FOREWORD

You have decided to start or continue a course in Science. What lies ahead?

In the immediate future the Faculty will expose you to lots of hard work. This is a personal thing. You may procrastinate with what you know to be the necessary work, get further and further behind, waiting always for 'tomorrow' when you will catch up, but tomorrow seldom comes, and finally you fail. (This applies of course to any Faculty). But other students will work steadily to a set program all year and pass. The choice is yours, and this is partly what University is all about.

Success brings quiet joy and leads to more success, and finally you emerge knowing, perhaps unknowingly, how to work on your own for a long-term goal. Once learnt this art is never lost.

Science, of course, is demanding of its students. But along the way you will learn the facts underlying many big issues today, whether it be to be able to talk and reason sensibly on the mining of coal, or the export of uranium, or enzyme chemistry. Science, underlying technology, has been in something of an eclipse in the past decade, but it is now re-emerging the world over with the realization that it is not 'good' or 'bad' for us, but is a basic understanding of nature that mankind must learn to use to his advantage and not to his destruction.

And what about work on graduating? Provided you don't necessarily demand to do precisely the line you have concentrated on here, but are prepared to learn an allied section of your subject, you should be employable, and certainly more employable than those who have no proven tertiary training.

May I conclude by saying, as Dean, that you should find advice and help wherever you seek it, but my door is always open to any student in the Faculty who would like to come and discuss what he sees as a personal problem related to any aspect of his University studies. May I wish you all a happy and rewarding time, both in our Faculty, and in the University as a whole.

C. ELLYETT,
Dean of Science
CONTENTS
Faculty of Science

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

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

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

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

"Each Faculty Board shall:—

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

Dean
Professor C. D. Ellyett

Sub-Dean
Dr T. K. Roberts (1978)

Faculty Secretary
P. W. Day
Laboratory Assistants
W. H. Crebert
B. L. Jenkins

Professor
C. D. Ellyett, MSc(New Zealand), PhD(Manchester), FRAS, FRNZ, FAIP

Associate Professors
B. J. Fraser, MSc(New Zealand), PhD(Canterbury)
C. S. L. Key, MSc(New Zealand), PhD(Canterbury), MAC(Toronto), FIP, FAIP,
FRASNZ, FRAS
J. A. Ramsey, MSc(Melbourne), PhD, FAIP

Senior Lecturers
P. T. Bagnall, BSc(New South Wales), MSc(New England), PhD, GAIIP
J. D. Balfe, MSc(Queensland), AlnastP, MAIP
J. E. R. Cleary, MSc(New South Wales)

Lecturers
P. A. McGovern, BE, BSc(Queensland), MS, PhD(California Institute of Technology),
MIEEE, MIREAust
R. H. Roberts, BE(New South Wales), MSc, ASTC, GradIEAust

Senior Tutor
J. A. Kennewell, BSc(Monash), PhD

Tutor
S. Chandra, MSc(Aligarh), PhD(Queen's (Canada) )

Honorary Associate
B. W. N. Lo, BSc(London), PhD(Monash)

Departmental Office Staff
June J. Haddow
Aileen M. Rowley

Professional Officer
P. W. McNabb

Senior Technical Officers
G. B. Davis
M. K. O’Neill
J. S. Ratcliffe

Senior Laboratory Craftsmen
G. H. Clarke
H. Steiger

Technical Officers
P. S. Daniels
J. C. Foster
J. J. Norman
J. P. Pearson
T. G. White

Professors
J. A. Keats, BSc(Adelaide), BA(Melbourne), AM, PhD(Princeton), FBPsS, FAPsS
M. G. King, BA, PhD(Queensland), FAPsS, MAPsS

(Head of Department)

Associate Professor
B. Fenelon, BA(Queensland), MA, PhD, MAPsS, AAAN

Senior Lecturers
D. C. Finlay, MSc, PhD(Melbourne), MAPsS
A. C. Hall, BA(Reading), MA
A. Ivanis, BA(Queensland), MA, PhD, MAPsS
N. F. Fegan, BA, PhD(Australian National), MAPsS
Daphne M. Keats, BA(Sydney), MED, PhD(Queensland), DipEd(Sydney), MAPsS,
MSAANZ
A. W. Keesee, BA(New Zealand), MA(Melbourne), PhD, MAPsS
J. L. Seggie, BA, PhD, MAPsS

Lecturers
Cathryn P. Brown, BA, PhD(Sydney)
Molly M. Cotton, MA, PhD(New England), AAPsS
R. A. Heath, BSc, PhD(McMaster), AAPsS
K. R. Mahes, BA(Sydney), PhD(Macquarie), MAPsS
J. A. C. Price, BA(Queensland), ABPsS, MAPsS, MSAANZ

Senior Tutor
R. O. McGee, BSc(New South Wales)

Tutors
R. Gill
P. Harris, BSc(Flinders)
Monica H. Hayes, BA(Leicester)

Honorary Associates
D. B. Dunlop, MB, BS(Sydney), DO, FRSM, MACO
J. T. Holland, MB, BS(BSc(Med) (Sydney), FRACP
H. Johnson
J. Milles, BA, PhD
J. W. Stanier, BA, BSc(Sydney), BEd(Melbourne), PhD(London), MBPsS, MAPsS

Departmental Office Staff
Shirley D. Bryon
Annette Crethary
Robin Furner

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)

Senior Technical Officers
A. O. Harcombe
R. R. Mudge

Technical Officers
Margaret F. Brosnan, BSc(Queensland)
R. Gogborn
S. T. Green
Margaret A. Stephenson, BA

Laboratory Craftsmen
A. P. Latimer

Laboratory Assistants
F. Atkinson
Eleanor M. Huber
T. H. Scutt
R. J. Tiley

Professorial Officer
H. P. E. Pfister, BA(Macquarie)
Senior Lecturers
J. C. R. Camm, MSc(Hull), PhD
Mary R. Hall, MA(Manchester)
R. J. Loughran, BSc(Durham), MSc, PhD(New England)
D. N. Parkes, BA(Durham), MA, PhD
J. C. Turner, BScAgr(Sydney), MS, PhD(Wisconsin)

