board to be equivalent or who has had previous research experience, this period may, with the approval of the Faculty Board, be reduced by up to three terms.

8. For each candidate there shall be two examiners appointed by the Senate, one of whom shall be an external examiner.

9. A candidate who fails to satisfy the examiners may be permitted to resubmit his thesis in an amended form. Such a resubmission must take place within twelve months from the date on which the candidate is advised of the result of the first examination. No further resubmission shall be permitted.

1 Separate sheet on the preparation and binding of higher degree thesis is available on application.
REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

1. The degree of Doctor of Philosophy may be awarded by the Council on the recommendation of the Senate to a candidate who has satisfied the following requirements.

2. A candidate for registration for the degree of Doctor of Philosophy shall:

(i) have satisfied all of the requirements for admission to the degree of master or the degree of bachelor with first or second classhonours in the University of Newcastle or a degree from another university recognised by the Senate as having equivalent standing;

or

(ii) have satisfied all of the requirements for admission to the degree of bachelor with third class honours or without honours in the University of Newcastle or a degree from another university recognised by the Senate as having equivalent standing, and have achieved by subsequent work and study a standard recognised by the Senate as equivalent to at least second class honours;

or

(iii) in exceptional cases submit such other evidence of general and professional qualifications as may be approved by the Senate.

3. The Senate may require a candidate, before he is permitted to register, to undergo such examination or carry out such work as it may prescribe.

4. A candidate for registration for a course of study leading to the degree of Ph.D. shall:

(i) apply on the prescribed form at least one calendar month before the commencement of the term in which he desires to register;

and

(ii) submit with his application a certificate from the Head of the Department in which he proposes to study stating that the candidate is a fit person to undertake a course of study or research leading to the Ph.D. degree and that the Department is willing to undertake the responsibility of supervising the work of the candidate.

5. Before being admitted to candidature, an applicant shall satisfy the Senate that he can devote sufficient time to his advanced study and research.

6. Subsequent to registration, the candidate shall pursue a course of advanced study and research for at least nine academic terms save that in exceptional cases Senate may exempt a candidate from not more than three academic terms.

7. A candidate shall present himself for examination not later than fifteen academic terms from the date of his registration, unless special permission for an extension of time be granted by the Senate.

8. (a) The course shall be carried out in a Department of the University.

(b) Notwithstanding the provisions of subsection (a) of this clause, a candidate may be granted special permission by the Senate to spend a period of not more than three academic terms in research at another institution approved by the Senate.

(c) The course shall be carried out under the direction of a supervisor or supervisors appointed by the Senate.

9. Not later than three academic terms after registration the candidate shall submit the subject of his thesis for approval by the Senate. After the subject has been approved it may not be changed except with the permission of the Senate.

10. A candidate may be required to attend a formal course of study appropriate to his work.

11. On completing his course of study every candidate shall submit a thesis which complies with the following requirements:

(i) The greater proportion of the work described must have been completed subsequent to registration for the Ph.D. degree.

(ii) It must be a distinct contribution to the knowledge of the subject.

(iii) It must be written in English or in a language approved by the Senate and reach a satisfactory standard of literary presentation.

12. The thesis shall consist of the candidate's own account of his research. In special cases work done conjointly with other persons may be accepted provided the Senate is satisfied on the candidate's part in the joint research.

13. Every candidate shall be required to submit with his thesis a short abstract of the thesis comprising not more than 300 words.

14. A candidate may not submit as the main content of his thesis any work or material which he has previously submitted for a university degree or other similar award.
15. The candidate shall give in writing three months' notice of his intention to submit his thesis and such notice shall be accompanied by the appropriate fee.

16. Four copies of the thesis shall be submitted together with a certificate from the supervisor that the candidate has completed the course of study prescribed in his case and that the thesis is fit for examination.

17. The thesis shall be in double spaced typescript. The original copy for deposit in the Library shall be prepared and bound in a form approved by the University. The other three copies shall be bound in such manner as allows their transmission to the examiners without possibility of disarrangement.

18. It shall be understood that the University retains four copies of the thesis and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act (1968) the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

19. The candidate may also submit as separate supporting documents any work he has published, whether or not it bears on the subject of the thesis.

20. The Senate shall appoint three examiners of whom at least two shall not be members of the teaching staff of the University.

21. The examiners may require the candidate to answer, viva voce or in writing, any questions concerning the subject of his thesis or work.

22. The result of the examination shall be in accordance with the decision of a majority of the examiners.

23. A candidate permitted to re-submit his thesis for examination shall do so within a period of twelve months from the date on which he is advised of the result of the first examination.

24. In exceptional circumstances the Senate may relax any of these Requirements.

**REQUIREMENTS FOR THE DEGREE OF DOCTOR OF SCIENCE**

1. The degree of Doctor of Science may be awarded by the Council, on the recommendation of the Senate, for an original contribution or contributions of distinguished merit adding to the knowledge or understanding of any branch of learning with which the Faculty is concerned.

2. An applicant for registration for the degree of Doctor of Science shall hold a degree of the University of Newcastle or a degree from another university recognised by the Senate as being equivalent or shall have been admitted to the status of such a degree.

3. The degree shall be awarded on published work although additional unpublished work may also be considered.

4. Every candidate in submitting his published work and such unpublished work as he deems appropriate shall submit a short discourse describing the research embodied in his submission. The discourse shall make clear the extent of originality and the candidate's part in any collaborative work.

5. An applicant for registration for the degree shall submit in writing to the Secretary a statement of his academic qualifications together with:
   - (a) four copies of the work, published or unpublished, which he desires to submit; and
   - (b) a Statutory Declaration indicating those sections of the work, if any, which have been previously submitted for a degree or diploma in any other university.

6. The Senate shall appoint three examiners of whom at least two shall not be members of the teaching staff of the University.

7. The examiners may require the candidate to answer, viva voce or in writing, any questions concerning his work.

8. The result of the examination shall be in accordance with the decision of a majority of the examiners.

In these requirements, the term "published work" shall mean printed in a periodical or as a pamphlet or as a book readily available to the public. The examiners are given discretion to disregard any of the work submitted if, in their opinion, the work has not been so available for criticism.

**GUIDE TO SUBJECT ENTRIES**

Subject outlines and reading lists are set out in a standard format to facilitate easy reference. An explanation is given below of some of the technical terms used in this Handbook.

1. (a) **Prerequisites** are subjects which must be passed before a candidate enrolls in a particular subject.

   (b) Where a subject is marked **Advisory** it refers to a pass in the Higher School Certificate. In such cases lectures will be given on the assumption that a pass has been achieved at the level indicated.
(c) Preparatory subjects are those which candidates are strongly advised to have completed before enrolling in the subject for which the preparatory subject is recommended.

2. Corequisites refer to subjects or topics which the candidate must either pass before enrolling in the particular subject or be taking concurrently.

3. Texts are books recommended for purchase.

4. References are books relevant to the subject or topic which need not be purchased.

DEPARTMENT OF BIOLOGICAL SCIENCES

711100 Biology I

Prerequisites Nil, but a series of 10 lectures in background chemistry will be offered in the last two weeks of February for those students enrolling in Biology I who have done little chemistry. Attendance at the lectures is optional.

Hours 3 lecture hours and 3 hours of tutorial and laboratory classes per week. A two-day excursion.

Examination One 3-hour paper

Content

Cells and Cell Constituents

Fundamental Chemical Reactions
Photosynthesis. Respiration (aerobic and anaerobic). Chemosynthesis. Production of ATP.

Diversity of Organisms
Origins of life, Classification of organisms

Plant Classification and Processes
Plant Kingdom. Structure, function and development of higher plants.

Animal Classification and Processes

Immunology
Antigens and antibodies. Blood groups.

Genetics and Development

Population Biology
An introduction to ecology, population genetics and evolution.

Human Biology
Evolution of man. Heredity and environment. Eugenics. Population control. The practical classes will present exercises relevant to these topics.

Preliminary Reading

White, E. H. Chemical Background for the Biological Sciences 2nd edn (Prentice-Hall 1973)


Keeton, W. J. Biological Science 2nd edn (Norton 1972)

Clarke, R. B. & Panchen, A. L. Synopsis of Animal Classification (Chapman & Hall)

Holloway, B. W. Genes and Chromosomes in Action (Thomas Nelson)

Moroney, M. J. Facts from Figures (Penguin)

Srb, A. M. et al. General Genetics 2nd edn (Freeman)

712100 Biology IIA

Molecular and Cellular Biology

Prerequisites Biology I

Hours 3 lecture hours and 6 hours tutorial and laboratory classes per week

Examination Two 3-hour papers

Content

Biochemistry

Cell Biology
Cellular organization and inter-relationships, Organelles, their structure and function. Cellular processes.

Genetics
Statistics
Normal distribution. Tests of significance. Correlation. Regression. The practical classes will present exercises relevant to these fields. Tutorials will deal with biological topics of interest, and provide practice in statistical evaluation of biological data.

Texts
Bailey, N.T.J. Statistical Methods in Biology (English U.P. 1964)
Giese, A. C. Cell Physiology 4th edn (Saunders 1973)
Srb, A. M. et al. General Genetics 2nd edn (Freeman 1965)

References
Gardner, E. J. Principles of Genetics 5th edn (Wiley 1975)
Krogmann, D. W. The Biochemistry of Green Plants (Prentice-Hall 1973)
McDermott, A. Cytogenetics of Man and Other Animals (Chapman & Hall)
De Robertis, E. D. P. et al. Cell Biology (Saunders)
Smith-Keary, P. F. Genetic Structure and Function (Macmillan)
White, E. H. Chemical Background for the Biological Sciences 2nd edn (Prentice-Hall 1970)
Wold, F. Macromolecules: Structure and Function (Prentice-Hall 1971)
Woods, R. A. Biochemical Genetics (Chapman & Hall 1973)

712200 Biology III
Biology of Organisms and Population

Prerequisites
Biology I

Hours
3 lecture hours and 6 hours tutorial and laboratory classes per week.

