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ADMINISTRATION GL, GS, G

CLASSICS C

COMMUNITY PROGRAMMES Q

COMPUTER CENTRE O

CRIMINAL LAW Q

ENGLISH LG

FRENCH Q

GERMAN Q

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PHILOSOPHY Q

PSYCHOLOGY Q

UNIVERSITY COUNSELLING SERVICE LG

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CHEMISTRY D

BIOLOGICAL SCIENCES LG

ARCHITECTURE LG

ARTS DRAMA THEATRE G

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COMMERCE MG

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LEGAL STUDIES MG

TEMPORARY BUILDINGS T

AMENITIES OFFICE T

DEAN & STUDENT EMPLOYMENT OFFICE T

MATHEMATICS V

LINGUISTICS V

ENGINEERING COMPLEX EA

CHEMICAL ENGINEERING EA

CIVIL ENGINEERING EA

ELECTRICAL ENGINEERING EA

MECHANICAL ENGINEERING EA

ENGINEERING THEATRE EA

CLASSROOMS EF

UNION

CHAPLAINCY SERVICE

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OVERSEAS STUDENTS SERVICE

THE UNIVERSITY OF NEWCASTLE
NEW SOUTH WALES 2308

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
Faculty of Science
# CONTENTS

Faculty of Science

The colour band on the spine of this Handbook is the lining colour of the hood worn by Bachelors of Science of this University

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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 Tudor/Demonstrators of the Departments composing the Faculty together with the following representatives of the Departments offering services to or receiving services from 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, 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".

Dean
Professor J. A. Keats

Sub-Dean
Dr D. C. Finlay

Faculty Secretary
R. J. Archer
BIOLOGICAL SCIENCES

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J. W. Patrick, BScAgr(Sydney), PhD(Macquarie)
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H. Steigler

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M. K. O'Neill
J. F. Pearson

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(Head of Department)
R. W. Robinson, MA(Dartmouth), PhD(Cornell)

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P. K. Smrz, PromPhys, CSc, RNDr(Charles)

Lecturers
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J. G. Couper, BSc, PhD(New England)
R. W. Gibberd, BSc, PhD(Adelaide)
M. J. Hayes, BA(Cambridge)
D. L. S. McElwain, BSc(Queensland), PhD(York (Canada)
E. R. Smith, MSc(Melbourne), PhD(London)
W. Summerfield, BSc(Adelaide), PhD(Flinders)
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A. C. Yorke, BA(Rutgers), MA(Pennsylvania)

Tutors
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C. S. Dibley, BMath
Winifred Frost, BA

Honorary Associate
I. L. Rose, BE(Sydney), PhD(New South Wales)

Computer Programmer
B. R. Cheek, BMath

Research Assistants
Joan A. Cooper, BMath, PhD
D. F. Morrison, BMath

Departmental Office Staff
Elinor F. Pearsall
Joanne L. Duggan
Julie H. Latimer
Anne M. Nicholls
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 a pass 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 A149).

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 1976. 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

| Biology IIA with | Physics IIIB |
| Biology IIB with | Chemistry IIIA |
| Biology IIIA with | Psychology IIIA |
| Biology IIIB with | Chemistry IIIB |
| Chemistry IIB |
| Chemistry IIIA |
| Chemistry IIIB |
| Electronics & Instrumentation II |
| Psychology IIIB |
| Biology IIB with | Chemistry IIIB |
| Chemistry IIIA |
| Chemistry IIIB |
| Electronics & Instrumentation II |
| Physics IIIA |

Because of the interchange of A and B timetables in alternate years, subjects clashing with Biology IIA and IIIA in 1976 will clash with Biology IIB and IIIB respectively in 1977 and vice versa.

CHEMISTRY

| Chemistry IIA with | Geology IIB |
| Chemistry IIB with | Biology IIIA |
| Biology IIIA |
| Biology IIIB |
| Geology IIIB |
| Geology IIIA |
| Geology IIIB |
| Physics IIIA |
| Psychology IIIA |
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. The Faculty Board pursuant to By-law 5.4.1.2. 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 paragraph 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**

*For Entry to the University in 1977*

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.
Subject Assumed Level

Physics IA, IB — Physics (2 unit course) or Multistrand (4 unit) Science.
Chemistry I — Chemistry (2 unit course) or Multistrand (4 unit) Science.
Mathematics I — Mathematics (2 unit course).

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.

(i) 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.
REQUIREMENTS FOR THE DEGREE OF
BACHELOR OF SCIENCE
IN THE FACULTY OF SCIENCE

GENERAL PROVISIONS

1. Definitions
In these Requirements, unless the contrary intention appears, "the Faculty" means the Faculty of Science and "the Faculty Board" means the Faculty Board of the Faculty of Science.

2. Grading of Degree
The Degree of Bachelor of Science may be conferred either as an ordinary degree or as an honours degree and may be undertaken by either full-time or part-time study.

3. Approval of Enrolment
(a) A candidate shall obtain the approval of the Dean or the Dean's nominee for his enrolment in any year and for any subsequent alteration in that enrolment.
(b) A candidate enrolling in the Faculty for the first time or a candidate wishing to enrol in more subjects than the number recommended for the normal programme, as set out in Clause 18, shall, when seeking the approval required in sub-clause (a) of this Clause, report in person to the Dean or the Sub-Dean.

4. Timetable Requirements
A candidate may not enrol in any year in any combination of subjects which is incompatible with the requirements of the timetable for that year.

5. Annual Examinations
The Annual Examinations shall be conducted by means of written examinations supplemented by such oral and practical tests as the examiners think fit.

6. Special Examinations
A candidate may be granted a special examination in accordance with the provisions of By-law 5.9.3.

7. Examination Grades
The results of successful candidates at Annual Examinations and Special Examinations, except for those enrolled in the final honours subjects, shall be classified:
Pass, Credit, Distinction, High Distinction.

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) (a) four subjects shall be chosen from Part I, three subjects from Part II, and two subjects from Part III.

(b) Notwithstanding the provision of sub-clause (i) (a) of this Clause, one subject from Part I may be substituted for a subject from Part II and one subject from Part II may be substituted for a subject 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) (a) only one of Physics IA and Physics IB may be counted.

(b) not more than four Mathematics subjects may be counted.¹

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.

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.

¹ Undergraduates who enrolled in the course prior to 1972 are exempt from this proviso.

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:

- **Year I**
  - Four Part I subjects

- **Year II**
  - Three Part II subjects; or
  - Two Part II and one Part I subject

- **Year III**
  - Two Part III subjects; or
  - One Part III and one Part II subject.

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. 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.

21. 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.

22. The honours subjects offered shall be:
   - Biology IV
   - Chemistry IV
   - Geography IV
   - Geology IV
   - Mathematics IV
   - Physics IV
   - Psychology IV

23. 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.