Lecturers
Rosemary E. Barnard, BA(Sydney), PhD(Australian National)
W. J. A. Jonas, BA(New South Wales), MA; DipEd(New South Wales)
G. N. McIntyre, BA(Tasmania), MA(Australian National), FRMetS
R. A. Bridgman, BA(Beloit College), MA(Hawaii), PhD Wisconsin

Senior Tutors
Lisbet A. de Castro Lopo, CandMag(Copenhagen), MA(Wisconsin), PhD;
DipEd(Copenhagen)
K. W. Lee, BA(Liverpool), MA(New England)

Tutors
A. Burns, BA(New South Wales)
Susan M. Macey, BA(Queensland)

Departmental Office Staff
Valma M. Wiggins

Cartographer
L. J. Henderson

Cartographic Draughtsmen
B. R. McEwan
P. E. Reynolds

Laboratory Attendants
Myra L. Graham (Map Library)
A. E. Williams

MATHEMATICS

Professors
J. A. Campbell, MSc(Adelaide), SM(Massachusetts Institute of Technology),
MA(Cambridge), DPhil(Oxford)
R. G. Keats, BSc, PhD(Adelaide), FIMA, FASA
R. W. Robinson, MA(Dartmouth), PhD(Cornell) (Head of Department)

Associate Professors
W. Britsker, BSc(Sydney), MSc(New South Wales), PhD; DipEd(New England)
C. A. Croxton, BSc(Leicester), MA, PhD(Cambridge)
J. R. Giles, BA(Sydney), PhD; DipEd(Sydney)
A. J. Gutmann, MSc(Melbourne), PhD(New South Wales)
W. D. Wallis, BSc, PhD(Sydney)

Senior Lecturers
Annette J. Dobson, BSc(Adelaide), MSc, PhD(James Cook)
V. Ficker, PromMat, CSc, RNDi(Comenius)
R. W. Gibberd, BSc, PhD(Adelaide)
W. T. F. Lau, ME(New South Wales), PhD(Sydney), MAIAA
D. L. S. McEwain, BSc(Queensland), PhD(York (Canada))
T. K. Sheng, BA(Marlian College), BSc(Malaya & London), PhD(Malaya)
P. K. Smrz, PromPhys, CSc, RNDr(Charles)
R. J. Vaughan, BSc, MEngSc, ME(New South Wales), PhD(Adelaide), FSS
Information for Undergraduates

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

Professional Employment and Professional Recognition

Geology

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

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

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

Psychology

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

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

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

The University of Newcastle Psychology Students' Association

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

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

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

Subject Timetable Clashes

Students are strongly advised to check on possible timetable clashes before enrolling. Clashes may force students to take those subjects in different years. Although academic staff are always willing to advise students, it is the student's responsibility to ensure that chosen subjects may be studied concurrently. To help in this matter the following table of existing clashes has been compiled for Science Faculty subjects in 1978. However, Science students taking subjects from other faculties must examine the timetable to ensure that clashes do not exist in their proposed courses.

### Biological Sciences

<table>
<thead>
<tr>
<th>Subject</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIA with Chemistry IIIA</td>
<td>Physics IIIB</td>
</tr>
<tr>
<td>Biology IIIA with Chemistry IIIB</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Biology IIIB with Chemistry IIIB</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Biology IIIB with Geology IIB</td>
<td>Electronics &amp; Instrumentation II</td>
</tr>
<tr>
<td>Biology IIIB with Electronics &amp; Instrumentation II</td>
<td>Physics IIIA</td>
</tr>
</tbody>
</table>

Because of the interchange of A and B timetables in alternate years, any subjects clashing with Biology IIA and IIIA in 1978 will clash with Biology IIB and IIIB respectively in 1979 and vice versa.

### Chemistry

<table>
<thead>
<tr>
<th>Subject</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry IIA with Physics IIIB</td>
<td>Biology IIB</td>
</tr>
<tr>
<td>Chemistry IIIA with Biology IIB</td>
<td>Geology IIB</td>
</tr>
<tr>
<td>Chemistry IIIA with Geology IIB</td>
<td>Biology IIIA</td>
</tr>
<tr>
<td>Chemistry IIIB with Biology IIIA</td>
<td>Physics IIIA</td>
</tr>
<tr>
<td>Chemistry IIIB with Electronics &amp; Instrumentation II</td>
<td>Physics IIIA</td>
</tr>
</tbody>
</table>

### Geology

<table>
<thead>
<tr>
<th>Subject</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology IIB with Biology IIB</td>
<td>Chemistry IIIA</td>
</tr>
<tr>
<td>Geology IIB with Biology IIIA</td>
<td>Chemistry IIA</td>
</tr>
<tr>
<td>Geology IIB with Chemistry IIA</td>
<td>Physics IIIA</td>
</tr>
</tbody>
</table>

### Mathematics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics III (some topics only) with Chemistry IIIA</td>
<td>Electronics &amp; Instrumentation II</td>
</tr>
<tr>
<td>Mathematics III (some topics only) with Chemistry IIIB</td>
<td>Physics IIIA</td>
</tr>
</tbody>
</table>

### Physics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics &amp; Instrumentation II with Biology IIB</td>
<td>Chemistry IIIA</td>
</tr>
<tr>
<td>Electronics &amp; Instrumentation II with Mathematics III (some topics)</td>
<td>Physics IIIA</td>
</tr>
</tbody>
</table>
Physics IIIA with Biology IIA
Chemistry IIB
Chemistry IIA
Chemistry IIB
Geology III
Geology IIB
Mathematics III (some topics)

Physics IIB with Biology IIA
Chemistry IIA
Mathematics III (some topics)

Psychology

Student Academic Progress

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

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

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

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

Advisory Prerequisite for entry to the Faculty

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

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

Student Advice

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

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

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

Students who intend to proceed to a Diploma in Education should familiarise themselves with the prerequisites for curriculum and method subjects offered in the Diploma Course.

These prerequisites are stated in terms of subjects of the University of Newcastle. Applicants with qualifications from other universities, whose courses of study have included subjects which are deemed for this purpose to provide an equivalent foundation, may be admitted by the Dean on the recommendation of the Head of the Department of Education.

(a) English — (i) A Part I and a Part II subject in English:

(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

(g) Social Science/Studies — B.Com. including Microeconomics and Macroeconomics.