Examination
Two 3-hour papers

Content
Comparative Structure and Function
Structural comparisons of organisms from the major phyla. Phylogenetic development of particular structures in terms of their functional capacities to solve environmental problems.

Ecology
Physical and biological factors influencing the abundance and distribution of organisms. Determination and measurement of these factors.

Statistics
Normal distribution. Tests of significance. Correlation. Regression. The practical classes will present exercises relevant to these fields. Tutorials will deal with biological topics of interest, and provide practice in statistical evaluation of biological data.

Texts
Bailey, N. T. J. Statistical Methods in Biology (English U.P.)
Doyle, W. T. The Biology of Higher Cryptograms (Macmillan)
Krebs, C. J. Ecology (Harper & Row)
Sutcliffe, J. Plants and Water (Arnold)

References
Barnes, R. D. Invertebrate Zoology 2nd edn (Saunders 1974)
Bell, P. & Woodcock, C. The Diversity of Green Plants 2nd edn (Edward Arnold 1971)
Bossart, E. Q. & Wilson, W. H. A Primer in Population Biology (Sinauer)
Clark, L. R. et al. The Ecology of Insect Populations in Theory and Practice (Methuen)
Darnell, R. M. Organism and Environment (Freeman)
Daubenmire, R. F. Plants and Environment 3rd edn (Wiley 1974)
Passmore, R. & Robson, J. S. (eds) Anatomy, Biochemistry, Physiology and Related Subjects (Blackwell 1973)
Pianka, E. R. Evolutionary Ecology (Harper & Row)
Russell-Hunter, W. D. Biology of Lower Invertebrates (Collier Macmillan)
Russell-Hunter, W. D. Biology of Higher Invertebrates (Collier Macmillan)
Schmidt-Nielsen, K.  *Animal Physiology* 3rd edn (Prentice-Hall 1975)

Weichert, C.  *Anatomy of Chordates* 4th edn (McGraw-Hill)

713100 Biology IIA
Molecular and Cellular Biology

**Prerequisites**  Biology IIA

**Hours**  4 lecture hours and 8 hours tutorial and laboratory classes per week.

**Examination**  Two 3-hour papers

**Content**

**Developmental Biology**
Fertilization, Cleavage and Gastrulation, Differentiation. Induction Genetic Control.

**Animal and Plant Physiology**
General principles of physiology with comparisons between different organisms. Emphasis laid on molecular and cellular physiology.

**Immunology**
Molecular and cellular aspects.

Additional texts and references may be recommended at the beginning of the course.

**Texts**
- Gordon, B. L.  *Essentials of Immunology* 2nd edn (Davis 1974)
- Hamburgh, M.  *Theories of Differentiation* (Arnold 1971)
- Zar, J. H.  *Biostatistical Analysis* (Prentice-Hall)

**References**
- Ashworth, J. M.  *Cell Differentiation* (Chapman & Hall 1974)
- Balinsky, B. I.  *An Introduction to Embryology* 3rd edn (Saunders 1970)
- Bellanti, J. A.  *Immunology* (Saunders 1971)
- Ebert, J. D. & Sussex, I. M.  *Interacting Systems in Development* (Holt, Rhinehart & Winston 1970)
- Garrod, D.  *Cellular Development* (Chapman & Hall 1974)

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Stanier, R. Y. et al.  *General Microbiology* 3rd edn (Macmillan 1971)

Torrey, J. G.  *Development in Flowering Plants* (Macmillan)

Tyndale Biscoe, H.  *Life of Marsupials* (Arnold)


713200 Biology IIB
Biology of Organisms and Populations

**Prerequisites**  Biology IIA or IIB

**Hours**  4 lecture hours and 8 hours tutorial and laboratory classes per week.

**Examination**  Two 3-hour papers

**Content**

**Fundamentals of Population and Quantitative Genetics**

**Community Analysis**
Structure and dynamics of biological communities.

**Environmental Physiology**
Functional adaptations (homeostatic and developmental) of organisms to their environments.

**Texts**
- Falconer, D. S.  *Introduction to Quantitative Genetics* (Oliver & Boyd 1975)
- Krebs, C. J.  *Ecology* (Harper & Row)
- Milthorpe, F. L. & Moorby, J.  *An Introduction to Crop Physiology* (Cambridge U.P.)
- Zar, J. H.  *Biostatistical Analysis* (Prentice-Hall)

**References**
- Connell, P. W.  *Water Pollution* (Queensland U.P.)
- Ford, E. B.  *Ecological Genetics* (Methuen 1975)
Gordon, M. S.  
Kershaw, K. A.  
Leopold, A. C. & Kriedemann, P. E.  
Pianka, E. R.  
Phillipson, J.  
Poole, R. W.  
Schmidt-Nielson, K.  
Swenson, M. J. (ed.)

Animal Physiology: Principles and Adaptions  (Macmillan 1972)
Quantitative and Dynamic Plant Ecology  2nd edn (Arnold 1973)
Plant Growth and Development  (McGraw-Hill 1975)
Evolutionary Ecology (Harper & Row)
Ecological Energetics (Arnold)
Introduction to Quantitative Ecology  (McGraw-Hill)
How Animals Work (Cambridge U.P.)
Dukes Physiology of Domestic Animals  (Cornell U.P. 1970)

714100 Biology IV

Prerequisite  Nil
Examination  To be advised

DEPARTMENT OF CHEMISTRY

721100 Chemistry I

Prerequisites  Nil
Hours  About 3 lecture hours and 3 hours of tutorial and laboratory classes per week.
Examination  Three 3-hour papers, one in mid-year.

Content
Inorganic Chemistry (30 lectures)
The periodic properties of the elements and their compounds; chemistry of selected elements from some Groups of the Periodic Table.

Organic Chemistry (30 lectures)

Physical Chemistry (30 lectures)
The mole concept; atomic and molecular structure; binding and energy; chemical equilibria and energetics; chemical kinetics.

Texts
Aylward, G. H. & Findlay, T. J. V.  
Benfey, O. T.  
Hart, H. & Scheutz, R. D.  
Pimentel, G. C. & Spratley, R. D.

The Names and Structures of Organic Compounds (Wiley 1966)
Understanding Chemistry (Holden-Day 1971)

S.I. Chemical Data 2nd edn (Wiley 1974)
Organic Chemistry 4th edn (Houghton Mifflin 1973)

Diesel Chemistry of Domestic Animals

a Several other texts provide suitable alternative approaches, one widely used is:

Brescia, F. et al.  
Chemistry, Experimental Foundations  
(Prentice-Hall 1970)

b Students with deficient background knowledge are advised to consolidate basic understanding through study of books such as:

Parry, R. W. et al.  
Chemistry: A Structural View 2nd edn  
(Melbourne U.P. 1970)

722200 Chemistry IIA

Prerequisite  Chemistry I
Preparatory Subjects  Mathematics I & either Physics IA or IB
Hours  About 3 lecture hours and 6 hours of tutorial and laboratory classes per week
Examination  A student may satisfy the examiners:
EITHER by achieving an overall satisfactory performance in the two progressive examinations (Papers 1 & 2).
OR by achieving an overall satisfactory performance in the two final papers scheduled for the November examination period (Papers 3 & 4).

Students who attempt both sets of examinations will be credited with the higher of the two results.

All papers are of 3-hours duration.
The average laboratory mark counts 20% towards the final grading.

Content
Analytical Chemistry
Basic principles: spectroscopic procedures; separation methods.
Co-ordination Chemistry
Types of complexes; structure elucidation; transition metal chemistry.

Dynamics
Kinetics; chemical affinity; electrochemical cells.

Organic Chemistry
Chemistry of carbonyl compounds. Aromatic chemistry.

Quantum Chemistry
Schrödinger’s equation; methods of approximation; applications to spectroscopy and bonding theories.

Thermodynamics
Basic laws.

Texts
Barrett, J. 
Introduction to Atomic and Molecular Structure 
(Wiley 1970)

Geissman, T. A. 
Principles of Organic Chemistry 3rd edn 
(Freeman 1968)

Pickering, W. F. 
Modern Analytical Chemistry (Dekker 1971)

Shoemaker, D. P. & 
Garland, C. W. 
Experiments in Physical Chemistry 2nd edn 
(Mc-Graw-Hill 1967)

Shriner, R. L. et al. 
The Systematic Identification of Organic Compounds 5th edn (Wiley 1964)

Wentworth, W. E. & 
Ladner, S. J. 
Fundamentals of Physical Chemistry 
(Wadsworth 1972)

Students intending to proceed to Chemistry IIIA are advised to purchase a copy of:

Huheey, J. E. 

722300 Chemistry III

Prerequisites
Chemistry I

Corequisites
Chemistry IIIA (advisory)

Hours
3 lecture hours and 6 laboratory hours per week comprising 8 units of which the student must attempt 6. Each unit consists of approximately 10 lectures, 4 tutorials and 28 hours of laboratory or other support activities.

Examination
One hour examination for each unit.

Content
Each student programme must be approved by the Head of the Department.

The units offered may vary from year to year and the topics available include: electronic instrumentation for chemists; problem solving; evaluation of chemical pollution; analysis in organic systems; radioc-chemistry; chemistry in industrial processes; science, conflict and society; chemistry of colloids; polymers; ionic transport in solution; non-aqueous chemistry; organic chemistry—data interpretation. In the industrial processes unit, attendance on excursions is compulsory.

Texts
To be advised

CHEMISTRY — PART III SUBJECTS

Prerequisites
A pass in Chemistry IIA is a prerequisite for entry into Chemistry IIIA; Chemistry IIIA is a pre- or co-requisite for Chemistry IIIIB.

Hours
The Chemistry Department offers two Part III subjects, each involving ninety hours of lectures and each comprised of nine topics chosen from the list below. Associated with each subject is 8 hours per week of laboratory work.