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

25. In each department 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

26. 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, five of which shall be 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 the remainder of which shall be chosen from the other subjects listed in the Schedule of Subjects approved for the degree of Bachelor of Science provided that:

(a) the maximum total number of Mathematics Part I subjects and Science Part I subjects shall be six;
(b) the minimum total number of Mathematics Part III subjects and Science Part III subjects shall be three;

1 Please refer to the Notes to the Degree Requirements.
(c) a candidate counting Psychology IIIIC may not count either Psychology IIIIA or Psychology IIIB;
(d) a candidate counting Economics IIIIC may not count either Economics IIIIA 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**

27. (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**

**Subject**  
Remarks, Prerequisites, Corequisites, Preparatory Subjects

**PART I**

<table>
<thead>
<tr>
<th>Biology I</th>
<th>Chemistry I</th>
<th>Geography I</th>
<th>Mathematics I</th>
<th>Physics IA</th>
<th>Physics IB</th>
<th>Psychology I</th>
</tr>
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</table>

Only one of these subjects may be taken.

**PART II**

<table>
<thead>
<tr>
<th>Biology IIA</th>
<th>Biology IIB</th>
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</table>

<table>
<thead>
<tr>
<th>Chemistry IIA</th>
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<tr>
<th>Chemistry IIB</th>
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<tr>
<th>Electronics and Instrumentation II</th>
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<table>
<thead>
<tr>
<th>Geography IIA</th>
<th>Geography IIB</th>
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<table>
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<tr>
<th>Geology IIA</th>
<th>Geology IIB</th>
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<table>
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<tr>
<th>Mathematics IIA</th>
<th>Mathematics IIB</th>
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<tr>
<th>Mathematics IIC</th>
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**PART III**

<table>
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<tr>
<th>Biology IIIA</th>
<th>Biology IIIB</th>
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<table>
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<tr>
<th>Chemistry IIIA</th>
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<th>Chemistry IIIB</th>
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<table>
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<tr>
<th>Geography IIIA</th>
<th>Geography IIIB</th>
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<table>
<thead>
<tr>
<th>Geology IIIA</th>
<th>Geology IIIIB</th>
</tr>
</thead>
</table>

**Remarks, Prerequisites, Corequisites, Preparatory Subjects**

**Prerequisite:** Biology I  
**Prerequisite:** Chemistry I  
**Preparatory Subjects:** Mathematics I and either Physics IA or Physics IB  
**Prerequisite:** Chemistry I  
**Corequisite:** Chemistry IIA (Advisory)  
**Prerequisite:** Physics IA or IB  
**Prerequisite:** Geography I  
**Prerequisite:** Geology I  
**Prerequisite:** Mathematics I  
**Corequisite:** Mathematics IIA  
**Prerequisite:** Mathematics I  
**Prerequisite:** Mathematics I, Physics IA or normally a credit pass or better in Physics IB  
**Prerequisite:** Psychology I  
**Prerequisite:** Biology IIA  
**Prerequisite:** Biology IIA or IIB  
**Prerequisite:** Mathematics I and Chemistry IIA  
**Corequisite:** Chemistry IIIA  
**Prerequisite:** Chemistry IIA  
**Remarks:** Before enrolling in Geography IIIIB, the student must obtain the approval of the Head of the Department of Geography or his representative  
**Prerequisite:** Geography IIA or IIB  
**Prerequisite:** Geography IIA or IIB  
**Corequisite:** Geography IIIA  
(for full-time students)  
**Prerequisite:** Geography IIA  
**Preparatory Subjects:** Geography IIA  
**Prerequisite:** Geography IIIA  
**Corequisite:** Geology IIIA  
**Prerequisite:** Geology IIIA  
**Corequisite:** Geology IIIA
Year III At least one Science Part III subject and two other subjects including an Arts Group I Part II subject if no Arts Group I Part II subject has so far been passed. At the end of Year III students must have passed at least three Arts Group I subjects.

Year IV One subject which is an Arts Group I Part III subject if this requirement has not already been met (and is from a department different from that of the Science Part III subject) and two other subjects to complete the Requirements for the degree of Bachelor of Arts.

(b) Year I Four Arts Part I subjects passed with an average performance of credit level or higher.

Year II Three Arts Part II subjects and an additional subject which will be a Part I subject chosen from the B.Sc. Schedule if no subject included in that Schedule has been passed.

Year III At least one Arts Part III subject and two other subjects including a Science Part II subject if no Science Part II subject has so far been passed. By the end of this year at least three subjects from the B.Sc. Schedule of Subjects must be passed.

Year IV One subject, which is a Science Part III subject if this requirement has not already been met (and is from a department different from that providing the Arts Part III subject), and two other subjects to complete the Requirements for the degree of Bachelor of Science.

B.Sc./B.Math

Normally the joint degree programme would be pursued as follows:

Year I Mathematics I and three Part I subjects passed with an average performance of credit level or higher.

Year II three Group II subjects including Mathematics IIA and Mathematics IIC, and another Part I subject.

Year III Mathematics IIA plus two other subjects which must include at least one Part III subject.

Year IV either Mathematics IIB or a schedule B subject from the requirements for B.Math, plus two other subjects which will complete the requirements for the Science degree.

B.Sc./B.E.

For sample programmes see relevant sections of the Handbook for the Faculty of Engineering.
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 1, 2 and 3 in an approved Science discipline, and a minor sequence, i.e. part 1 and 2 in a different approved Science discipline.

POSTGRADUATE COURSES

Studies may be undertaken at a postgraduate level in the following courses:
- Diploma in Psychology (Clinical)
- Diploma in 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 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. 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 recommendation 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
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 practical 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 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. A person may register for the degree of Master of Science if —

(a) he is a graduate or graduand of the University of Newcastle or other approved university with Honours in the subject to be studied for that degree; or

(b) he is a graduate or graduand of the University of Newcastle or other approved university: or

(c) in exceptional cases he produces evidence of such academic and professional attainments as may be approved by the Senate, on the recommendation of the Faculty Board.

3. In the case of applicants desiring to register under provision 2(b), and (c), the Faculty Board may require the candidates to carry out such work and sit for such examinations as the Board may determine before registration as a candidate for the degree of Master of Science is confirmed.

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 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 University¹. 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.
6. Subsequent to registration, the candidate shall pursue a course of advanced study and research for at least nine academic terms, save that any candidate who before registration was engaged upon research to the satisfaction of the Senate, may be exempted from 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. The course, other than field work, must be carried out in a department of the University, under the direction of a supervisor appointed by the Senate, or under such conditions as the Senate may determine, save that 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.

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.

**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.

1 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 enrols 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 Three lecture hours and three hours of tutorial and laboratory classes per week. A two-day excursion.

Examination One three-hour paper

Content

Cells and Cell Constituents Proteins, carbohydrates, lipids, mitosis. Organisation of cells as tissues.

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

Continuity of Life

Immunology
Antigens and antibodies. Blood groups.

Chemical Basis of Heredity
Evolution and Ecology
Diversity of Organisms

Human Biology
The practical classes will present exercises relevant to these topics.