(h) Mathematics — Out of Economics, Geography, History, Psychology, Sociology, Legal Studies and Economic History:

(i) one subject at Part II level;

(ii) two other subjects at Part I level

(i) Science — (i) Three subjects from the disciplines of Biology, Chemistry, Geology and Physics;

(ii) at least one other subject drawn from any of the above or from Mathematics, Geography, or Psychology.

(f) Primary — No specific prerequisites.

Note: 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 time-
table 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 with-
draw without penalty.

9. Relaxing Clause
In order to provide for exceptional circumstances arising in par-
ticular 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, herein-
after called a subject, a candidate shall attend such lectures,
tutorials, seminars, laboratory classes and field work and sub-
mit such written work as the Department concerned shall
require.
(b) 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.

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

13. Degree Patterns
To qualify for admission to the ordinary degree a candidate shall
pass nine subjects, chosen in terms of Clause 12, provided that:
(i) one of the following degree patterns is chosen:
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 enrolls 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.

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

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

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

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

HONOURS DEGREE

20. Honours

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

(b) A candidate for the honours degree, before enrolling in the honours subject shall:
   (i) have completed the requirements for admission to the ordinary degree;
   (ii) have been granted approval to enrol in the honours subject from both the Head of the Department concerned and the Dean.

(c) The honours subjects offered shall be:
   - Biology IV
   - Chemistry IV
   - Geography IV
   - Geology IV
   - Mathematics IV
   - Physics IV
   - Psychology IV

(d) To qualify for admission to the honours degree a candidate, in addition to satisfying the other provisions of these requirements, shall:
   (i) complete the requirements of the combined Honours subject in one year's full-time study or two years' part-time study; and
   (ii) pass the combined Honours subject.

21. Combined Honours

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

(b) A candidate for the combined Honours degree in the Faculty of Science, before enrolling in the combined Honours subject shall:
   (i) have completed the Requirements for admission to the ordinary degree and have included in his degree course such prerequisite subjects as prescribed by Faculty Board for admission to the combined Honours subject;
   (ii) have been granted approval to enrol in the combined Honours subject from the Heads of the Departments concerned and the Dean.

(c) The combined honours subjects offered shall be:
   - Physics/Mathematics IV
   - Psychology/Mathematics IV

(d) To qualify for admission to the combined Honours degree a candidate, in addition to satisfying the other provisions of these requirements, shall:
   (i) complete the requirements of the combined Honours subject in one year's full-time study or two years' part-time study;
   and
   (ii) pass the combined Honours subject.

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

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

COMBINED DEGREE COURSES

24. A candidate may complete the Requirements for the degree of Bachelor of Science in conjunction with another Bachelor's degree by completing a combined course approved by the Faculty Board of the Faculty of Science and the other Faculty Board concerned provided that:
   (i) admission to a combined course shall normally be at the end of the first year and shall be subject to the approval of the Deans of the two Faculties concerned;
   (ii) admission to combined courses will be restricted to students with an average of at least Credit level;
   (iii) the Deans of both Faculties shall certify that the work in the combined degree course is no less in quantity and quality than if the two courses were taken separately.
Science/Arts

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

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

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

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

Science/Mathematics

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

(a) five subjects, being Mathematics I, Mathematics II A, Mathematics II C, Mathematics III A and either Mathematics III B or a Part III subject chosen from Schedule B of the Schedule of Subjects approved for the degree of Bachelor of Mathematics

and

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

and

(c) three subjects chosen, with the approval of the Deans of the Faculties of Mathematics and Science, from the subjects approved for any of the degree courses offered by the University

provided that:

(a) the number of Part I subjects shall not exceed six;

(b) the minimum number of Part III subjects shall be three;

(c) a candidate counting Psychology II C shall not be entitled to count either Psychology II A or Psychology II B;

(d) a candidate counting Psychology III C shall not be entitled to count either Psychology III A or Psychology III B;

(e) a candidate counting Economics III C shall not be entitled to count either Economics III A or Economics III B.

Science/Engineering

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

EQUIVALENT HONOURS

25. (a) On the recommendation of a Head of Department in the Faculty and with the permission of the Dean, a graduate who, in the discipline concerned, has not completed the fourth year honours subject either as a full-time or a part-time student at this or at any other Australian university, may enrol in the fourth year honours subject either as a full-time or a part-time student.

(b) Such a graduate who has completed all of the requirements of the fourth year honours subject shall be issued with a statement to this effect by the Secretary; the Statement shall indicate the honours level equivalent to the standard achieved by the student in completing the fourth year honours subject.

SCHEDULE OF SUBJECTS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Remarks, Prerequisites, Corequisites, Preparatory Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART I</strong></td>
<td></td>
</tr>
<tr>
<td>Biology I</td>
<td></td>
</tr>
<tr>
<td>Chemistry I</td>
<td></td>
</tr>
<tr>
<td>Geography I</td>
<td></td>
</tr>
<tr>
<td>Geology I</td>
<td></td>
</tr>
<tr>
<td>Mathematics I</td>
<td></td>
</tr>
<tr>
<td>Physics I A</td>
<td></td>
</tr>
<tr>
<td>Physics I B</td>
<td></td>
</tr>
<tr>
<td>Psychology I</td>
<td></td>
</tr>
<tr>
<td><strong>PART II</strong></td>
<td></td>
</tr>
<tr>
<td>Biology II A</td>
<td></td>
</tr>
<tr>
<td>Biology II B</td>
<td></td>
</tr>
<tr>
<td>Chemistry II A</td>
<td></td>
</tr>
</tbody>
</table>

Only one of these subjects may be taken.

Prerequisites: Biology I

Prerequisites: Chemistry I

Preparatory Subjects: Mathematics I & either Physics I A or Physics I B
Students enrolled in the Faculty of Science are required to meet the following standards to maintain satisfactory progress.

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

Remarks, Prerequisites, Corequisites, Preparatory Subjects

| Prerequisite: Chemistry I |
| Corequisite: Chemistry IIA (Advisory) |
| Prerequisite: Physics I or IB |
| Prerequisite: Geography I |

Prerequisites: Geology I

Prerequisites: Mathematics I

Corequisite: Mathematics I or Physics I or normally a credit pass or better in Physics IB

Prerequisites: Psychology I

Remarks

Before enrolling in Chemistry IIB, the student must obtain the approval of the Head of the Department of Chemistry or his representative.