Examination
Both subjects will be examined by progressive examinations. To pass each subject, students must achieve an acceptable aggregate mark and earn a pass grading in the specified laboratory programme.

Content
All students enrolling in Chemistry IIIA must include at least one topic from each of the four sub-groups distinguished by capital prefixes (i.e. A, P, I and O). The other five topics may be drawn from within these groupings, or from the selection of alternative topics on offer in a given year.

Students enrolling in Chemistry IIIB must nominate nine topics not previously included in their IIIA programme.

All proposed programmes must be approved by the Head of Department (or his nominee) before the start of the academic year.

The following guidelines apply:
(a) There must be a reasonable spread of load over the full year.
(b) Not all the topics listed will be offered in any given year, and there may be substitutions. Accordingly students should check the list of topic summaries posted on Departmental notice boards before submitting their programme.
(c) The advisory recommendations re companion studies provided on the topic summaries, should have been considered.
(d) The programme must be feasible in terms of timetabling (e.g. some topics offered on Thursday or Friday may clash with other part III subjects).

List of Topics for Part III Chemistry

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<thead>
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<th>Group</th>
<th>Number</th>
<th>Topic</th>
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<td>Group A</td>
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<td>Principles of Analysis</td>
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<td>2</td>
<td>Separation Techniques</td>
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<td>3</td>
<td>Applied Spectroscopy</td>
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<td>Group P</td>
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<td>Molecular Spectroscopy</td>
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<td>Group I</td>
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<td>Crystal Chemistry</td>
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<td>Organometallic Chemistry</td>
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<td>Group O</td>
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<td>Carbohydrates, amino acids, proteins</td>
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<td>Bio-inorganic chemistry</td>
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<td>Organic synthesis</td>
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<td>Physical organic chemistry</td>
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<td>Biologically Important Organic Molecules</td>
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<td>Biogenesis</td>
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<td>21</td>
<td>Plant Growth Regulators, Insecticides &amp; fungicides</td>
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<td>22</td>
<td>Medicinal Chemistry</td>
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<td>Trace Analysis</td>
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<td>24</td>
<td>Lasers and Laser Raman Spectroscopy</td>
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<td>Zeolites</td>
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<td>X-ray crystallography</td>
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<td>27</td>
<td>The Chemistry of some Non-Metals</td>
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<td>28</td>
<td>Clinical &amp; Automated Analysis</td>
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<td>Instrumental Techniques</td>
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<td>Geochemistry</td>
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<td></td>
<td>31</td>
<td>Physical methods in Inorganic Chemistry</td>
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<td></td>
<td>32</td>
<td>Organic B,P,S compounds</td>
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</tbody>
</table>

Texts

To be advised: see departmental topic summaries.

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724100 Chemistry IV

Prerequisites Completion of ordinary degree requirements and permission of Head of Department.

Hours

Examination To be advised

Content

A subject extending over one full-time academic year or its equivalent comprising three parts:
(i) A minimum of 40 hours of lectures and tutorials, and a course of directed reading;
(ii) A supervised research project, the results of which are to be embodied in a thesis;
(iii) Two seminars, one on the subject of the research project and the other on a literature survey.

The lecture and tutorial course will be assessed progressively, whereas the directed reading course will be examined early in third term with two papers each of three hours duration. An oral examination on the thesis will be given in November.

The three areas of assessment (of the class of Honours) — (formal work in Chemistry IV: the research project and thesis; and the previous undergraduate record) shall be equally weighted.

Texts To be advised

DEPARTMENT OF GEOLOGY

731100 Geology I

Prerequisite Nil

Hours 3 lecture hours and 2½ laboratory hours per week and 2 days field work.

Examination Two 3-hour papers, class assignments and practical examinations.

Content

Material Geology

Introductory crystallography; mineralogy and petrology; classification of rocks; economic mineral deposits, applications of geology to engineering.

Physical Geology

Erosion cycle; agents of erosion; diastrophism; structural geology; marine geology; geomorphology.
Historical Geology
Introductory palaeontology and stratigraphy; brief geological history of New South Wales.

Texts
Press, F. & Siever, R. Earth (Freeman 1974)
EITHER Read, H. H. Rutley's Elements of Mineralogy 24th edn (Murby 1960)
OR Mason, B. & Berry, L. G. Mineralogy (Freeman 1959)
(for students intending to proceed beyond Geology I)

732200 Geology IIA

Prerequisite Geology I

Hours 3 lecture hours and 4 laboratory hours per week and 8 days field work.

Examination Two 3-hour papers, class assignments and practical examinations.

Content

Mineralogy
Crystallography; chemistry and physics of minerals; genesis of minerals.

Petrology
Rock forming minerals; nature of and crystallization from a magma; chemical equilibrium studies; petrology of igneous rock associations; petrography and classification of igneous rocks.

Stratigraphy and Palaeontology
Stratigraphy of Australia; invertebrate palaeontology.

Structural Geology and Geotectonics
Nomenclature and origin of diastrophic and non-diastrophic structures.

Texts
Bishop, A. C. An Outline of Crystal Morphology (Hutchinson 1967)
EITHER Black, R. H. The Elements of Palaeontology (Cambridge U.P. 1970)
OR Moore, R. C. et al. Invertebrate Fossils (McGraw-Hill 1952)

732300 Geology IIB

Prerequisite Geology I

Hours 4 lecture hours and 3 laboratory hours per week and 8 days field work.

Examination Two 3-hour papers, class assignments and practical examinations.

Content

The subject comprises 8 units of 14 lectures each, 3 laboratory hours per week and 8 days field work. The units to be offered in 1977 are:

(i) Marine Geology — the morphology of ocean basins
Nature and origins of morphological features of the oceans and their floors. Destructive and constructive processes; submarine volcanicity; genesis types and potential of heavy and economic mineral deposits; the role of eustatic changes.

(ii) Marine Geology — geophysical aspects
Tectonic framework of the oceans; the concept of seafloor spreading and the geophysical aspects of ocean areas. Outline of laboratory and research methods with examples of oceanographic research projects.

(iii) Environmental Geology
Development of Earth's primary and secondary atmospheres; importance of trace metals; bacterial oxygen demand; litho-, hydro- and atmospheric balances; waste disposal; geological hazards — mineral and energy resources — present and future demands.

(iv) Introduction to Engineering and Mining Geology
Geological parameters related to engineering works; geological hazards associated with foundations, stability problems, sampling and mining.

(v) Geomathematics
Elementary introduction to basic mathematics and data processing in geology.

(vi) Volcanology
Volcanic processes, volcano types, magma types and their tectonic setting and environment. Topographic and physical features of volcanoes, their roots and ejecta. Prediction of volcanism and the tapping and utilisation of geothermal energy.
(vii) **Extraterrestrial Geology**
Origin of the solar system; structure, distribution, age, chemical characteristics and petrogenesis of lunar rocks; astroblemes; meteorites; geology of other planets.

(viii) **Palaeoecology**
Application of ecological laws to modern and ancient plant and animal communities.

**Texts**
Consult lecturers concerned.

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**733100 Geology IIIA**

**Prerequisites**
Geology I & II A

**Preparatory Subjects**
Chemistry I & either Physics I A or IB

**Hours**
5 lecture hours and 6 laboratory hours per week and 4 days field work.

**Examination**
Two 3-hour papers, class assignments and practical examinations.

**Content**

** Petrology (21 lectures, 42 laboratory hours)**
Petrology of igneous rock associations; petrogenesis of metamorphic rocks, metamorphic belts and plate tectonics.

**Sedimentology (21 lectures, 42 laboratory hours)**
Petrogenesis of sedimentary rocks.

**Economic Geology (21 lectures, 21 laboratory hours)**
Principles of formation of economic mineral deposits; textures of ore minerals; major Australian ore deposits; ore mineralogy.

**Structural Geology and Geotectonics (21 lectures, 42 laboratory hours)**
Advanced structural geology and detailed geotectonics; structural aspects of geosynclinal concept; orogenies; continental drift; global tectonics.

**Photogrammetry and Photogeology (21 laboratory hours)**
Basic principles of photogrammetry and photogeological interpretation; aerial photographs and their use in cartography and in stratigraphic and structural studies.

**Micropalaeontology and Theoretical and Evolutionary Palaeontology (21 lectures)**
Micropalaeontology, principles of taxonomy, quantitative methods; species concepts, genetics, evolution; selected evolutionary patterns from the palaeontological record.

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**733200 Geology IIIB**

**Prerequisites**
Geology I & II A

**Corequisite**
Geology III A

**Hours**
4 lecture hours and 4 laboratory hours per week and 12 days field work.

**Examination**
Two 3-hour papers, class assignments and practical examinations.

**Content**
This subject comprises 8 units of which students must select 4, two from the units offered in each part of the year.
Students must note that it may not be possible to offer all 8 units each year. No unit is offered for an enrolment of less than 2 in that unit. The selection of units by students must be approved by the Head of Department. Each unit is of equal length — approximately 28 lectures and 28 laboratory hours. The units are:

(i) **Mineralogical and Geochemical Techniques**
X-ray diffraction and fluorescence, differential thermal and thermogravimetric analysis, atomic absorption, infra-red and optical spectroscopy, the electron microscope and microprobe, differential staining and advanced mineral separation methods and techniques; survey geochemistry and chromatography.

(ii) **Material Sources of Energy**
Origin, distribution, classification and economic potential of uranium, petroleum and gas, and coal.

(iii) **Structural Analysis and Rock Mechanics**
Petrofabric analysis, symmetry concepts; movement picture and movement plan; stress-strain relationship.
Analysis of stress and strain; theory of elasticity; stress distribution; statistical analysis and experimental design; instrumentation; mechanical properties and behaviour of rocks; photoelasticity; rock model studies; design and stability of structures in rock.
(iv) Sedimentology
Lithologic associations in relation to the depositional facies of their environment of formation with emphasis on the genetic connection between the geological setting of a depositional area and its sedimentary fill (basin analysis).