Preliminary Reading
White, E. H. *Chemical Background for the Biological Sciences* 2nd edn (New York, Prentice-Hall)

Texts
Keeton, W. J. *Biological Science* 2nd edn (New York, Norton & Co.)

References
Holloway, B. W. *Genes and Chromosomes in Action* (Thomas Nelson 1969)
Moroney, M. J. *Facts from Figures* (Middlesex Penguin)
Srb, A. M., Owen, R.D. & Edgar, R. S. *General Genetics* 2nd edn (Freeman)

712100 Biology IIIA

Prerequisites
Biology I

Hours
Three lecture hours and six hours tutorial and laboratory classes per week

Examination
Two three-hour papers

Content
Biochemistry

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

Genetics

Statistics
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
Srb, A. M., Owen, R.D. & Edgar, R. S. *General Genetics* 2nd edn (San Francisco, Freeman 1965)

OR

References
Mahler, H. R. & Cordes, E. H.

Cordes, E. H.

de Robertis, E. D. P.

Nowinski, W. W. & Saez, T. A.

Smith-Keary, P. F.

White, E. H.

Wold, F.

712200 Biology IIB

Prerequisites

Hours

Examination

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


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 Universities Press)

Bell, P. & Woodcock, C. The Diversity of Green Plants 2nd edn (Edward Arnold 1971)

Hoar, W. S. General & Comparative Physiology 2nd edn (Prentice-Hall 1975)


Sutcliffe, J. Plants and Water (Edward Arnold 1968)

References


Barnes, R. D. Invertebrate Zoology 2nd edn (Saunders)

Bossart, E. Q. & Wilson, W. H. A Primer in Population Biology (Sinauer 1971)

Clark, L. R. et al. The Ecology of Insect Populations in Theory and Practice (Sciena Paperbacks Methuen 1967)

Darnell, R. M. Organism and Environment (Freeman)


Russell-Hunter, W. D. Biology of Lower Invertebrates, Biology of Higher Invertebrates (Collier Macmillan)

Schmidt-Nielson K. Animal Physiology 3rd edn (Prentice Hall)


713100 Biology IIIA

Prerequisites

Hours

Examination

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 (Philadelphia, Davis 1974)
Hamburgh, M. *Theories of Differentiation* (London, Arnold 1971)
Torrey, J. G. *Development in Flowering Plants* (New York, Macmillan 1967)
Zar, J. H. *Biostatistical Analysis* (Prentice-Hall)

References
Ebert, J. D. *Interacting Systems in Development* (New York, Prentice-Hall 1965)

Biology IIIB

Prerequisites
Biology II

Hours
Four lecture hours and eight hours tutorial and laboratory classes per week.

Examination
Two three-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)
Ford, E. B. *Ecological Genetics* (Methuen)
Hoar, W. S. *General & Comparative Physiology* 2nd edn (Prentice-Hall 1975)
Zar, J. H. *Biostatistical Analysis* (Prentice-Hall)

References
Briggs, D. & Walters, S. M. *C.S.I.R.O.*
Kershaw, K. A. *Quantitative and Dynamic Plant Ecology* 2nd edn (Edward Arnold)
Phillipson, J. *Ecological Energetics* (Edward Arnold 1966)
Schmidt-Nielsen, K. *How Animals Work* (Cambridge University Press 1972)
714100 Biology IV

Prerequisite  Nil

Hours  As required by the Head of Department

Examination  As required by the Head of Department

DEPARTMENT OF CHEMISTRY

721100 Chemistry I

Prerequisites  Nil

Hours  About three lecture hours and three hours of tutorial and laboratory classes per week.

Examination  Three three-hour papers, one held 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)
The chemistry of carbon and its compounds; hydrocarbons; chemistry of compounds containing oxygen, nitrogen and halogens as functional groups; reaction mechanisms; molecules containing two or more functional groups; separation and purification of compounds.

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.  S.I. Chemical Data 2nd edn (Sydney, Wiley & Sons Australasia 1974)
Benfey, O. T.  The Names and Structures of Organic Compounds (New York, Wiley & Sons 1966)
a,b Pimentel, G. C. & Spratley, R. D.  Understanding Chemistry (California Holden-Day 1971)
a Several other texts provide suitable alternative approaches, one widely used is:
b Students with deficient background knowledge are advised to consolidate basic understanding through study of books such as:


OR


722200 Chemistry IIA

Prerequisite  Chemistry I

Preparatory Subjects  Mathematics I and either Physics IA or IB

Hours  About three lecture hours and six hours of tutorial and laboratory classes per week

Examination  Two three-hour papers

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
Aliphatic and aromatic compounds; condensation reactions; reaction mechanisms.

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

Thermodynamics
Basic laws.

Texts

Geissman, T. A.  Principles of Organic Chemistry 3rd edn (Freeman 1968)
Pickering, W. F. Modern Analytical Chemistry (New York, Dekker 1971)

OR

Barrett, J. Introduction to Atomic and Molecular Structure (London, John Wiley & Sons Ltd 1970)

Students intending to proceed to Chemistry IIIA are advised to purchase a copy of either:
Texts
Moore, W. J.  
Bockris, J. O'M. & Reddy, A. K. N.  
Shoemaker, D. P. & Garland, C. W.  
Pickering, W. F.  
Pecsok, R. L. & Shields, L. D.  
Cotton, F. A. & Wilkinson, G.  
Huheey, J. E.  
Angelici, R. J.  
Albert, A.  
Katritzky, A. R. & Lagowski, J. M.  
Acheson, R. M.  
Sykes, P.  
Fleming, I. & Williams, D. H.  

Or  

Pecsok, R. L. & Shields, L. D.  
Modern Methods of Chemical Analysis  
(New York, Wiley & Sons 1968)  

Cotton, F. A. & Wilkinson, G.  
Advanced Inorganic Chemistry 3rd edn  
(Interscience 1972)  

Huheey, J. E.  
Inorganic Chemistry (New York, Harper International edn 1975)  

Angelici, R. J.  
Synthesis and Technique in Inorganic Chemistry (Philadelphia, Saunders 1969)  

Albert, A.  
Heterocyclic Chemistry 2nd edn (Melbourne, Melbourne University Press 1968)  

Katritzky, A. R. & Lagowski, J. M.  
Principles of Heterocyclic Chemistry (Methuen 1967)  

Acheson, R. M.  
An Introduction to the Chemistry of Heterocyclic Compounds 2nd edn  
(New York, Wiley 1967)  

Sykes, P.  

Fleming, I. & Williams, D. H.  
Spectroscopic Methods in Organic Chemistry  
(McGraw-Hill 1966)  

Texts and reference books for Chemistry IIIB, IIIA and IV vary with the options selected.

Examination
Each unit will be examined separately (by one hour examination or by assignment) and the annual examination result will be obtained by combination of the individual unit marks.