Corequisite: Chemistry IIA

Prerequisites: Mathematics I & Chemistry IIA

Corequisite: Chemistry IIB

Remarks

Two years of enrolment as a part-time student — to pass at least four subjects.

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

Combined Degree Courses

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

Science/Arts

1. Four Science Part I subjects passed with an average performance of credit level or higher.
2. Three Science Part II subjects and an additional subject which will be an Arts Group I Part I subject if no Arts Group I subject has been passed.

Remarks

Year I

Year II

Year III

Year IV

(a)

(b)

Year I

Year II

Year III

Year IV

Notes

Progress Requirements for Students in the Faculty of Science

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

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

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

Note Section 13 (iv) (b) of the Degree Requirements.
Science/Mathematics

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 IIIA plus two other subjects which must include at least one Part III subject.

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

Science/Engineering

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

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

POSTGRADUATE COURSES

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

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

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

8. (a) Notwithstanding the provision of subsection (a) of Section 7, the Faculty Board, on the recommendation of the Board of Studies, may permit to register as a provisional candidate a person who has satisfied all of the requirements for admission to a degree of the University of Newcastle or another university approved for this purpose by the Faculty Board; and
   (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 PSYCHOLOGY (CLINICAL)

1. 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" means the Board of Studies in Psychology, and "the Dean" means the Dean of the Faculty of Science.

2. On the recommendation of the Head of the Department of Psychology, the Board shall appoint a Course Controller who shall recommend to the Board the nature and extent of the programmes to be prescribed pursuant to Section 8 (i) and shall be responsible for the collation of all written work submitted by candidates in pursuing those programmes.

3. An application for admission to candidature shall be made in writing to the Secretary.

4. An applicant for admission to candidature shall:

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

(b) on the recommendation of the Board, have satisfied all the requirements for admission to a degree of the University of Newcastle or to a degree, approved for this purpose by the Faculty Board, of another university, provided that the course completed for that degree by the applicant included a major sequence in Psychology.

5. Before approving an admission to candidature, the Board shall be satisfied that adequate supervision and facilities are available.

6. In considering an application the Board shall take account of the applicant's academic qualifications and experience, and also the report of an interview with the applicant and any other selection procedures applied to the applicant as determined by the Board, which shall be conducted by a selection committee approved by the Board; the Board shall then either:

(a) approve or reject applications made pursuant to section 4 (a); or

(b) make recommendations to the Faculty Board in respect of applications made pursuant to section 4 (b).

7. Before confirming an admission to candidature pursuant to section 4 (b) the Faculty Board, on the recommendation of the Board, may require an applicant to complete such work and pass such examinations at Bachelor's degree honours level as may be prescribed by the Faculty Board.

8. Upon admission to candidature the candidate shall enrol and shall:

(i) pursue a programme consisting of such lectures, seminars and tutorials, written and practical work and examinations as may be prescribed by the Board, and

(ii) carry out an empirical investigation.

9. To qualify for the degree the candidate shall:

(i) in not less than six terms complete the work prescribed in Section 8 (i) to the satisfaction of the Board, and

(ii) submit a thesis embodying the results of the empirical investigation.

10. The candidate shall carry out the investigation and other work prescribed in Section 8 either under the direction of a supervisor or supervisors appointed by the Faculty Board or under such conditions as the Faculty Board may determine.
11. The candidate and the supervisor shall submit to the Faculty Board annual reports on the candidate's progress. If after considering these reports, the Faculty Board is of the opinion that the candidate is not making satisfactory progress towards the degree then the Faculty Board may terminate the candidature or place such conditions on the continuation of the candidature as it deems fit.

12. The candidate shall give in writing to the Secretary three months' notice of intention to submit the thesis and such notice shall be accompanied by any prescribed fee.

13. The candidate shall comply with the following provisions concerning the presentation of the thesis:
   (a) the thesis shall contain an abstract of approximately 200 words describing its content;
   (b) the thesis shall be typed and bound in a manner prescribed by the University;
   (c) three copies of the thesis shall be submitted together with:
      (i) a certificate from the supervisor that the candidate has completed the prescribed programme and that the thesis is of sufficient academic merit to warrant examination;
      (ii) if the candidate so desires, any document or work published by the candidate whether bearing on the subject of the thesis or not.

14. The University shall be entitled to retain the submitted copies of the thesis, accompanying documents and published work. The University shall be 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 any part in photostat or microfilm or other copying medium.

15. On the recommendation of the Faculty Board the Senate shall appoint for each candidate two examiners: one, an internal examiner being a member of the staff of the University; the other, an external examiner not being a member of the staff of the University.

16. The Board shall consider the reports submitted by the examiners on the thesis. If the examiners fail to agree on whether the candidate should be admitted to the degree, a third examiner shall be appointed by the Senate on the recommendation of the Faculty Board made following consultation with the Board.

17. In the light of the examiners' reports and a report of the internal examiner, made in consultation with the course controller, on the candidate's performance in the programme prescribed under Section 8 (i) of these Requirements the Faculty Board on the recommendation of the Board shall decide whether:
   (a) the candidate be recommended to the Senate for admission to the degree;
   (b) the candidate be permitted to resubmit an amended thesis within such period of time as the Faculty Board prescribes;
   (c) the candidate be required to undertake such further oral, written or practical examinations as the Faculty Board prescribes; or
   (d) the candidate be not admitted to the degree.

18. In exceptional circumstances, the Senate, on the recommendation of the Faculty Board, may relax any provision of these Requirements.

REQUIREMENTS FOR THE DEGREE OF
MASTER OF PSYCHOLOGY (EDUCATIONAL)

1. 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" means the Board of Studies in Psychology, and "the Dean" means the Dean of the Faculty of Science.

2. On the recommendation of the Head of the Department of Psychology, the Board shall appoint a Course Controller who shall recommend to the Board the nature and extent of the programmes to be prescribed pursuant to Section 8 (i) and shall be responsible for the collation of all written work submitted by candidates in pursuing those programmes.