(v) Engineering and Mining Geology
Geological problems in engineering design and construction; subsurface water; engineering control of sedimentation; fieldwork, drilling and analysis of exploration data; development of economic deposits; problems associated with mining in different geological environments.

(vi) Economic and Exploration Geology
Ore microscopy; paragenesis and stability of ore minerals; ore-forming fluids; sulphur, lead and oxygen isotopes in ore mineral genesis; geochemistry of ore deposits; dispersion of metals; geochemical prospecting.

(vii) Petrographic Techniques and Advanced Igneous and Metamorphic Petrology
Interpretation and representation of chemical analysis of minerals and rocks, micrometric analysis; petrology of selected igneous rock associations; interpretation of metamorphic textures using metallurgical concepts.

(viii) Stratigraphic Palaeontology
Basic stratigraphic concepts, facies, correlation, biostratigraphy, palaeoecology, palaeoclimates, palaeomagnetism, palaeogeography; a synthesis of zonal development in the Carboniferous sequence of Eastern Australia.

Texts
Text books required will vary with the options selected. Consult lecturers concerned.

734100 Geology IV

Prerequisites
Geology IIIA, completion of ordinary degree requirements and permission of the Head of Department.

Hours
To be advised.

Examination
(i) performance in one 3-hour paper
(ii) a viva voce examination
(iii) research work carried out and its presentation in a thesis
(iv) such other work, e.g. seminars, assignments, earlier academic record, which may be considered relevant.

Content
Part A
Lecture-tutorial work with directed reading in two of the following fields of geology; mineralogy and crystallography; igneous petrology; metamorphic petrology; coal petrology; sedimentology; stratigraphy; structural geology; economic geology.

Part B
A research project, the results of which are to be embodied in a thesis.

DEPARTMENT OF PHYSICS

741200 Physics IA

Prerequisite
Physics (2 unit course), grade 1, 2 or 3 or Multistrand (4 unit) Science, grade 1, 2 or 3 (advisory)

Hours
3 lecture hours and 3 hours of laboratory and tutorial work per week.

Examination
One 2-hour paper after the end of each term and an hour's written examination on the year's practical work.

Content
For students who may wish to proceed to Physics II, and for all students in the Faculty of Engineering except Chemical Engineering. (Some students in Chemical Engineering may be advised to take Physics IB.)

A rigorous, mathematically based discipline with emphasis on the unifying principles which link together different areas of the subject. Lectures will cover mechanics, wave motion, electromagnetism, thermal physics, geometrical optics, physical optics, and quantum physics. The treatment throughout will assume some knowledge of calculus.

Texts

741300 Physics IB

Prerequisite
Physics (2 unit course), grade 1, 2 or 3 or Multistrand (4 unit) Science, grade 1, 2 or 3 (advisory)

Hours
3 lecture hours and 3 hours laboratory or demonstrations and practice period per week.
**Examination**
One 2-hour paper after the end of each term.

**Content**
For students who in general do not intend to proceed with further studies in Physics. (A credit pass or better in Physics IB will normally be required for entry to Physics II). The treatment will require a minimum of mathematics and will involve an experimental approach throughout. The coverage of the subject will be somewhat broader than in Physics IA.

**Texts**
Refer to Physics Department notice board.

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**742200 Electronics & Instrumentation II**

**Prerequisites**
Physics IA or IB

**Hours**
3 lecture hours, 4 laboratory hours and 2 tutorial hours with directed assignments each week.

**Examination**
One 2-hour paper on each of the 3 topics selected.

**Content**
Topic A — Basic Theory of Techniques;
Instrumentation Practice;
Specialist Instrumentation.

Topic B — Instrumentation Theory.

Topic C — Electrical Measurement Principles;
Digital and Linear Integrated Circuits;
Instrumentation Systems.

Topic D — Basic Device Physics;
Measurement Devices.

Students taking Physics II (either previously or concurrently) will be examined in Topics B, C and D. They must also attend the lectures on Instrumentation Practice in Topic A as part of the directed assignments requirements.

Students who have not taken Physics II will be examined in Topics A, C and D.

**Texts**
Malmstadt, H. V. et al. Instrumentation for Scientists Series, Texts with Experiments Modules 1, 2, 3 & 4 (Benjamin)

**Other Texts**
Refer to Physics Department notice board.

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**742100 Physics II**

**Prerequisites**
Mathematics I, Physics IA or normally a credit pass or better in Physics IB.

**Hours**
3 lecture hours and 6 laboratory hours per week.

**Examination**
Equivalent of 6 hours total examination.

**Content**

**Mechanics**

**Thermal Physics**

**Quantum Physics**

**Electromagnetics**

**Physical Optics**

Physics II students should include at least one Group II Mathematics subject, incorporating for preference Topics C, E, G and H in their course. (It is possible to achieve this combination with either Mathematics IIB alone, or Mathematics IIA and IIC.)

**Texts**
Baird, D. C. Experimentation (Prentice-Hall 1962)

Any further texts will be listed on the Physics Department notice board.

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**743100 Physics IIIA**

**Prerequisites**
Physics II, Mathematics IIA or IIB or IIC with Topics C, E, G and H or B or D recommended.

**Hours**
120 lecture hours and 240 laboratory and tutorial hours.

**Examination**
Assessment to the equivalent of three 3-hour papers.

**Content**
The areas of classical and quantum physics essential to the understanding of both advanced pure physics and also the many applications of physics. Some electronics is also included.
A. Classical Physics
Mathematical methods, advanced mechanics, special theory of relativity, electromagnetics including waveguide and antenna theory.

B. Modern Physics
Quantum mechanics, atomic and molecular physics, statistical physics, solid state physics, nuclear physics, electronics.

C. Laboratory
Parallels the lecture course in overall content, with at least one experiment available in each topic, although students are not expected to carry out all the experiments available.

Texts
Texts will be listed on the Physics Department notice board. Students should retain their Physics II texts.

743200 Physics IIIB
This subject will not be offered in any one year unless there are three or more enrolments.

Prerequisite
Physics II

Corequisite
Physics IIIA

Hours
90 lectures, 180 hours laboratory total, and two Mathematics topics.

Examination
Two 2½-hour papers and assessment. The mathematics topics will be examined by the Department of Mathematics.

Content
The subject emphasizes the experimental and applied aspects of Physics. The Department considers it desirable that some mathematical studies should be continued through this level, so two mathematics topics are included in Physics IIIIB, to be selected in consultation with the Physics Department.

The Physics lecture course will treat the following topics:

Experimental Techniques
Photometry and Instrumental Optics
Nuclear Measurements
Radio-frequency Spectroscopy
Electronics
Geophysics
Statistical Mechanics
Solid State Physics
Physics of Fluids

Texts
Larmore, L.

Introduction to Photographic Principles
(Dover)

Millman, F. & Halkias, C.

Integrated Electronics (McGraw-Hill)

Reif, F.

Fundamentals of Statistical and Thermal Physics (McGraw-Hill)

Stacey, F. D.

Physics of the Earth (Wiley)

Any further texts will be listed on the Physics Department notice board.

744100 Physics IV

Prerequisite
Physics IIIA

Hours
To be advised.

Examination
Assessment to the equivalent of three 3-hour papers plus evaluation of the research project, and a possible brief oral examination.

Content
Physics IV is intended to give students an advanced understanding of the fundamental theories of modern physics appropriate for an Honours graduate in the discipline, as well as an exposure to the current research interests of the Physics staff, which are experimental atomic physics, geophysics, and applied physics. Students also carry out a research project to develop their research skills.

The lecture and reading course covers topics classified below under several major headings. Students may have some degree of choice for examination purposes. Not all topics may be offered in a given year, and others may be added, depending on student interest and staff availability. The Head of Department must approve the final programme of study.

Atomic Physics — Associate Professor Ramsey & Mr Roberts
Solid state physics and physics of surfaces.

Quantum Mechanics — Dr Smith & Dr Lo
Advanced quantum mechanics and many electron systems.

Relativity and Electromagnetism — Dr McGovern & Dr Kennewell
Special relativity theory (tensor analysis developed as required and not prerequisite), advanced electromagnetic theory, applied electromagnetics, experimental basis of gravitational theories.

Upper Atmosphere and Space Physics — Professor Ellyett
Structure of the ionosphere, theory of electromagnetic wave propagation in the ionosphere and its applications.
— Dr Fraser
Plasma physics with emphasis on magnetohydrodynamics and geomagnetic applications.

Electronic Techniques
— Associate Professor Keay
Digital electronics, signal processing.
— Mr Cleary
Fast pulse techniques, high speed atomic processes.

Research Project
The research project is carried out under the supervision of a staff member and results are embodied in a formal report. The Department generally provides to prospective students a short list of research projects carefully chosen for suitability as Physics IV projects, and for relevance to research within the Department. The choice is not necessarily confined to this list. Students should consult with staff members on choice of project topic. Project work is to be started in the first week of February.

Texts
Texts and literature references will be given as needed by the lecturers concerned.

744200 Physics/Mathematics IV

Prerequisites
Physics IIIA and Mathematics IIIA

Hours
To be advised

Examination
In the Physics IV and Mathematics IV topics selected. A project of mathematical and physical significance, jointly supervised.

Content
Four topics from Mathematics IV chosen for relevance to Physics, and topics from Physics IV, as approved by Head of Physics Department. Project work will normally begin in the first week of February.

DEPARTMENT OF PSYCHOLOGY

751100 Psychology I

Prerequisites
Nil

Hours
3 lecture hours, one hour practical session and one hour tutorial per week.

Examiation
One 3-hour paper and an assessment of practical work.

Content
A general introduction to psychology and includes such topics as social psychology, learning theory, perception, developmental psychology, physiological psychology, theory of measurement and descriptive statistics and statistical analysis of data.

Texts
OR
OR
Morgan, C. T. & King, R. A.
Introduction to Psychology 4th edn (McGraw-Hill 1971)

Additional texts may be recommended.
**Content**

* Such topics as developmental psychology, developmental psychobiology, clinical neuropsychology, individual differences, personality, social ethology, and social psychology. Statistical methods will be taught and tested during the year.