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

The units offered will vary from year to year and the topics available include:

- Applied Spectroscopy; Applied Thermodynamics; Aromaticity; Advanced Co-ordination Chemistry; Bio-Inorganic Chemistry; Organic Compounds of Biological Interest; Biogenesis; Homogeneous Catalysis by Transition Metal Compounds; Heterogeneous Equilibria; Introductory Electrodes, Lasers and Laser Raman Spectroscopy; Modern Analytical Chemistry; Polymer Chemistry; Radio Chemistry; Reaction Mechanisms; Surface Chemistry; Theoretical Chemistry; Crystal Chemistry.

Texts
Range of texts required will vary with the options selected. Consult lecturers concerned and Departmental lists.

724100 Chemistry IV

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

Hours  
As required by the Head of Department

Examination  
To be arranged

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 assessment of the class of Honours will be based upon the formal work in Chemistry IV; the research project and thesis; and the previous undergraduate record. These three areas of assessment shall be equally weighted.

**Texts**
Consult lecturers concerned and Departmental lists.

**DEPARTMENT OF GEOLOGY**

**731100 Geology I**

**Prerequisite**
Nil

**Hours**
Three lecture hours and 2½ laboratory hours per week. Two days field work.

**Examination**
Two three-hours 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**
EITHER
OR
Mason, B. & Berry, L. G. *Mineralogy* (San Francisco, Freeman 1959)
(for students intending to proceed beyond Geology I)
EITHER
OR
Bickford, M. E. et al. *Geology Today* (CRM Book)

**732200 Geology IIA**

**Prerequisite**
Geology I

**Hours**
Three lecture hours and four laboratory hours per week. Eight days field work.

**Examination**
Two three-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**
EITHER
OR
Kottlowski, F. E. *Measuring Stratigraphic Sections* (N.Y., Holt, Reinhart & Winston 1965)
732300 Geology IIIB

Prerequisite
Geology I

Hours
Four lecture hours and three laboratory hours per week. Eight days field work.

Examination
Two three hour papers, class assignments and tests.

Content
The subject comprises six units of which the students must select four. Students must note that it may not be possible to offer all six units each year. The selection of units by students must be approved by the Head of Department. No unit is offered for an enrolment of less than 3 in that unit. Each unit is of equal length — approximately 28 lectures and 21 laboratory hours. The units comprise the following topics:

(i) Regional Geology
The tectonic framework and geological history of continents, extra-terrestrial geology.

(ii) Marine Geology
Tectonic framework of ocean basins; sea floor topographic features and zones; sedimentary environments in relation to sediment types; techniques of marine investigation; economic application and implications.

(iii) Environmental Geology
Positive and negative geological factors in pollution; degassing of Earth; toxicity of geological materials; importance of trace metals; metal scavengers of sedimentation; bacterial oxygen demand; supply and demand of geological materials in rural and urban expansion; litho-, hydro-, and atmospheric balances; disposal of atomic wastes; geological hazards.

(iv) Palaeobotany and Palaeoecology
Brief survey of fossil plants; introduction to palynology; ancient plant and animal communities.

(v) Quaternary Geology (including Man and other Vertebrates)
Geological events related to man’s appearance and distribution on Earth and his relation to other vertebrates.

(vi) Physico-chemical Principles Applied to Geology
Problems of degrees of freedom in geological environments; equilibrium constants in geological systems; the laws of thermodynamics applied to geology.

Units ii and iv will be given during the first half of 1976. Students will do both. Units i, iii and vi will be given during the second half, hence students will be expected to select two from these.

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

733100 Geology IIIA

Prerequisites
Geology I & Geology IIA

Preparatory Subjects
Chemistry I and either Physics IA or IB

Hours
Five lecture hours and six laboratory hours per week. Four days field work.

Examination
Two three 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.

Theoretical and Evolutionary Palaeontology (21 lectures)
Principles of taxonomy, quantitative methods; palaeoecology; species concepts, genetics, evolution; selected evolutionary patterns from the palaeontological record.
Geochronology and World Stratigraphy (14 lectures)
Principles of age dating; regional geology of selected provinces of the world.

Exploration Geophysics (28 lectures)
Geophysical techniques — their interpretation and application in petroleum and mining exploration, and hydrogeological and engineering investigations.

Texts
Deer, W. A., Howie, R. A. & Zussman, J.
Mason, B. & Berry, L. G.
Park, L. F. & McDiarmid, R. A.
Ragan, D. M.
Raup, D. M. & Stanley, S. M.
Jacobs, J. A., Russell, R. D. & Wilson, J. T.

An Introduction to the Rock Forming Minerals
(London, Longmans 1966)
Mineralogy (San Francisco, Freeman 1959)
Ore Deposits 2nd edn (San Francisco, Freeman 1970)
Structural Geology 2nd edn (N.Y., John Wiley & Sons)
Principles of Palaeontology (San Francisco, Freeman 1973)

733200 Geology III

Prerequisites
Geology I & IIA

Corequisite
Geology IIIA

Hours
Four lecture hours and four laboratory hours per week. Twelve days field work.

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

Content
This subject comprises eight units of which students must select four. Students must note that it may not be possible to offer all eight 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 comprise the following topics:

(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.

(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; sub-surface 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 and Micropalaeontology
An introduction to the main micro-fossil groups; a synthesis of the major zonal development of fossils in Australian stratigraphy and the correlation of these zones with overseas type sections.
Units i, iii, iv and viii will be given during the first half of 197~
and units ii, v, vi and vii during the second half, hence students will be
expected to select two from the units in each part of the year.

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
As required by the Head of Department

Examination
(i) performance in one three-hour paper
(ii) a viva voce examination
(iii) research work carried out and its presenta­
tion in a thesis
(iv) such other work, e.g. seminars, assign­
ments, 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;
palaeontology; structural geology; economic geology.

Part B
A research project, the results of which are to be embodied in a thesis.
742200 Electronics & Instrumentation II

Prerequisites
Physics 1A or IB

Hours
Three lecture hours, four laboratory hours, and two tutorial hours with directed assignments each week.

Examination
One two-hour paper on each of the three topics selected.

Content
Topic A — Basic Theory of Techniques; Instrumentation Practice; Specialist Instrumentation.
Topic B — Instrumentation Theory.
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, Enke & Crouch
Instrumentation for Scientists Series, Texts with Experiments Modules 1, 2, 3 & 4 (Benjamin Inc.)

Supplementary Reference Texts
Refer to Physics Department notice board.

742100 Physics II

Prerequisites
Mathematics I, Physics 1A or normally a credit pass or better in Physics IB.

Hours
Three lecture hours and six laboratory hours per week.

Examination
Three two-hour papers. One of these papers is given at the commencement of Third term.

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 (N.J., Prentice-Hall 1962)

Hayt, W. H.

Thompson, J. H.
Optics (N.Y., Wiley 1971)

Young, H. D.

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

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
Four lecture hours and eight laboratory hours per week.

Examination
Assessment will be by written papers and special assignments to the equivalent of three three-hour papers, and on laboratory and regular assignment work.