3. An application for admission to candidature shall be made in writing to the Secretary.

4. An applicant for admission to candidature shall:
   (a) have satisfied all the requirements for admission to a degree of Bachelor of the University of Newcastle or to a degree, approved for this purpose by the Faculty Board, of another university, and have satisfactorily completed a Part III Psychology subject or reached a standard in Psychology deemed by the Board to be equivalent; or
   (b) have satisfied all the requirements for the award of the Diploma in Education of the University of Newcastle or another teaching qualification approved for this purpose by the Faculty Board; and
(c) have at least two years teaching or other relevant practical experience approved by the Board.

5. Before approving an admission to candidature the Board shall be satisfied that adequate supervision and facilities are available.

6. In considering an application the Board shall take account of the applicant's academic qualifications and experience, and also the report of an interview with the applicant and any other selection procedures applied to the applicant as determined by the Board, which shall be conducted by a selection committee approved by the Board; the Board shall then either approve or reject the application.

7. Upon admission to candidature the candidate shall enrol and shall:
   (i) pursue a programme consisting of such lectures, seminars and tutorials, written and practical work and examinations as may be prescribed by the Board;
   (ii) carry out an empirical investigation.

8. To qualify for the degree the candidate shall:
   (i) in not less than six terms complete the work prescribed in Section 7 (i) to the satisfaction of the Board; and
   (ii) submit a thesis embodying the results of the empirical investigation.

9. The investigation and other work prescribed in Section 6 shall be carried out either under the direction of a supervisor or supervisors appointed by the Faculty Board or under such conditions as the Faculty Board may determine.

10. The candidate and the supervisor shall submit to the Faculty Board annual reports on the candidate's progress. If after considering these reports, the Faculty Board is of the opinion that the candidate is not making satisfactory progress towards the degree then the Faculty Board may terminate the candidature or place such conditions on the continuation of the candidature as it deems fit.

11. The candidate shall give in writing to the Secretary three months' notice of intention to submit the thesis and such notice shall be accompanied by any prescribed fee.

12. The candidate shall comply with the following provisions concerning the presentation of the thesis:
   (a) the thesis shall contain an abstract of approximately 200 words describing its content;
   (b) the thesis shall be typed and bound in a manner prescribed by the University;¹
   (c) three copies of the thesis shall be submitted together with:
      (i) a certificate from the supervisor that the candidate has completed the prescribed programme and that the thesis is of sufficient academic merit to warrant examination; and
      (ii) if the candidate so desires, any documents or work published by the candidate whether bearing on the subject of the thesis or not.

13. The University shall be entitled to retain the submitted copies of the thesis, accompanying documents and published work. The University shall be 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 any part in photostat or microfilm or other copying medium.

14. On the recommendation of the Faculty Board the Senate shall appoint for each candidate two examiners: one, an internal examiner being a member of the staff of the University; the other, an external examiner not being a member of the staff of the University.

15. The Board shall consider the reports submitted by the examiners on the thesis. If the examiners fail to agree on whether the candidate should be admitted to the degree, a third examiner shall be appointed by the Senate on the recommendation of the Faculty Board made following consultation with the Board.

16. In the light of the examiners' reports and a report of the internal examiner, made in consultation with the course controller, on the candidate's performance in the programme prescribed in Section 7 (i) of these Requirements the Faculty Board on the recommendation of the Board shall decide whether:
   (a) the candidate be recommended to the Senate for admission to the degree;
   (b) the candidate be permitted to resubmit an amended thesis within such period of time as the Faculty Board prescribes;
   (c) the candidate be required to undertake such further oral, written or practical examinations as the Faculty Board prescribes; or
   (d) the candidate be not admitted to the degree.

18. In exceptional circumstances, the Senate, on the recommendation of the Faculty Board, may relax any provision of these Requirements.

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

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

2. An applicant for registration for the degree of Master of Science shall
either:

(a) have satisfied all the requirements for admission to the degree of
Bachelor of Science with Honours Class I or Class II in the Univer-
sity of Newcastle or to an appropriate degree of this or any other
university approved for this purpose by the Faculty Board of the
Faculty of Science; or

(b) have satisfied all the requirements for admission to the degree of
Bachelor of Science in the University of Newcastle or other ap-
proved university; or

(c) in exceptional cases produce evidence of possessing such other
qualifications as may be approved by the Faculty Board on the
recommendation of the Head of the Department concerned.

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

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

5. An applicant approved by the Faculty Board shall register in one of
the following categories:

(i) Student in full-time attendance at the University.

(ii) Student in part-time attendance at the University.

6. (i) Every candidate for the degree shall be required to submit a thesis
embodying the results of an investigation or design, to take such
examinations and to perform such other work as may be prescribed
by the Faculty Board. The candidate may submit also for examina-
tion 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 University. The other two copies of the thesis
shall be bound in such manner as allows their transmission to the
examiners without possibility of their disarrangement.

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

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

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

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

1 Separate sheet or the preparation and binding of higher degree thesis is available on
application,

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 can-
didate enrolls in a particular subject.

(b) Where a subject is marked Advisory it refers to a pass in the
Higher School Certificate. In such cases lectures will be
given on the assumption that a pass has been achieved at
the level indicated.
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 (between 9.30 and 11.30 a.m. each day in the Department of Biological Sciences lecture theatre, JLG08) for those students enrolling in Biology I who have done little chemistry. Attendance at the lectures is optional.

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

Examination One 3-hour paper

Content

Cells and Cell Constituents

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

Diversity of Organisms

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

Animal Classification and Processes

Immunology
Antigens and antibodies. Blood groups.