**Texts**

To be advised

* The following transitional arrangements apply. Students who have completed Psychology II prior to 1975 and wish to proceed to Psychology IIB will be required to attempt such topics from Psychology IIA and IIB as are prescribed by the Head of Department and which would comprise a full Part II subject.

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**753100 Psychology IIIA**

**Prerequisite**

Psychology IIA

**Hours**

4 lecture hours and up to 5 hours practical work per week.

**Examination**

Two 3-hour papers and an assessment of practical work.

**Content**

Such topics as cognition, verbal learning, perception, physiological psychology, animal behaviour, statistical analysis, experimental method, neurophysiology and learning.

The practical work is divided into

(a) Laboratory sessions — 3 hours per week.

(b) An investigation carried out under supervision. The topic of this will usually be selected by the student, although some restrictions may be decided by the Department — 2 hours per week.

**Texts**

To be advised

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**753200 Psychology IIIB**

**Prerequisite**

Psychology IIB

**Hours**

4 lecture hours and 5 hours practical work per week.

**Examination**

Two 3-hour papers and an assessment of practical work.

**Content**

Such topics as social psychology, psychopathology, personality, developmental psychology, quantitative psychology and cross-cultural psychology, factor analysis, behaviour change, ethology.

**Texts**

To be advised

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**754100 Psychology IV**

**Prerequisites**

Completion of an ordinary degree normally including at least 4 Psychology subjects and permission of the Head of Department.

**Hours**

To be advised

**Examination**

Two 3-hour papers and assessment of the thesis material.

**Content**

The student is expected to cover such fields as abnormal and clinical psychology, animal behaviour, developmental psychology, learning and cognition, motivation, perception, personality, physiological psychology, quantitative psychology, and social psychology.

**Texts**

To be advised

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Diploma in Psychology (Clinical)

**Prerequisites**

Honours degree in Psychology or other qualifications approved by the Faculty Board of the Faculty of Science.

**Hours**

12 formal hours per week; the part-time course extends over 2 years.

**Examination**

Clinical proficiency is evaluated through practical examinations and the continual assessment provided by reports of academic and field supervisors. Written contributions are required in the form of research reports and essays. Familiarity with relevant legal acts and regulations, professional codes and special topics is required. A final examination each year of 2 papers, one theoretical and one practical.

**Content**

The major sections of the course are as follows:

(i) Psychodiagnostic practicum (interview, psychometric and electro-physiological techniques and interpretations).

(ii) Therapy practicum (sensitivity training, individual and group psychotherapies, behaviour modification treatment).

(iii) Research projects (group project; individual studies).

(iv) An internship is provided for each student in approved training institutions and in the field setting appropriate to contemporary concepts of community mental health. Training in organisation, teaching and management is given. The specific content of the course is described in the Curriculum, General and Term Programmes issued to the student.
MASTER OF PSYCHOLOGY (EDUCATIONAL)

Prerequisites
A bachelor's degree including at least one Part III Psychology subject, a Diploma in Education or equivalent qualification and at least two years teaching or other relevant practical experience approved by the Board of Studies in Psychology.

Hours
18 formal hours and six practical hours per week in the first year. Ten formal hours and 24 practical hours per week in the second year.

Examination
Professional proficiency is evaluated through practical examinations and ongoing assessments. There is a final examination at the end of each year and an assessment of the thesis at the end of the second year.

Content
First Year:
Seminars on psychological development of the child, the child in school and society, cognitive development, exceptional and problem children, counselling theory and procedures, education systems and personal development.

Workshops concentrating on the development of diagnostic skills and methods of psychological testing and assessment. Further activities include case study skills, consulting, communication and report writing, counselling procedures and personal development. Approximately equal time will be devoted to seminar and workshop activities and project supervision will continue throughout the year.

Second Year:
The course work consists of seminars and workshops which extend the work from the first year in counselling theory and procedures, case work, consulting and communication skills. The project begun in the previous year will be completed.

EXAMINATION
Examination
To be advised.

Content
A study of the structure and interaction of two major systems: the ecological system that links man and his environment, and the spatial system that links one region with another in a complex interchange of flows. The study explores the internal structure and the linkages between each of the basic components in the two systems.

The practical programme is designed to enable students to gain proficiency in and understanding of the tools of geographical analysis. Methods in the cartographic and statistical organization of geographic data are studied.

Text

References
To be advised.

DEPARTMENT OF GEOGRAPHY

351100 Geography I

Prerequisites
Nil

Hours
2 lecture hours and 3 hours practical work per week, 1 tutorial hour per fortnight and 3 days of field work.
TERM II: One of the following:

(c) 352115 Historical Geography
An introduction to the scope and methods of historical geography. Particular attention is paid to the historical geography of the British Isles with emphasis on the geographical patterns of the 18th and 19th centuries.

(d) 352120 Urban Social Geography
An introduction to the study of intra-urban problems and processes in advanced scale societies. Urbanisation processes, urban growth, and urban morphology are examined, with particular emphasis being placed on residential areas. These are examined in respect of their sociogeographic structure. Attention is given to the study of urban social behaviour, including the nature of urban adaptive social systems and of urban images—especially as a framework for investigating residential mobility.

TERM III:

(e) 352125 Geography of Industrial Location
An introduction to the methods and concepts of manufacturing geography. The relevant variables in the location decision-making process are discussed in the context of various theories of location, with reference to specific case studies in both developed and developing worlds.

Texts
(a) Development Geography
Brookfield, H. C. Interdependent Development (Methuen 1975)

(b) Political Geography
Busteed, M. A. Geography and Voting Behaviour (Oxford U.P. 1975)
Cox, K. R. Conflict, Power and Politics in the City, A Geographic View (McGraw-Hill 1973)
East, W. G. & Prescott, J. R. V. Our Fragmented World (Macmillan 1975)
Jackson, W. A. & Bergman, E. F. A Geography of Politics (Brown 1973)
Prescott, J. R. V. Political Geography (Methuen 1972)

(c) Historical
Baker, A. R. H. & Harley, J. B. (eds) Essays in English Historical Geography, Man Made the Land (David & Charles 1973)

(d) Urban Social
Abler, R. et al. Human Geography in a Shrinking World (Duxbury Press 1975)

References
352200 Geography IIB
Prerequisites Geography I
Hours 4 lecture hours, 2 hours of practical/tutorial work per week and 8 days field work.
Examination To be advised
Content
(i) A study of processes and patterns in man's physical environment. The behaviour of the atmosphere, including its interaction with the earth's surface, over wide ranges of scale in space and time.
(ii) Geomorphic processes and problems of historical geomorphology. The subject is a prerequisite for the Fluvial Geomorphology and Advanced Geomorphology electives in Geography III.

Texts
Barry, R. G. & Chorley, R. J. Atmosphere, weather and climate 3rd edn (Methuen Paperback 1975)
Strahler, A. N. Physical Geography 4th edn (Wiley 1975)
References To be advised

352300 Geography IIC
Prerequisites Geography I
Hours 4 lecture hours, 1 hour of tutorial work per week and assignments equivalent to 8 days of fieldwork.
Examination To be advised
Content
A topical study of the area known as monsoon Asia. It examines aspects of the physical and human geography of the area both systematically and regionally.

Texts Nil
References To be advised

353100 Geography IIIA

Prerequisites Geography IIA, IIB or IIC

Hours 5½ hours per week of lectures, practical work and seminars and 8 days' field work.

Examination To be advised

Content
(i) Core Topic — The History and Philosophy of Geography.
(ii) Two Electives—which have not been, or are not being, studied in Geography IIB—selected from list below.

References To be advised

353200 Geography IIB

Prerequisites Geography IIA, IIB or IIC

Hours 5½ hours per week of lectures, practical work and seminars and 8 days' field work.

Content
(i) Core Topic—Problems of the Australian Region.
(ii) Two Electives—which have not been, or are not being studied in Geography IIIA—selected from the list below.

References To be advised

Electives 1977

Topic (a) 353102 Advanced Economic Geography

Prerequisites Geography IIA

Hours 2 hours per week and related tutorials and field work

Examination To be advised

Content
(i) an introductory conceptual section;
(ii) an examination of selected aspects of location theory;
(iii) a discussion of some methods of locational analysis.

Practical classes will be chiefly concerned with the methods of analysis useful in economic geography.

Texts Nil
References To be advised

Topic (b) 353110 Advanced Geomorphology

Prerequisites Geography IIB

Hours 2 hours per week and related tutorials and fieldwork

Examination To be advised

Content
(i) Fluvial processes within the drainage basin system.
(ii) The historical-geomorphological interpretation of selected landscapes with some regard to the significance of the physical features for human occupation.

Texts Gregory & Walling Drainage basin form and process. A geomorphological approach (Arnold 1973)
Lambert, A. M. The making of the Dutch landscape (Seminar 1971)

References To be advised

Topic (c) 353111 Advanced Urban Geography

Prerequisites Nil

Hours 2 hours per week and related tutorials and fieldwork

Examination To be advised
Content
The study of human behaviour in urban systems, with an emphasis on temporal characteristics.

References
To be advised

Topic (d) 353103 Biogeography

Prerequisites
Nil

Hours
2 hours per week and related tutorials and fieldwork

Examination
To be advised

Content
(i) some basic concepts in biogeography;
(ii) an introduction to ecology, with emphasis on man as an inseparable part of nature;
(iii) approaches towards ecological harmony between man and the rest of nature.

Texts
Anderson, E.
Bates, M.
Kellman, M. C.
Leopold, A.

References
To be advised

Topic (e) 353106 Geographical Techniques

Prerequisites
Nil

Hours
2 hours per week and related fieldwork

Examination
To be advised

Content
Methods of data collection, manipulation, interpretation and presentation. The elective is of value for all students, but is especially relevant for those intending to proceed to Honours.