Content
Physics IIIA deals primarily with the more basic and fundamental aspects of Physics treated at third year level and covers the areas of classical and quantum physics which are essential to the understanding of both advanced pure physics and also the many applications of physics.

The course can be broadly summarized under the headings of Classical Physics and Modern or Quantum Physics. A sub-section, electronics, treats electron device physics and the use of these devices in electronic circuit design.
Classical Physics
Mathematical methods, advanced mechanics, special theory of relativity, electromagnetics including waveguide and antenna theory.

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

Laboratory
The laboratory course is intended to parallel the lecture course in overall content, having at least one experiment available in each topic listed above, although students are not expected to carry out all the experiments available.

Texts
Reif, F. *Fundamentals of Statistical and Thermal Physics* (McGraw-Hill)
Resnick, R. *Introduction to Special Relativity* (Wiley)

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

743200 Physics IIIB

**Prerequisite**
Physics II

**Corequisite**
Physics IIIA

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

**Examination**
Two 24-hour papers and assignment work during the year. The mathematics topics will be examined by the Faculty of Mathematics.

744100 Physics IV

**Prerequisite**
Physics IIIA

**Hours**
As required by the Head of Department.

**Examination**
Assessment of the lecture and reading course will be based on assignment work and written examinations to the equivalent of three three-hour papers. Final grading will also include evaluation of the research project, and the examiners may also require a 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 mostly in 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 electrons.

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.

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.

Texts
Texts and literature references will be given as needed by the lecturers concerned.
Texts
No specific texts are set, but recommendations are made at the beginning of the course.

752100 Psychology IIB

Prerequisite
Psychology I

Hours
Three lecture hours, one two-hour practical session and one one-hour tutorial per week.

Examination
Two three-hour papers plus an assessment of practical work carried out during the year.

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
No specific texts are set, but recommendations are made at the beginning of the course.

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.

753100 Psychology IIIA

Prerequisite
Psychology II A

Hours
Four lecture hours and up to five hours practical work per week.

Examination
Two three-hour papers plus an assessment of practical work carried out during the year.

Content
The course includes such topics as cognition, verbal learning, perception, physiological psychology, and animal behaviour.

The practical work is divided into
(a) Laboratory sessions, totalling three 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. Work on this will take two hours per week.

Texts
No specific texts are set but recommendations are made at the beginning of the course.

753200 Psychology IIIB

Prerequisite
Psychology II B

Hours
Four lecture hours and five hours practical work per week.

Examination
Two three-hour papers plus an assessment of practical work carried out during the year.

Content
The lecture course includes lectures on such topics as social psychology, psychopathology, human operant conditioning, personality assessment, developmental psychology, quantitative psychology and cross-cultural psychology.

Texts
No specific texts are set but recommendations are made at the beginning of the course.

754100 Psychology IV

Prerequisites
In 1976 completion of ordinary degree requirements including a major in Psychology and permission of the Head of Department. In 1977 and subsequent years completion of an ordinary degree normally including at least four Psychology subjects and permission of the Head of Department.

Hours
As prescribed by the Head of Department.

Examination
Two three-hour papers together with an 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
No specific texts are set but recommendations are made at the beginning of the course.
**Diploma in Psychology (Clinical)**

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

**Hours**
Twelve formal hours per week; the part-time course extends over two 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. The final examination at the conclusion of each year consists of two papers, one theoretical and one practical.

**Content**
The major sections of the course are as follows:

- Psychodiagnostic practicum (interview, psychometric and electrophysiological techniques and interpretations)
- Therapy practicum (sensitivity training, individual and group psychotherapies, behaviour modification treatment)
- Research projects (group project/s; individual studies).

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.

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**DEPARTMENT OF GEOGRAPHY**

351100 Geography I

**Prerequisites**
Nil

**Hours**
Two hours lectures and three hours practical work per week. One hour tutorial every two weeks. Three days of field work during the year.

**Examination**
As prescribed by the Head of Department.

**Content**
The lecture programme is divided into two strands: human and physical. The human geography strand is concerned with the development of an understanding of concepts basic to the study of human geography. These concepts are applied to selected aspects of cultural geography. The physical geography strand studies the world and its climatic variety.

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 organisation of geographic data are studied.

**Texts**
- McCaskill, M. *Patterns on the land, basic concepts in Geography* (Melbourne, Longman 1973)

**References**
Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

352100 Geography IIA

**Prerequisites**
Geography I

**Hours**
Four hours of lectures, two hours of practical/tutorial work per week and eight days field work.

**Examination**
As prescribed by the Head of Department.

**Content**
This subject is concerned with human geography. It reviews the methods and concepts of economic geography, with selected studies of the location of agricultural, and manufacturing economic activity. Urban geography is introduced in terms of the patterns and processes associated with the organisation of the ‘western’ city. Patterns of urban social order, expressed in aggregate data, are discussed from the classical ecological approach through to recent factorial ecology. The processes involved in the formation of these patterns are identified in various aspects of individual, group and institutional behaviours. Normal and deviant behaviour are considered and some attention is given to the spatial characteristics and problems in the distribution of welfare and justice in the ‘western’ city. Problems of the Australian city system are emphasised.

**Texts**
- Smith, Taaffe & King *Readings in Economic Geography* (Rand McNally 1968)
References

Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

352200 Geography IIB

Prerequisites
Geography I

Hours
Four hours of lectures, two hours of practical/tutorial work per week and eight days' field work.

Examination
As prescribed by the Head of Department.

Content
This is a study of processes and patterns in man's physical environment. One section of the subject deals with the behaviour of the atmosphere, including its interaction with the earth's surface, over wide ranges of scale in space and time. The other section deals with geomorphic processes on the one hand, and problems of historical geomorphology on the other. The subject is a prerequisite for the Fluvial Geomorphology and Advanced Geomorphology electives in Geography III.

Texts
Barry, R. G. & Chorley, K. J.
Strahler, A. W.

References
Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

352300 Geography IIC

Prerequisites
Geography I

Hours
Four hours of lectures, two hours of practical/tutorial work per week and assignments equivalent to eight days of fieldwork.

Examination
As prescribed by the Head of Department.

Content
This is essentially 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
Spencer, J. E. & Thomas, W. L.

References
Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

353100 Geography IIIA

Prerequisites
Geography IIA or IIB

Hours
Five and a half hours per week of lectures, practical work and seminars. Eight days' field work are an integral part of the subject.

Examination
As prescribed by the Head of Department.

Content
(i) Core Topic — The History and Philosophy of Geography.
(ii) Two Electives — Selected from list below.

References
Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

353200 Geography IIIB

Prerequisites
Geography IIA or IIB

Corequisites for full-time students
Geography IIIA (see Schedule of Subjects appended to the Degree Requirements).

Hours
Five and a half hours per week of lectures, practical work and seminars. Eight days' field work are an integral part of the subject.