Genetics and Development

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

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

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

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

References
Clarke, R. B. & Panchen, A. L. Synopsis of Animal Classification (Chapman & Hall)
Holloway, B. W. Genes and Chromosomes in Action (Thomas Nelson)
Moroney, M. J. Facts from Figures (Penguin)
Rayle, D. & Wellberg, L. Botany: A Human Concern (Houghton Mifflin 1975)
Srb, A. M. et al. General Genetics 2nd edn (Freeman)

712100 Biology II

Molecular and Cellular Biology

Prerequisites Biology I

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

Examination Two 3-hour papers

Content

Biochemistry

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

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

Texts
Bailey, N.T.J. Statistical Methods in Biology (English U.P. 1964)
Giese, A. C. Cell Physiology 4th edn (Saunders 1973)
White, A. et al. Principles of Genetics 5th edn (Freeman 1965)

References
Brock, D. & Mayo, O. (eds) The Biochemical Genetics of Man (Academic)
Gardner, E. J. Review of Physiological Chemistry 14th edn (Lange Medical Publications 1973)
Mahler, H. R. & Cordes, E. H. Cytogenetics of Man and Other Animals (Chapman & Hall)
De Robertis, E. D. P. Cell Biology 6th edn (Saunders 1975)
Smith-Keary, P. F. Genetic Structure and Function (Macmillan)
White, E. H. Chemical Background for the Biological Sciences 2nd edn (Prentice-Hall 1970)
Wold, F. Macromolecules: Structure and Function (Prentice-Hall 1971)
Woods, R. A. Biochemical Genetics (Chapman & Hall 1973)

712200 Biology IIB
Biology of Organisms and Population

Prerequisites
Biology I

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

Examination
Two 3-hour papers

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

Ecology and Fundamental Population Genetics
Physical and biological factors influencing the abundance and distribution of organisms. Determination and measurement of these factors. Factors affecting gene frequencies in populations.

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

Texts
Bailey, N. T. J. Statistical Methods in Biology (English U.P.)
Bossart, E. Q. & Wilson, W. H. A Primer in Population Biology (Sinauer)
Doyle, W. T. The Biology of Higher Cryptograms (Macmillan)
Krebs, C. J. Ecology (Harper & Row)
Sutcliffe, J. Plants and Water (Arnold)

References
Barnes, R. D. Invertebrate Zoology 2nd edn (Saunders 1974)
Bell, P. & Woodcock, C. The Diversity of Green Plants 2nd edn (Edward Arnold 1971)
Clark, L. R. et al. The Ecology of Insect Populations in Theory and Practice (Methuen)
Darnell, R. M. Organic Chemistry (McGraw-Hill)
Daubenmire, R. F. Plants and Environment 3rd edn (Wiley 1974)
Gordon, M.S. Animal Physiology: Principals and Adaptation 2nd edn (Macmillan)
Passmore, R. & Robson, J. S. (eds)  
A Comparison to Medical Studies, Vol. 1: Anatomy, Biochemistry, Physiology and Related Subjects (Blackwell 1973)

Pianka, E. R.  
Evolutionary Ecology (Harper & Row)

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

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

Schmidt-Nielson, K.  
Animal Physiology 3rd edn (Prentice-Hall 1975)

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

713100 Biology IIA  
Molecular and Cellular Biology

Prerequisites  
Biology IIA

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

Examination  
Two 3-hour papers

Content  
A course involving the important aspects of cell physiology. Concepts will be developed based on the biochemical and cellular processes involved in developmental biology, immunology and plant and animal physiology.

Texts  
Billett, F. S. & Wild, A. E.  
Practical Studies of Animal Development (Chapman & Hall 1975)

Gordon, B. L.  
Essentials of Immunology 2nd edn (Davis 1974)

Leopold, A. C. & Kriedemann, P. E.  
Plant Growth and Development (McGraw-Hill 1975)

Zar, J. H.  
Biostatistical Analysis (Prentice-Hall)

References  
Ashworth, J. M.  
Cell Differentiation (Chapman & Hall 1974)

Balinsky, B. I.  
An Introduction to Embryology 3rd edn (Saunders 1970)

Bellanti, J. A.  
Immunology (Saunders 1971)

Berrill, N. J. & Karp, G.  
Development (McGraw-Hill 1976)

Bidwell, R. G. S.  
Plant Physiology (Macmillan 1974)

713200 Biology IIB  
Biology of Organisms and Populations

Prerequisites  
Biology IIA or IIB

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

Examination  
Two 3-hour papers

Content  
Fundamentals of Population and Quantitative Genetics  

Community Analysis  
Structure and dynamics of biological communities.

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

Texts  
Falconer, D. S.  
Introduction to Quantitative Genetics (Oliver & Boyd 1975)

Krebs, C. J.  
Ecology (Harper & Row)

Milthorpe, F. L. & Moorby, J.  
An Introduction to Crop Physiology (Cambridge U.P.)

Nalbandov, A. V.  
Reproductive Physiology 2nd edn (Freeman)

Zar, J. H.

Biostatistical Analysis (Prentice-Hall)
References
Bannister, P. Introduction to Physiological Plant Ecology (Blackwell 1976)
Connell, P. W. Water Pollution (Queensland U.P.)
Leopold, A. C. & Kriedemann, P. E. Plant Growth and Development (McGraw-Hill 1975)
Pianka, E. R. Evolutionary Ecology (Harper & Row)
Phillipson, J. Ecological Energetics (Arnold)
Poole, R. W. Introduction to Quantitative Ecology (McGraw-Hill)

Prerequisite
Nil

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

Examination
To be advised

DEPARTMENT OF CHEMISTRY

721100 Chemistry I

Prerequisite
Nil

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

Examination
Three 3-hour papers, one in mid-year.

Content

Inorganic Chemistry (30 lectures)
Revision of basic concepts; periodic properties of the elements and their compounds; Bonding and Structure.

Organic Chemistry (30 lectures)

Physical Chemistry (30 lectures)
Chemical equilibria and energetics; chemical kinetics.

Texts
Benfey, O. T. The Names and Structures of Organic Compounds (Wiley 1966)

Prerequisite
Chemistry I

Preparatory Subjects
Mathematics I & either Physics IA or IB

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

Examination
A student may satisfy the examiners:
EITHER by achieving an overall satisfactory performance in the two progressive examinations (Papers 1 & 2).
OR by achieving an overall satisfactory performance in the two final papers scheduled for the November examination period (Papers 3 & 4).

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

All papers are of 3-hours duration.

The average laboratory mark counts 20% towards the final grading.

Content

Analytical Chemistry
Basic principles: spectroscopic procedures; separation methods.
Inorganic Chemistry
Symmetry and structure; main group metal chemistry; types of co-ordination complexes; structure elucidation; transition metal chemistry.

Dynamics
Kinetics; chemical affinity; electrochemical cells.

Organic Chemistry
Aliphatic and aromatic chemistry.

Thermodynamics
Basic laws, and applications to ideal and non-ideal systems.

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

Also advisable, particularly if proceeding to Chemistry IIIA.