Topic (f) 353113 Historical Geography

Prerequisites
Nil

Hours
2 hours of lectures per week and related tutorials and fieldwork

Examination
To be advised

Content
An investigation and interpretation of some of the vital themes in Australian development, such as rural settlement, attitudes about and appraisals of the natural environment, urbanisation, transport and industrialisation from the beginning of settlement up to 1914.

Text

References
To be advised

Topic (g) 353108 Southeast Asia

Prerequisites
Nil

Hours
2 hours per week and related tutorials and assignments

Examination
To be advised

Content
The examination of various concepts relating to the geography of development in South East Asia and the application of these concepts to selected parts of the region. The relationships between the modern and traditional sectors of South East Asia's economy are particularly emphasised.

References
To be advised

The following electives will not be offered in 1977.
Conservation and Use of Natural Resources
East Asia (Japan or China)
Fluvial Geomorphology
Genetic Geomorphology
Political Geography.
In order to qualify for admission to Geography IV, a student must normally have passed at Credit level or better in at least 4 Geography subjects. In exceptional cases students who do not quite reach these requirements but who can satisfy the Head of the Department that they are suitable candidates may be admitted to the Part IV subject. Students considering entry to Geography IV should consult the Head of the Department before the beginning of the third term of the preceding year. Those accepted for entry will be expected to commence their thesis field programmes early in January.

Hours
To be advised

Examination
To be advised

Content
This subject is designed in part as an introduction to research work in Geography. Each student is required to submit a thesis embodying the result of an original investigation on a topic approved by the Head of the Department of Geography. Seminars and field work will be offered in the following:
(a) The impact of man and society on nature.
(b) A systematic topic approved by the Head of the Department.

References
To be advised

DEPARTMENT OF MATHEMATICS

Preliminary Notes
The Department offers and examines subjects. Each subject is composed of topics, each topic consisting of about 27 lectures and 13 tutorials throughout the year. Each of the Part I, Part II, and Part III subjects consists of four topics. For Mathematics I, there is no choice of topics; for Mathematics IIA, IIB, IIC there is some choice available to students; for Mathematics IIIA and IIIB there is a wider choice. No topic may be counted twice in making up distinct subjects.

Students who passed some mathematics subjects before this arrangement of subjects was introduced should consult the "transition arrangements" set out on p.155 of the 1970 Faculty of Arts handbook, and p.76 of the 1973 Faculty of Mathematics handbook. Note that the "code letters" for the topics may vary slightly from year to year.)

Progressive Assessment
From time to time during the year students will be given assignments, tests, etc. The student's performance in this work will be taken into account in the following manner.
(a) For the implementation of By-law 5.4.1-1, which deals with unsatisfactory progress. A copy of this By-law appears in the General Supplement to the Faculty Handbooks.
(b) Where a student's performance during the year has been better than his performance in the final examination, then the former will be taken into account in determining his final result. On the other hand, when a student's performance during the year has been worse than his performance in the final examination, then his performance during the year will be ignored in determining his final result.

Part 1 Subject

Mathematics I

Prerequisites
Nil

Hours
4 lecture hours and 2 tutorial hours per week

Examination
Two 3-hour papers

Content
Topics AN — Real Analysis
AL — Algebra
CA — Calculus
NM — Numerical Mathematics

Part 1 Topics

Topic AN — Real Analysis — M. J. Hayes

Prerequisites
Nil

Hours
1 lecture hour per week and 1 tutorial hour per fortnight

Content

Text
Nil
References
Apostol, T. Calculus Vol. 1 2nd edn (Blaisdell 1967)
Spivak, M. Calculus (Benjamin 1967)

Topic AI—Algebra—R. B. Eggleton

Prerequisites Nil
Hours 1 lecture hour per week and 1 tutorial hour per fortnight
Content Introduction to basic algebraic objects and ideas. Matrices, permutations, complex numbers. Linear Algebra: vector spaces, homomorphisms, matrices, determinants; algorithms for solution of equations; rank, nullity; eigenvectors and eigenvalues; applications various.

Text
Brisley, W. A Basis for Linear Algebra (Wiley 1973)

References
Liebeck, H. Algebra for Scientists and Engineers (Wiley 1971)
Lipschutz, S. Linear Algebra (Schaum 1968)
McCoy, N. Introduction to Modern Algebra (Allyn & Bacon 1968)
Tropper, M. A. Linear Algebra (Nelson 1973)

Topic CA — Calculus — R. F. Berghout

Prerequisites Nil
Hours 1 lecture hour per week and 1 tutorial hour per fortnight

Text Nil

References
Apostol, T. Calculus Vol. I 2nd edn (Blaisdell 1967)
Ayres, F. Calculus (Schaum Outline Series, McGraw-Hill)
Hille, E. & Sals, S. First Year Calculus Internat. Textbook Series (Blaisdell 1968)

Topic NM—Numerical Mathematics—R. J. Vaughan

Prerequisites Nil
Hours 1 lecture hour per week and 1 tutorial hour per fortnight
Content Introduction to computers, flowcharts and Fortran coding. Elementary data analysis: calculations of sample moments of discrete distributions and programming of these operations. Introduction to statistical analysis and numerical analysis with computer illustrations. The writing of successful computer programs is a required part of this topic.

Texts
Blatt, J. M. Basic Fortran IV Programming; Version MIDITRAN (Computer Systems of Australia Pty Ltd 1969)
Bellamy, C. J. & Whitehouse, L. G. or An Introduction to Computer Programming in Fortran (Monecs Fortran) (Monash Uni. Comp. Centre 1976)

References
Ralston, A. A First Course in Numerical Analysis (McGraw-Hill 1965)
Wilkes, M. V. A Short Introduction to Numerical Analysis (Cambridge U.P. 1971)
Part II Subjects

The Department offers three Part II subjects. Students whose course restricts them to one such subject must study Mathematics IIA or Mathematics IIIB. The subject Mathematics IIA is a pre- or corequisite for Mathematics IIC, and IIA and IIC together a prerequisite for any Part III subject, so students wishing to take two Part II subjects would normally choose Mathematics IIA and IIC. Students taking all three of the Part II subjects would study all twelve of the topics listed below. Summaries and extended booklists for these topics will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.

**LIST OF TOPICS FOR PART II MATHEMATICS**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Corequisite or Prerequisite Topic</th>
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<tbody>
<tr>
<td>A</td>
<td>Mathematical Models</td>
</tr>
<tr>
<td>B</td>
<td>Complex Analysis</td>
</tr>
<tr>
<td>C</td>
<td>Calculus and Vector Calculus</td>
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<tr>
<td>D</td>
<td>Linear Algebra</td>
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<tr>
<td>E</td>
<td>Differential Equations and Integral Transforms</td>
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<tr>
<td>F</td>
<td>Numerical Analysis and Computing</td>
</tr>
<tr>
<td>G</td>
<td>Fourier series, Partial Differential Equations and Special Functions</td>
</tr>
<tr>
<td>H</td>
<td>Probability and Statistics</td>
</tr>
<tr>
<td>I</td>
<td>Topic in Statistics</td>
</tr>
<tr>
<td></td>
<td>e.g. Applications of Statistics</td>
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<tr>
<td>J</td>
<td>Topic in Applied Mathematics</td>
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<tr>
<td></td>
<td>e.g. Mechanics</td>
</tr>
<tr>
<td>K</td>
<td>Topic in Pure Mathematics</td>
</tr>
<tr>
<td></td>
<td>e.g. Group Theory</td>
</tr>
<tr>
<td>L</td>
<td>Analysis of Metric Spaces</td>
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</tbody>
</table>

The selection rules and definitions of the Part II subjects follow.

662100 Mathematics IIA

**Prerequisite**

Mathematics I

**Hours**

4 lecture hours and 2 tutorial hours per week

**Examination**

Each topic is examined separately

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662200 Mathematics IIIB

**Prerequisite**

Mathematics I

**Hours**

4 lecture hours and 2 tutorial hours per week

**Examination**

Each topic is examined separately

**Content**

Four topics chosen from A to H and approved by the Head of Department. In exceptional circumstances, and with the consent of the Head of Department one or more of the topics I, J, K or L may be included.

662300 Mathematics IIC

**Prerequisite**

Mathematics I

**Pre- or Corequisite**

Mathematics IIA

**Hours**

4 lecture hours and 2 tutorial hours per week

**Examination**

Each topic is examined separately

**Content**

Either topics G, J, K and L or topics H, I, K and L. Subject to the consent of the Head of Department one topic from A to J may be substituted for one of the topics I or J.

**Notes**

1. Mathematics IIIB is no longer offered in two parts in the Faculty of Science. Students who passed Mathematics IIIB part (i) before 1971 should consult Note 1 on page 90 of the 1971 handbook.

2. In order to pass both Mathematics IIA and Mathematics IIIB a student must study all the topics A to H above and offer them for examination.

3. Mathematics IIA is a corequisite or prerequisite for Mathematics IIC.

4. In order to pass in all three Part II subjects a student must study all twelve topics and offer them for examination.

5. Students whose courses include Physics IIIA are advised to include topics C, E, G and H in their Part II Mathematics subjects. This may require the use of the substitution rules.

6. Students who passed a Part II Mathematics subject prior to 1974 and who wish to take further Part II Mathematics subjects should note that the topic coded "L" in 1974, 1975, 1976 and 1977 corresponds to the topic coded "A" in previous years. Such students may require special permission for their selection of Part II topics, and should consult with the Head of Department.
Texts for Part II Topics

662101 Topic A—Mathematical Models
Nil

662102 Topic B—Complex Analysis

662103 Topic C—Calculus and Vector Calculus
Marder, L. Calculus of Several Variables (Allen Unwin 1972)
Marder, L. Vector Fields (Allen Unwin 1972)

662104 Topic D—Linear Algebra
Lipschutz, S. Linear Algebra (Schaum 1968)

662105 Topic E—Differential Equations and Integral Transforms

662106 Topic F—Numerical Analysis and Computing
Nil

662107 Topic G—Fourier series, Partial Differential Equations and Special Functions
Sneddon, I. N. Fourier Series (Routledge 1961)

662108 Topic H—Probability and Statistics
Freund, J. E. Mathematical Statistics 2nd edn or (Prentice-Hall 1971)

662109 Topic I—Topic in Statistics
Nil

Part III Subjects

The Mathematics Department offers two Part III subjects, each comprising four topics chosen from the list below.