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
Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.
Electives 1976

Topic (a)  353102  Advanced Economic Geography

Prerequisites  Geography IIA

Hours  Two hours per week and related field work

Examination  As prescribed by the Head of Department

Content  The lectures will fall into three major sections:

(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  Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

Topic (b)  353110  Advanced Geomorphology

Prerequisites  Geography IIB

Hours  Two hours per week and related fieldwork

Examination  As prescribed by the Head of Department

Content  The elective is made up of two parts. One section focuses attention on fluvial processes within the drainage basin system. The other deals with the historical-geomorphological interpretation of selected landscapes and, to some extent, with the significance of the physical features for human occupation.

Texts  

References  Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

Topic (c)  353111  Advanced Urban Geognosy

Prerequisite  Geography IIA

Hours  Two hours per week and related field work

Examination  As prescribed by the Head of Department

Content  This topic is designed for the study of selected aspects of human behaviour in cities. About one term is given over to a time-space approach to urban activity systems. Examples are related to U.S.A., U.K., Sweden and Australia. Recent developments in the study of urban images; intra-urban residential movements and the processes associated with spatial behaviour of minority groups are also considered. A study of urban space-time profiles related to urban and sub-urban health care needs in socially stratified space will be a group-project, in doing fieldwork. Discussion of the control of urban social systems and the future of cities concludes the course.

References  Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

Topic (d)  353103  Biogeography

Prerequisite or Corequisite  Geography IIB

Hours  Two hours per week and related field work

Examination  As prescribed by the Head of Department

Content  The topic deals with:

(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.

References  Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

Kellman, Martin, C.  *Plant Geography* Paperback (London, Methuen 1975)


**References**

Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

**Topic (e) 353106 Geographical Techniques**

**Prerequisites**

Nil

**Hours**

Two hours per week and related field work

**Examination**

As prescribed by the Head of Department

**Content**

This topic is concerned with the 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.

**Reference**

*The Southeast Asian World* (London, Bell 1967)

**Topic (g) 353108 Southeast Asia**

**Prerequisites**

Nil

**Hours**

Two hours per week

**Examination**

As prescribed by the Head of Department

**Content**

This topic is designed to study the regional variety which exists in the monsoon Asian region. Because this is largely an underdeveloped area, the elective will concentrate on the study of the characteristics of underdevelopment and the areal manifestations of these characteristics.

**Text**

Buchanan, K. M.  *The Southeast Asian World* (London, Bell 1967)

The following electives will not be offered in 1976.

- Conservation and Use of Natural Resources
- East Asia (Japan or China)
- Fluvial Geomorphology
- Genetic Geomorphology
- Historical Geography

**354100 Geography IV**

**Prerequisites**

In order to qualify for admission to Geography IV, a student must normally have passed at Credit level or better in at least four 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 arranged

**Examination**

As prescribed by the Head of Department
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 Department.

References
Lists will be distributed to students at the commencement of the year, and at appropriate times thereafter.

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 IIB 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.)

Students should take particular note of Clause 13(iii)(b) of the degree requirements for the ordinary degree of Bachelor of Science which states that not more than four mathematics subjects may be counted.

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.

<table>
<thead>
<tr>
<th>Mathematics I</th>
<th>Part I Subject</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>Nil</td>
</tr>
<tr>
<td>Hours</td>
<td>Four lecture hours and two tutorial hours per week for three terms</td>
</tr>
<tr>
<td>Examination</td>
<td>Two three-hour papers</td>
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<tr>
<td>Content</td>
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<tr>
<th>Topics</th>
<th>Mathematics IIA — Real Analysis</th>
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<td></td>
<td>AL — Algebra</td>
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<td></td>
<td>CA — Calculus</td>
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<td></td>
<td>NM — Numerical Mathematics</td>
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<tr>
<th>Part I Topics</th>
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<tbody>
<tr>
<td>Topic AN — Real Analysis — M. J. Hayes</td>
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<tr>
<td>Prerequisites</td>
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<td>Hours</td>
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<td>Content</td>
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<tr>
<th>References</th>
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<tbody>
<tr>
<td>Apostol, T.</td>
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<tr>
<td>Giles, J. R.</td>
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<tr>
<td>Spivak, M.</td>
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</table>

| Topic AL — Algebra — W. Brisley |
| Prerequisites | Nil          |
| Hours         | One lecture hour per week and one 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**

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebeck, H.</td>
<td><em>Algebra for Scientists and Engineers</em></td>
<td>Wiley 1971</td>
</tr>
<tr>
<td>Lipschutz, S.</td>
<td><em>Linear Algebra</em></td>
<td>(Schaum 1968)</td>
</tr>
<tr>
<td>McCoy, N.</td>
<td><em>Introduction to Modern Algebra</em></td>
<td>(Allyn &amp; Bacon 1968)</td>
</tr>
<tr>
<td>Tropper, Mary A.</td>
<td><em>Linear Algebra</em></td>
<td>(Nelson 1973)</td>
</tr>
</tbody>
</table>

**Topic CA — Calculus — R. F. Berghout**

**Prerequisites**  
Nil

**Hours**  
One lecture hour per week and one tutorial hour per fortnight

**Content**

**Text**  
Nil

**References**

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apostol, T.</td>
<td><em>Calculus</em> Vol. I 2nd edn_</td>
<td>(Ginn Blaisdell 1967)</td>
</tr>
<tr>
<td>Britton, J. R.,</td>
<td><em>Calculus and Analytic Geometry</em></td>
<td>(Freeman 1966)</td>
</tr>
<tr>
<td>Krieg, R. B. &amp; Rutland, L. W.</td>
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<tr>
<td>Hille, E. &amp; Salas, S.</td>
<td><em>First Year Calculus</em></td>
<td>(Ginn Blaisdell 1968)</td>
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<td></td>
<td>(International Textbook Series)</td>
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</table>

**Topic NM — Numerical Mathematics — A. J. Guttmann**

**Prerequisites**  
Nil

**Hours**  
One lecture hour per week and one 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**

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blatt, J. M.</td>
<td><em>Basic Fortran IV Programming</em></td>
<td>Version MIDITRAN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Computer Systems of Australia Pty. Ltd. 1969)</td>
</tr>
<tr>
<td>Wilkes, M. V.</td>
<td><em>A Short Introduction to Numerical Analysis</em></td>
<td>(Cambridge University Press 1971)</td>
</tr>
</tbody>
</table>

**References**

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoel, P. G.</td>
<td><em>Introduction to Mathematical Statistics</em></td>
<td>4th edn</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(New York, Wiley 1971)</td>
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<tr>
<td>Ralston, A.</td>
<td><em>A First Course in Numerical Analysis</em></td>
<td>(McGraw-Hill 1965)</td>
</tr>
</tbody>
</table>

**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 IIB. 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 Mathematical Models</td>
<td>C</td>
</tr>
<tr>
<td>B Complex Analysis</td>
<td>C</td>
</tr>
<tr>
<td>C Calculus and Vector Calculus</td>
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<tr>
<td>D Linear Algebra</td>
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<tr>
<td>E Differential Equations and Integral Transforms</td>
<td>C</td>
</tr>
<tr>
<td>F Numerical Analysis and Computing</td>
<td>—</td>
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</table>

82
Fourier series, Partial Differential Equations and Special Functions

Probability and Statistics

Topic in Statistics

Applications of Statistics

Topic in Applied Mathematics

Mechanics

Topic in Pure Mathematics

Group Theory

Analysis of Metric Spaces

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

662100 Mathematics IIA

Prerequisite: Mathematics I

Hours: Four lecture-hours and two tutorial-hours per week for three terms

Examination: Each topic is examined separately

Content:
Topics B, C, D, and E. In exceptional circumstances and with the consent of the Head of Department, one topic from A, F, G, or H may be substituted for B. Additional substitutions may be allowed in the case of candidates who have passed the subject Mathematics IIB.