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

722300 Chemistry IIIA

Prerequisites Chemistry I
Corequisites Chemistry II A (advisory)

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

Examination One hour examination for each unit

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

Texts To be advised

CHEMISTRY — PART III SUBJECTS

Prerequisites A pass in Chemistry II A is a prerequisite for entry into Chemistry III A; Chemistry III A is a pre- or co-requisite for Chemistry IIIB.

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

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

Content
All students enrolling in Chemistry III A must include at least one topic from each of the four sub-groups distinguished by capital prefixes (i.e. A, P, I and O). Students understaking Chemistry III A as sole Part III chemistry subject may substitute up to three topics from the Chemistry II B list (subject to satisfying topic prerequisites). Students enrolling in Chemistry IIIB must nominate nine topics from the IIIB listing.

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

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

**723100 Chemistry IIIA**

**Group A**
- Principles of Analysis
- Separation Techniques
- Applied Spectroscopy (compulsory)

**Group P**
- Thermodynamics
- Surface Chemistry
- Molecular Spectroscopy

**Group I**
- Inorganic Chemistry
- Crystal Chemistry
- Organometallic Chemistry

**Group O**
- Carbohydrates, amino acids, proteins
- Heterocyclic Chemistry
- Predicting reactivity in organic chemistry

**723200 Chemistry IIB**

- Radiochemistry
- Organic synthesis
- Organic Reaction Mechanisms
- Biologically Important Organic Molecules
- Biogenesis
- Plant Growth Regulators, Insecticides & fungicides
- Medicinal Chemistry
- Trace Analysis
- Laser Raman Spectroscopy
- Zeolites
- X-ray crystallography
- Clinical & Automated Analysis or Instrumental Techniques
- Physical methods in Inorganic Chemistry
- Aromaticity

**Texts**

To be advised; see departmental topic summaries.

**724100 Chemistry IV**

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

**Hours**
To be advised

**Examination**

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

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

**Texts**

To be advised

**DEPARTMENT OF GEOLOGY**

**731100 Geology I**

**Prerequisite**
Nil

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

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

**Content**

**Material Geology**
- Introductory crystallography; mineralogy and petrology; classification of rocks; economic mineral deposits; applications of geology to engineering.
- Physical Geology
  - Erosion cycle; agents of erosion; diastrophism; structural geology; marine geology; geomorphology.
- Historical Geology
  - Introductory palaeontology and stratigraphy; brief geological history of New South Wales.

**Texts**

- Black, R. M.
- Press, F. & Siever, R.

**EITHER**

- Read, H. H.
- Mason, B. & Berry, L. G.

- Rutley's Elements of Mineralogy 24th edn (Murby 1960)
- Mineralogy (Freeman 1959)

(for students intending to proceed beyond Geology I)
732200 Geology IIA

Prerequisite
Geology I

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

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

Content

Mineralogy
Optical mineralogy.

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.

Photogrammetry and Photogeology
Basic principles of photogrammetry and photogeological interpretation; aerial photographs and their use in cartography and in stratigraphic and structural studies.

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

Texts
Francis, P. Volcanoes (Penguin 1976)
Till, R. Statistical Methods for the Earth Scientist (Macmillan 1974)

732300 Geology IIIB

Prerequisite
Geology I

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

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

Content
The subject comprises 8 units of 14 lectures each, 3 laboratory hours per week and 8 days field work. The units to be offered in 1978 are:

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

(ii) Introduction to Mineralogical and Petrological Techniques
Crystallography; methods of preparing materials for mineralogical and petrological examination; introduction to natural gem materials and synthetic and cultured gem materials; presentation of mineralogical and petrological data.

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

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

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

(vi) Volcanology
Volcanic processes, volcano types, magma types and their tectonic setting and environment. Topographic and physical features of volcanoes, their roots and ejecta. Prediction of volcanism and the tapping and utilisation of geothermal energy.

(vii) Extraterrestrial Geology
Origin of the solar system; structure, distribution, age, chemical characteristics and petrogenesis of lunar rocks; astroblemes; meteorites; geology of other planets.

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

Texts
Bishop, A. C. An Outline of Crystal Morphology (Hutchinson 1967)
Francis, P. Volcanoes (Penguin 1976)
Till, R. Statistical Methods for the Earth Scientist (Macmillan 1974)
**733100 Geology IIIA**

**Prerequisites**  
Geology I & IIA

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

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

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

**Content**

- **Petrology**  
Petrology of igneous rock associations; petrogenesis of metamorphic rocks, metamorphic belts and plate tectonics.

- **Sedimentology**  
Petrogenesis of sedimentary rocks.

- **Economic Geology**  
Principles of formation of economic mineral deposits; textures of ore minerals; major Australian ore deposits; ore mineralogy.

- **Structural Geology and Geotectonics**  
Advanced structural geology and detailed geotectonics; structural aspects of geosynclinal concept; orogenies; continental drift; global tectonics.

- **Photogrammetry and Photogeology**  
Basic principles of photogrammetry and photogeological interpretation; aerial photographs and their use in cartography and in stratigraphic and structural studies.

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

- **Geochronology and World Stratigraphy**  
Principles of age dating; regional geology of selected provinces of the world.

- **Exploration Geophysics**  
Geophysical techniques — their interpretation and application in petroleum and mining exploration, and hydrogeological and engineering investigations.

**Texts**


- Winkler, H. J. F.  *Petrogenesis of Metamorphic Rocks* 4th edn (Springer Verlag 1976)

For others, consult lecturers concerned.

---

**733200 Geology IIIB**

**Prerequisites**  
Geology I & IIA

**Corequisite**  
Geology IIIA

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

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

**Content**

This subject comprises 6 units of which students must select 4, two from the units offered in each part of the year. Students must note that only 4 units will be offered in any one year. These will be determined by the Head of Department after students have indicated their choice. Each unit is of equal length—approximately 28 lectures and 28 laboratory hours. The units are:

1. **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.

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

3. **Tectonophysics and Engineering Geology**  
Mechanical properties and behaviour of rocks; movement picture and movement plan; stress-strain relationships; symmetry concepts. Design and stability of structures in rocks; geological problems in engineering design and construction; rock mechanics.

4. **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.