Students wishing to proceed to Honours in Mathematics are required to take both these subjects. They will also be required to study additional topics as prescribed by the Heads of Departments concerned.

Passes in both Mathematics IIA and IIC are prerequisite for entry to Mathematics IIIA, and Mathematics IIIA is pre- or corequisite for Mathematics IIIB. It will be assumed that students taking a third-year subject in 1977 have already studied topics C, D, E, K, and L in their Part II subjects.

Summaries of the Part III topics together with extended booklists will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.

LIST OF TOPICS FOR PART III MATHEMATICS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Additional Prerequisites</th>
<th>Corequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>General Tensors</td>
<td>—</td>
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<tr>
<td>N</td>
<td>Variational Methods</td>
<td>—</td>
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<tr>
<td>O</td>
<td>Mathematical Logic</td>
<td>—</td>
</tr>
<tr>
<td>P</td>
<td>Differential &amp; Integral Equations</td>
<td>—</td>
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<tr>
<td>PD</td>
<td>Partial Differential Equations</td>
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<tr>
<td>Q</td>
<td>Fluid Dynamics</td>
<td>B</td>
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<tr>
<td>R</td>
<td>Probability &amp; Statistics</td>
<td>H</td>
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<td>S</td>
<td>Geometry</td>
<td>—</td>
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<tr>
<td>T</td>
<td>Group Theory</td>
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<tr>
<td>TC</td>
<td>Theory of Computing</td>
<td>F</td>
</tr>
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<td>U</td>
<td>Operations Research</td>
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<tr>
<td>V</td>
<td>Measure Theory &amp; Integration</td>
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The selection rules and definitions of the Part III subjects follow.

663100 Mathematics IIIA

Prerequisites    Mathematics IIA & IIC
Hours            4 lecture hours and 2 tutorial hours per week
Examination      Each topic is examined separately

Content          A subject comprising four topics, which must include O, and at least one of P, PD, Q, R, U or Y. In addition, students taking this subject will be required to complete an essay on a topic chosen from the history or philosophy of Mathematics.

663200 Mathematics IIIIB

Pre-or Corequisite Mathematics IIIA
Hours            4 lecture hours and 2 tutorial hours per week
Examination      Each topic is examined separately

Content          A subject comprising four topics chosen from the sixteen listed above.

Notes            1. In order to take both Mathematics IIIA and Mathematics IIIIB, a student must study eight topics from M to Z above with the restriction that Topic O, and at least one of P, PD, Q, R, U or Y must be included in these eight topics.
2. Students whose course includes a subject from Schedule B may have their choice of topics further restricted.
3. Students aiming to take Mathematics IV may be required to undertake study of more topics than the eight comprising the two part III subjects.

Texts for Part III Topics

663101 Topic M—General Tensors
Nil

663102 Topic N—Variational Methods
Elsgole, L. E.  Calculus of Variations (Pergamon 1963)

663103 Topic O—Mathematical Logic
Enderton, H. B.  A Mathematical Introduction to Logic
                     (Academic 1972)

663104 Topic P—Differential and Integral Equations
Sanchez, D. A.  Ordinary Differential Equations and Stability Theory; an Introduction
                     (Freeman 1968)

663108 Topic PD—Partial Differential Equations
Nil

663105 Topic Q—Fluid Dynamics
Nil

663106 Topic R—Probability and Statistics
Zehna, P. W.  Probability Distributions and Statistics
                     (Allyn & Bacon 1970)

663107 Topic S—Geometry
Nil

663201 Topic T—Group Theory
Baumslag, B. & Chandler, B.
                     Group Theory (Schaum 1968)
or

663209 Topic TC—Theory of Computing
Nil

663202 Topic U—Operations Research
Nil

663203 Topic V—Measure Theory and Integration
Nil

663204 Topic W—Analysis of Normed Linear Spaces
Nil

663205 Topic X—Rings and Fields
Nil
Transition Arrangements

A student who has passed some Part II or III Mathematics subjects prior to 1970 and who wishes to continue with Mathematics should proceed according to the pattern set out on p.120 of the 1973 handbook.

Part IV Subject

664100 Mathematics IV

Prerequisites

Mathematics IIIA and IIIB, and additional work as prescribed by the Head of the Department of Mathematics.

A student desiring admission to this subject must apply in writing to the Head of Department before 7th December of the preceding year.

Hours

At least 8 lecture hours per week over one full-time year or 4 lecture hours per week over two part-time years.

Examination

At least eight 2-hour final papers.

Each student will be required to present a thesis; i.e. a study under direction of a special topic using relevant published material and presented in written form.

The topics offered may be from any branch of Mathematics including Pure Mathematics, Applied Mathematics, Statistics, Computing Science and Operations Research as exemplified in the publication *Mathematical Reviews*.

Content

A selection of topics, each of about 27 lectures, will be offered. Summaries of topics which may be offered in 1977 will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.
**Chemical Education** (H. R. Tietze)
development of new experiments for undergraduate courses in Chemistry.

**Molecular Structure** (H. R. Tietze)
X-ray structure determination of selected inorganic crystalline solids.

**Electrochemistry** (Dr R. A. Fredlein)
electrosorption at solid metal-solution interphases and catalysis of the electroreduction of oxygen on oxide bronzes.

**Applied Spectroscopy** (Dr R. P. Cooney)
laser Raman and infrared spectroscopy applied to metal complexes, surface chemistry and polymers.

**Metal Complexes** (Associate Professor W. R. Walker)
studies of Interactions of Metal ions with biogenic amines, amino acids, drugs, purines, pyrimidines; both in vivo and in vitro.

**Natural Products** (Associate Professor H. Duewell)
elucidation of the components of Xanthorrhoea resin and the synthesis of related compounds. Tericyclic reactions, oxygen heterocyclics.

**Organic Reaction Mechanism** (Associate Professor L. K. Dyall)
studies on the mechanism of oxidations which involve a neighbouring group in a cyclization process.

**Organic Synthesis and Medicinal Chemistry** (Dr K. H. Bell)
development of new, selective reactions. Preparation, properties and mode of action of local anaesthetics and strong analgesics.

**Radiochemistry and Radiation Chemistry** (E. B. Jacoba)
applications of tracer techniques particularly in equilibrium and kinetics studies in solvent extraction systems. Polymerisations — particularly those induced by radiation.

**DEPARTMENT OF GEOLOGY**

The detailed geology of the Hunter Valley in all its aspects is the concern of all members of staff but other individual or team research projects are as follows:

Professor B. Nashar is investigating the mineralogy, geochemistry and genetic relations of the Carboniferous and Permian anadetic associations of eastern New South Wales. Her other interest is in the conditions of formation of secondary minerals in basic lavas. Associate Professor C. F. K. Diessel is studying the pattern of coalification and graphitization of dispersed organic matter in sediments and their metamorphic derivatives. Other research interests are sedimentology of clastic sediments, coalfield geology and coal formation.

Associate Professor B. A. Engel is concerned with the detailed description of Carboniferous trilobites, fenestrate bryozoans and brachiopods from the marine faunas of Eastern Australia. Associate Professor S. St. J. Warne is concerned with multi-method investigations into the development and application of advanced mineralogical techniques to mineral groups and mixtures, with special reference to minerals associated with coal and other depositional environments.

Dr K. H. R. Moelle's interests are an assessment of brittle deformation features and their interpretation in a regional setting; aspects of faulting in the northern fringe area of the Sydney Basin; "directional mining" research in some N.S.W. colliers.

Dr R. Offer is carrying out investigations on the low grade metamorphic rocks of Carboniferous and Devonian age, north of Newcastle, and structural and petrographical studies of the Globe-Vauxhall Retrograde Schist Zone, Broken Hill. He is also carrying out a joint project with Professor Diesel on the relationship between metamorphic grade and reflectance of coalified and graphitic plant fragments.

Dr P. K. Seccombe is concerned with geochemical and sulphur isotope studies of sulphide ore deposits. He is carrying out an experimental study of the mineral partitioning of sulphur isotoopes.

Dr J. A. Gamble's interests are in the fields of volcanology, petrology, petrogenesis and geochemistry of Tertiary and recent volcanic and sub-volcanic rocks.

Mrs L. N. Morris' research interest is in Carboniferous and late Devonian floras of Eastern Australia.

**DEPARTMENT OF PHYSICS**

**Airborne infra-red** (Professor Ellyett, Dr Chandra)
Airborne far infra-red scanner observations continue to be flown to study areas of particular geological or hydrological interest. New interpretation techniques have been devised, including the production of computer-plotted absolute temperature profiles, and their presentation as colour temperature maps.

Theoretical work is also being undertaken to produce models of soil temperature under different evaporative conditions.

**Surface Physics** (Associate Professor Ramsey, Mr Roberts)
Studies are proceeding in the area of adsorption of oxygen on the low index faces of aluminium. The electronics for LEED system has been completed and tested. Modifications to the CMA Auger electron spectroscopy system are in progress to improve the resolution and sample handling facilities. Surface potential studies on polycrystalline films by the retarding field diode and Kelvin vibrating plate methods have been commenced. A retarding field low energy electron spectrometer is under construction for the analysis of the spectra of thermally stimulated exoelectrons.
Theoretical studies on the A1(111) surface and oxygen adsorbed thereon have shown that our model is feasible. Experimental studies await the completion of the specimen manipulator of the apparatus.