662200 Mathematics IIB

Prerequisite: Mathematics I

Hours: Four lecture-hours and two tutorial-hours per week for three terms

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: Four lecture hours and two tutorial hours per week for three terms

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 IIB is no longer offered in two parts in the Faculty of Science. Students who passed Mathematics IIB 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 IIB 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, B, 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 and 1976 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

No prescribed text

662102 Topic B — Complex Analysis


662103 Topic C — Calculus and Vector Calculus


Marder, L. Calculus of Several Variables (Allen Unwin, 1972)

Marder, L. Vector Calculus (Allen Unwin, 1972)

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 1976 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>Prerequisite</th>
<th>Corequisite</th>
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<tr>
<td>M</td>
<td>General Tensors</td>
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<tr>
<td>N</td>
<td>Variational Methods</td>
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<td>O</td>
<td>Mathematical Logic</td>
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<td>P</td>
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<td>PD</td>
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<tr>
<td>Q</td>
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<td>R</td>
<td>Probability &amp; Statistics</td>
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<td>U</td>
<td>Operations Research</td>
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<td>V</td>
<td>Measure Theory &amp; Integration</td>
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<td>W</td>
<td>Analysis of Normed Linear Spaces</td>
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<td>X</td>
<td>Rings &amp; Fields</td>
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<tr>
<td>Y</td>
<td>Topic in Applied Probability e.g. Information Theory</td>
<td>H</td>
</tr>
<tr>
<td>Z</td>
<td>Mathematical Principles of Numerical Analysis</td>
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</table>

The selection rules and definitions of the Part III subjects follow.
663100 Mathematics IIIA

Prerequisites
Mathematics IIA & IIC

Hours
Four lecture hours and two tutorial hours per week for three terms

Examination
Each topic is examined separately

Content
A subject comprising four topics, which must include 0, 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 IIIB

Pre- or Corequisite
Mathematics IIIA

Hours
Four lecture hours and two tutorial hours per week for three terms

Examination
Each topic is examined separately

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

Notes
1. In order to take both Mathematics IIIA and Mathematics IIIB, a student must study eight topics from M to Z above with the restriction that Topic 0, 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
No prescribed text

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

663103 Topic O — Mathematical Logic

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

663108 Topic PD — Applications of Partial Differential Equations
Croxton, C. A. Introductory Eigenphysics (Wiley 1974)

663105 Topic Q — Fluid Dynamics
No prescribed text

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

663107 Topic S — Geometry
No prescribed text

663201 Topic T — Group Theory
Baumslag, B. & Chandler, B. Group Theory (Schaum 1968)
OR Macdonald, I. D. The Theory of Groups (Oxford University Press 1968)

663202 Topic U — Operations Research
No prescribed text

663203 Topic V — Measure Theory and Integration
No prescribed text

663204 Topic W — Analysis of Normed Linear Spaces

663205 Topic X — Rings and Fields
No prescribed text
663206  Topic Y — Topic in Applied Probability  
e.g. Information Theory
No prescribed text

663207  Topic Z — Mathematical Principles of Numerical Analysis
No prescribed text

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

664108  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 eight lecture hours per week over one full-time year or four lecture hours per week over two part-time years.

Examination
At least eight final papers, each of two hours duration.

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 1976 will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.

RESERCH IN THE FACULTY OF SCIENCE

DEPARTMENT OF BIOLOGICAL SCIENCES

Professor Boettcher's research interests are in the field of immunogenetics, particularly in relation to humans. Current projects include a study of infertility due to immunity to spermatozoa, and the genetics of an Australian Aboriginal group.

Dr Angus's field of interest is evolution in the genus Drosophila.

Dr Conroy is interested in the ecology and genetics of populations, and is currently studying geographic variation and hybrid zones in Lepidoptera.

Dr Jones's research interests are in the field of physiology of reproduction, particularly the biology and preservation of gametes.

Dr Murdoch's special research interest is the hormonal regulation of enzymatic reactions associated with histotrophic nutrition and implantation of the conceptus in the female reproductive tract. This topic is within his general field of interest of mammalian reproductive physiology and biochemistry.

Within the broad framework of a research interest in factors determining crop yield, Dr Patrick is currently investigating the control of nutrient distribution in vascular plants.

Dr Quinn is interested in developmental biology and is concerned with the study of factors affecting the normal development of embryos and their application to livestock production.

Dr Robert's research interests are the field of protein chemistry and immunology. Current projects include a study of proteins in blood plasma and external secretions.

Dr Rose's field of interest is developmental cell physiology with particular interests in the control of plant cell division and chloroplast formation.

DEPARTMENT OF CHEMISTRY

Research Interests
The special interests of the Department are listed below. The overall programme provides sufficient overlap for effective internal discussion and criticism.
Analytical Chemistry (Professor W. F. J. Pickering)

studies of the role of solution equilibria in reactions involving a solid phase and a solvated species; development of methods for measuring pollution.

Carbohydrate Chemistry (Dr R. Basden)

studies of insect secretions and exudations of trees, and identification of sugars in these materials.

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 heterocycles.

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 Analgesics (Dr. K. H. Bell)

development of new organic reactions; the preparation of potential local anaesthetics and strong analgesics.

Polymers (E. B. Jacobs)

synthesis of cyclic siloxanes; polymerization studies including those induced by radiation.

Aliphatic and Heterocyclic Chemistry (Associate Professor L. A. Summers)

synthesis with particular reference to the preparation of new fungicides and plant growth regulators and studies of their mode of action.

Thermodynamics (Associate Professor G. C. Curthoys)

adsorption on solids from gaseous and liquid phases.

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 andesitic 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 and Dr K. H. R. Moelle are attempting to interpret the sedimentary and structural history of the Sydney Basin and fringe areas. Professor Diessel's particular interests lie in coalfield geology, coal petrology, palaeocurrent analysis and reflectivity measurements of the sediments in the Sydney Basin while those of Dr Moelle are the assessment of joint systems and their interpretation in a regional setting. A further interest of Dr Moelle is the design and stability of mine openings and open-cut operations in rocks of the coalfields in New South Wales.