Radar Meteor Studies (Associate Professor Keay)
Digital techniques employing integrated circuit logic and high speed mini-computer with microsecond cycle times have been combined to enable signal processing to be carried out in real time. This, and a new HF pulse transmitter, are being developed for a fully automated radar meteor detection system.

Magnetic micropulsations (Dr Fraser)
The time of occurrence, velocity, polarisation and direction of travel of hydromagnetic waves in an ionospheric duct is being extensively investigated. The phenomenon is studied at the surface of the Earth as geomagnetic micropulsations recorded at Newcastle, Woomera, Launceston, Perth and Macquarie Island. Data from Auckland is also available.

Life-times of excited atoms (Mr Cleary)
Work is proceeding on the life-times of the excited states of atoms.

Theoretical Solid State Physics (Dr Smith)
Investigations in theoretical solid state physics include the study of the electronic properties of dilute substitutional and interstitial impurities in both simple and transition metal hosts. The energetics and diffusion of hydrogen impurities in nearly free electron and transition metal hosts are also being studied.

Analog IC techniques (Dr McGovern)
Novel analog integrated circuit configurations have been developed and used in instrumentation applications, most recently in a linearizer circuit for microwave diode detectors.

Electromagnetic wave propagation (Dr McGovern)
The major components of a fast reflectometer system are now available for experimental study of EM wave propagation in non-uniform structures.

Satellite Signals (Professor Ellyett, Dr Kennewell)
A weather satellite receiving station is near completion, and this is expected to provide visual and infra-red ground data for further processing.

Electrocardiograph recorder (Dr Kennewell)
Signal processing studies of ECG data have been commenced with a view toward the development of a low cost diagnostic system utilizing a microcomputer.

DEPARTMENT OF PSYCHOLOGY
The research activities of the Department may be grouped under different broad headings reflecting the special interests of the staff members. However, there is sufficient overlap among the groups to maintain communication at a high level.

Abnormal Psychology
A programme of research is being carried out on the effects of stress on the function of the hypothalmic-pituitary-adrenal system in early infantile autism. Also the use of biofeedback as a therapeutic technique is being investigated in a variety of disorders.

Cognitive Processes
Research into the development of cognitive processes has continued with particular emphasis on factors associated with the acquisition of concepts.

Cross-Cultural Research
The development of values and the relationship between norms, behaviour, alcohol and youth culture are being studied with an international team from the U.S.A., Norway and France. Research on the development of values in adolescents in Australia and Malaysia.

Developmental Psychology
The efficacy of various types of treatments on behavioural development in infancy is being studied.

Learning, Perception and Memory
The research interests in this area include instrumental avoidance conditioning, structure and parameters of perception, perceptual learning, and short-term memory.

Linguistics
Language behaviour is being investigated in terms of linguistic models and redundancy measures. The effects of language in acquiring concepts and on measures of motivation are being studied. Specific problems in reading are also being identified.

Mathematical Psychology
In mathematical psychology, experimental studies of new methods of measuring abilities and personality are continuing. Stochastic process models for decision making in information processing tasks are being explored. Work on the computer control of real-time psychological experimentation is being pursued.
Physiological and Comparative Psychology
Physiological and biochemical systems involved in behaviour are being investigated with both human and infrahuman subjects. Drugs and evoked responses in the nervous system are being used to study children with reading difficulties. Both human and infrahuman subjects are being used to investigate the role of the autonomic nervous system in stress and emotion. Several parameters of the cardiac response during a range of behaviours, e.g., aversive conditioning, open field activity, are being investigated using biofeedback and telemetric devices. In infrahuman subjects effects of early experience on adult behaviour are being examined.

DEPARTMENT OF GEOGRAPHY

Biogeography and Climate
Altitudinal gradation of rainforest at Barrington Tops (Dr J. C. Turner)
Microclimatology in vineyards (Mr G. N. McIntyre)

Development Geography
The economic development of less developed countries, with specific reference to the role of forestry production. (Mr W. J. A. Jonas)
The change from a tribal to a peasant economy by the small-holder rubber growers in Papua New Guinea. (Associate Professor P. G. Irwin)
Diffusion of a high yielding varieties programme among rice farmers, Kedah, Malaysia, and its impact on their economic system. (Dr R. E. Barnard)

Geographical theory and philosophy
Time-space and social behaviour (Dr D. N. Parkes)
Towards the creation of "ethical space" (Miss M. R. Hall)
Time-space and socio-technical systems (Mr K. W. Lee)

Geomorphology
Present and past tidal landforms (Associate Professor W. F. Geyl)
Suspended-sediment and solute transport from Congewai Creek drainage basin (Dr R. J. Loughran)

Historical Geography
Population geography of the Hunter Valley in the 19th century (Dr J. C. R. Camm)
Agricultural development in southeastern Queensland, 1890-1915 (Dr J. C. R. Camm)

Migration
Internal migration in Australia (Dr L. A. de Castro Lopo)
Networks in relation to the location of Greek immigrants in Newcastle (Mr A. Burns)
An Italian community in Newcastle as a support system (Mrs J. P. Galvin)

Political Geography
Political geography and regional planning in New South Wales and the Hunter Region (Professor K. W. Robinson)
Geographical aspects of the Australian federal movement (Professor K. W. Robinson)

DEPARTMENT OF MATHEMATICS

Algebra
Mr R. F. Berghout is pursuing some topics in ring theory and ring-like categories, making use of the theory of radicals, and is also engaged in the extension of this theory to additive categories.

Associate Professor W. Brisley is working on some problems occurring in the laws defining certain varieties of groups and the subsequent lattice of sub-varieties of given varieties.

Basic Biological Forces
Dr E. R. Smith is studying the role of Van der Waals and related forces in the stabilisation of biological arrays and colloids.

Chemical Kinetics
Dr D. L. S. McElwain is working on the mathematical modelling of non-equilibrium phenomena in gases, using the Master Equation approach.

Combinatorial Theory and Operations Research
Dr R. B. Eggleton is interested in all aspects of combinatorial mathematics, particularly graph theory.

Professor R. W. Robinson is applying combinatorics to the counting of various structures, such as graphs and search trees.

Dr R. J. Vaughan is interested in the application of optimisation methods to industrial production problems.

Associate Professor W. D. Wallis is carrying out research on block designs and graph theory. He is also working on rostering and scheduling problems.

Differential Geometry and Relativity
Dr P. K. Smrz is working on generalizations of Einstein's theory of relativity using modern differential geometry—in particular, the theory of Lie groups and fibre bundles.
Dynamical Systems
Dr J. G. Couper is working on stable and generic properties of flows and diffeomorphisms.

Environmental and Urban Studies
Dr R. J. Vaughan is investigating mathematical models in urban geography.
Associate Professor W. D. Wallis is working on mathematical models in urban geography and urban sociology.
Dr. R. W. Gibberd is studying the art of population projections and various models of urban structure and urban development. He is also interested in urban sociology, voting patterns and urban demographic models.

Fluid Mechanics
Associate Professor A. J. Guttmann is studying the problem of extrapolating regular perturbation series in fluid mechanics. Powder Mixing—the problem of powder mixing is being investigated.
Dr W. T. F. Lau is concerned with potential flow and viscous flow problems.

Functional Analysis
Associate Professor J. R. Giles is involved in determining properties of Banach spaces which can be derived from relations between the points of the space and their support functionals. In particular, he is examining differentiability properties of the norm. He is also working on the development of the theory of the numerical range of operators on locally convex spaces, and of elements of locally m-convex algebras.
Dr V. Ficker and Mr C. J. Ashman are working in measure theory, particularly in some problems on classes of null sets.

Geophysical Fluid Dynamics
Dr W. Summerfield is currently studying the dynamics of estuarine systems. He is also interested in all ocean wave phenomena.

History of Mathematics
Mr R. F. Berghout is pursuing research into the development of algebra, notably modern algebra, as well as the relations between this and classical occidental and oriental algebra.
Mr Berghout, together with Mrs Frost, is working on Greek algebra. Mrs Frost is currently translating into English some of Euclid's as yet untranslated works.

Information Theory
Professor R. G. Keats is continuing to work in co-operation with research scientists at the Weapons Research Establishment who are active in the study of signal processing. This work involves the study of non-linear systems with stochastic inputs.

Mathematical Logic
Professor R. W. Robinson is studying the structure of the recursively enumerable degrees and the degrees below O'.

Mathematical Models of Tumour Growth
Dr D. L. S. McElwain is investigating models for the growth of solid isolated tumours.

Number Theory
Dr R. B. Eggleton is interested in number theory; particularly in combinatorial aspects of the subject.
Dr T. K. Sheng studies the structure of humanly manageable numbers, application of dispersive and explosive linear operators, distribution of algebraic numbers in the complex plane, and functions defined on rational numbers.

Numerical Analysis and Computing
Associate Professor A. J. Guttmann is interested in methods of function approximation, particularly from the viewpoint of using a linear differential equation representation. He is also interested in the analysis of theoretical and experimental data.
Dr W. Summerfield is working on ways of determining the “condition” of linear systems of equations. Further, he is interested in the solution by linear marching schema of ordinary differential equations, in particular “stiff” systems. He is also investigating the finite element method of solution for partial differential equations.

Statistical Mechanics
Associate Professor A. J. Guttmann is working on the theory of equilibrium critical phenomena. He is particularly interested in the analysis of power series expansions which are frequently used to study systems exhibiting phase transitions.
Dr E. R. Smith is working on the theory of non-homogeneous systems and the theory of polar liquids.
Dr W. P. Wood is investigating the dynamical behaviour of long chain molecules in solution.
Dr. R. W. Gibberd is interested in most aspects of statistical mechanics. Associate Professor C. A. Croxton is working on the statistical mechanics of liquids and liquid interfaces.

Statistics
Associate Professor W. D. Wallis is working on the theory and application of Room square designs and paired comparison designs.

Transportation Problems
Dr R. J. Vaughan is continuing his work in the application of mathematics to traffic engineering, traffic accidents and transportation planning.