Associate Professor S. St. J. Warne is concerned with multi-method investigations into the development and application of advanced mineralogical techniques to mineral mixtures with special reference to minerals in and associated with coal.

Associate Professor B. A. Engel is concerned with the detailed description of Carboniferous trilobites, fenestrate cryptostome polyzoans and brachiopods from the marine faunas of Eastern Australia.

At present 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 Diessel on the relationship between metamorphic grade and reflectance of coalified and graphitised plant fragments.

Dr J. A. Gamble has interests in the fields of Carboniferous and Tertiary volcanism and in the geochemistry and petrogenesis of such rock suites.

Mr P. B. DeDecker is studying Palaeozoic microfossils (especially conodonts of eastern New South Wales). He is also developing new approaches to the classification of living ostracods based on detailed comparative morphology.

Mr S. W. McKnight is concerned with mineralization in the Lachlan Geosyncline and in particular is studying base-metal sulphides associated with the Silurian of central southern New South Wales.
DEPARTMENT OF PHYSICS

Infra-Red Environmental Investigations (Professor C. D. Ellyett & Dr S. Chandra)
The Department operates the only airborne thermal infra-red line scanner in any Australian University. The scanner is being applied to
the study of geological, hydrological, micrometeorological, and pollution
problems. Specific research interests are the direct estimation from a
remote platform of: ground thermal properties; soil moisture content
and evaporation rates from vegetation. A recent grant from A.R.G.C.
has provided a PDP11E10 minicomputer system for digital processing
of remote sensing data. This system opens the way for research into
new and interesting areas of remote sensing applications. Electronic
instrumentation is also being developed for direct ground temperature
measurements.

Radar Meteor Studies (Professor C. S. L. Keay & Dr J. A. Kennewell)
Work is proceeding on the development of a fully automated meteor­
rade radar system employing a PDP8/A on-line minicomputer data
 concentrator. Digital circuitry employing integrated circuit logic has
been developed to enable the signal processing to be carried out in
real time. When the system is in operation it will monitor the influx
of meteoroidal material from interplanetary space and provide terres­
trial upper atmosphere data.

Surface Physics (Professor J. A. Ramsey & Mr R. Roberts)
The investigations include experimental studies of the structure and
properties of single-crystal metal surfaces, gas adsorption on metal
surfaces and films, and electron emission associated with mechanical
deformation. Work on the adsorption of oxygen on the low-index
faces of aluminium is well under way. The experiments are carried
out in ultra-high vacuum systems which incorporate apparatus for
low-energy electron diffraction and Auger electron spectroscopy.
Access to a scanning electron microscope is also available.

Atomic Processes (Mr J. E. Cleary)
Equipment is being assembled to permit direct measurement of the
life-times of excited atomic states.

Geomagnetic Observations (Dr. B. J. Fraser)
Small variations of the Earth's magnetic field at frequencies in the
range 0.2 to 5 Hz yield information on solar-terrestrial disturbances
propagated as hydromagnetic waves in ionospheric ducts from high
latitude source regions. The time of occurrence, velocity, polarization
and direction of travel of these waves is deduced from records ob­
tained from stations at Newcastle, N.S.W.; Launceston, Tasmania;
Woomera, S.A.; Perth, W.A.; and Macquarie Island. Data from Auck­
land, New Zealand, is also used.

Guided Electromagnetic Waves (Dr P. A. McGovern)
Wave propagation in non-uniform transmission lines is being studied
using perturbation analysis and non-orthogonal coordinate methods to
resolve problems in precision fast-pulse transmission. Experimental
verification is obtained using pico-second sampling equipment and will
be improved by the introduction of signal processing techniques.
Analog operations and function generation using transistors and linear
integrated circuits is also being studied.

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 hypothalamic-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, be­
aviour, alcohol and youth culture are being studied with an inter­
national team from the U.S.A., Norway and France. Research on the
role of language in concept acquisition is being carried out with
bilingual children in Australia and Malaysia.

Developmental Psychology
The efficacy of various types of treatments on Behavioural develop­
ment in infancy is being studied.

Learning, Perception and Memory
The research interests in this area include instrumental avoidance con­
derencing, 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 con­
cepts 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
Research in the Department is divisible into the two broad fields of physical and human geography.

Research programmes in physical geography are concerned with the investigation of the problem of past and present tidal geomorphology (Associate Professor W. F. Geyl); suspended sediment and solute transport from the Congewai Creek drainage basin, near Cessnock (Dr R. J. Loughran); rain forest ecology (Dr J. C. Turner); aspects of the phenology of grape vines in the Hunter Region (G. N. McIntyre). Further projects, linking the human and physical fields, are concerned with the general problem of water allocation and water use (Professor A. D. Tweedie); and investigation into organisational aspects of water resources management (Mr K. W. Lee).

Human geography interests reveal a number of specialisms as follows:
A study of New Guinea rubber production, which was commenced in 1968, has been completed (Associate Professor P. G. Irwin).

Aspects of the historical geography of eastern Australian (Dr J. C. R. Camm).

The study of time in urban social and geographical space (Dr D. N. Parkes).

A comparative study of factors influencing the locations and attitudes to expansion of industries in Greater Newcastle and in a sample of Sydney's western suburbs is being undertaken (Miss M. R. Hall).

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, the subsequent lattice of sub-varieties of given varieties, and the location and construction of generating critical groups for varieties of groups.

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. A stochastic theory of the dissociation of diatomic gases and exchange reactions is being investigated.

Combinatorial Theory and Operations Research
Associate Professor W. D. Wallis is carrying out research on various parts of graph theory, including graph factorisation. He is also working on rostering and scheduling problems.

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

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

Differential Equations
Dr J. G. Couper has been working on the geometric theory of autonomous systems of ordinary differential equations.

An investigation is being made into some aspects of the political geography of regional development and planning (Professor K. W. Robinson).

A study of the timber industry in New Guinea (Mr W. J. Jonas).

An analysis of internal migration in Western Australia has been completed (Dr L. de Castro Lopo).

The study of intrarural migration in Newcastle (Mrs J. P. Galvin).

Patterns and linkages among Greek migrants in Newcastle (A. Burns).

The political geography of federation in Australia (G. T. Rhodes).
Differential Geometry and Relativity
Dr. P. K. Smrz is working on generalizations of Einstein's theory of relativity using modern differential geometry — in particular, theory of Lie groups and fibre bundles.

Dynamic Oceanography
Dr. W. Summerfield is interested in the interactions of the various oceanic motions with continental boundaries. He is also studying the various river and lake systems on the N.S.W. coastline.

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

Fluid Mechanics
Dr. W. T. F. Lau is concerned with potential flow and viscous flow problems.

Functional Analysis
Dr. I. 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.

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, which is supported by a grant from the Department of Defence, 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 0.

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

Number Theory
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
Dr. 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.

Statistical Mechanics
Dr. 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.
Dr. C. A. Croxton is working on the statistical mechanics of liquids and liquid interfaces.

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

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