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

6. **Stratigraphic Palaeontology**  
Basic stratigraphic concepts, facies, correlation, biostratigraphy, palaeoecology, palaeoclimates, palaeomagnetism, palaeogeography; a synthesis of zonal development in the Carboniferous sequence of Eastern Australia.
Texts
Text books required will vary with the options selected. Consult lecturers concerned.

754100 Geology IV

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

Hours
To be advised.

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

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

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

DEPARTMENT OF PHYSICS

741200 Physics IA

Prerequisite
Nil

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

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

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

741300 Physics IB

Prerequisite
Nil

Hours
3 lecture hours and 3 hours laboratory or demonstrations and practice period per week.

Examination
One 2-hour paper after the end of each term.

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

Texts

742200 Electronics & Instrumentation II

Prerequisites
Physics IA or IB

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

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

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

Topic B — Instrumentation Theory.

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

Topic D — Basic Device Physics;
    Measurement Devices.

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

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

Texts

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

Other Texts

Refer to Physics Department notice board.

742100 Physics II

Prerequisites

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

Hours

3 lecture hours and 6 laboratory hours per week. Engineering students refer to Engineering Faculty Handbook.

Examination

Equivalent of 6 hours total examination.

Content

Mechanics
    Thermal Physics
    Quantum Physics
    Electromagnetics
    Physical Optics

Physics II students who have completed only Mathematics I, should include a Mathematics II subject. It is suggested that in addition to Topic CO this should include Topic H and one of Topics B, D, and F.

Texts

Refer to the Physics Department notice board.

743100 Physics IIIA

Prerequisites

Physics II, a Mathematics subject with Topics C, E, G, and H or B or D recommended. For Mathematics II in 1978 Topics CO, H, and B or D or F are recommended.

Hours

120 lecture hours and 240 laboratory and tutorial hours.

Examination

Assessment to the equivalent of three 3-hour papers.

Content

The areas of classical and quantum physics essential to the understanding of both advanced pure physics and also the many applications of physics. Some electronics is also included.

A. Classical Physics

Mathematical methods, advanced mechanics, special theory of relativity, electromagnetics including waveguide and antenna theory.

B. Modern Physics

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

C. Laboratory

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

Texts

Refer to the Physics Department notice board.

Students should retain their Physics II texts.

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

Prerequisite

Physics II

Pre-or-Co-requisite

Physics IIIA

Hours

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

Examination

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

Content

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

The Physics lecture course will treat the following topics:

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

Texts

Refer to the Physics Department notice board.

744100 Physics IV

**Prerequisite**

Physics IIIA

**Hours**

To be advised.

**Examination**

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

**Content**

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

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

- **Atomic Physics** — Associate Professor Ramsey & Mr Roberts
  - Solid state physics and physics of surfaces.
- **Quantum Mechanics** — Dr Smith & Dr Lo
  - Advanced quantum mechanics and many electron systems.
- **Relativistic Physics and Electromagnetics** — Dr McGovern & Dr Kennewell
  - Special relativity theory (tensor analysis developed as required and not prerequisite), advanced electromagnetic theory, applied electromagnetics, experimental basis of gravitational theories.

Upper Atmosphere and Space Physics

- **Professor Ellyett**
  - Structure of the ionosphere, theory of electromagnetic wave propagation in the ionosphere and its applications.
- **Dr Fraser**
  - Plasma physics with emphasis on magnetohydrodynamics and geomagnetic applications.

**Electronic Techniques**

- **Associate Professor Keay**
  - Digital electronics, signal processing.
- **Mr Cleary**
  - Fast pulse techniques, high speed atomic processes.

**Research Project**

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

**Texts**

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

664300 Physics/Mathematics IV

**Prerequisites**

Physics IIIA and Mathematics IIIA

**Hours**

To be advised

**Examination**

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

**Content**

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

DEPARTMENT OF PSYCHOLOGY

751100 Psychology I

**Prerequisites**

Nil

**Hours**

3 lecture hours, one hour practical session and one hour tutorial per week.
Examination
One 3-hour paper and an assessment of practical work.

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

Texts
To be advised.

752100 Psychology IIA

Prerequisite
Psychology I

Hours
3 lecture hours, one 2-hour practical session and one hour tutorial per week.

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

Content
Such topics as scientific method, learning, physiological psychology, perception, cognition, motivation, and animal behaviour. Statistical methods will be taught and tested during the year.

Texts
To be advised.

752200 Psychology IIB

Prerequisite
Psychology I

Hours
3 lecture hours, one 2-hour practical session and 1 tutorial hour per week.

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

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

Texts
To be advised.

753100 Psychology IIIA

Prerequisite
Psychology IIA

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

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

Content
Such topics as cognition, verbal learning, information processing, physiological psychology, animal behaviour, statistical analysis, experimental method, memory and learning.

The practical work is divided into
(a) Laboratory sessions — 3 hours per week.
(b) An investigation carried out under supervision. The topic of this will usually be selected by the student, although some restrictions may be decided by the Department — 2 hours per week.

Texts
To be advised.

753200 Psychology IIIB

Prerequisite
Psychology IIB

Hours
4 lecture hours and 5 hours practical work per week.

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

Content
Such topics as social psychology, psychopathology, personality, developmental psychology, quantitative psychology and cross-cultural psychology, factor analysis, behaviour change, ethology. Practical work comprises workshop and laboratory work for up to 3 hours per week plus a supervised independent experimental project.

Texts
To be advised.

754100 Psychology IV

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

Hours
To be advised.

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

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

Texts
To be advised.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Hours</th>
<th>Examination</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>664200</td>
<td>Psychology IV/Mathematics</td>
<td>Mathematics IIA &amp; Psychology IIC</td>
<td>To be advised</td>
<td></td>
<td>4 Mathematics topics chosen from the Part IV Mathematics topics (see Faculty of Mathematics Handbook). Psychological Measurement (see below). Mathematical Models in Perception and Learning (see below).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(i) Psychological Measurement — J. A. Keats</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nil</td>
<td>1½ hours per week</td>
<td></td>
<td>Content</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The logic of measurement and its application to psychological phenomena and at least one paper on one of the more recently developed psychological scaling methods.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Text</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nil</td>
<td></td>
<td></td>
<td>An Introduction to Mathematical Learning Theory (Wiley 1965)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mathematical Psychology (Prentice-Hall 1970)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The Theory of Stochastic Processes (Methuen 1965)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mathematical Psychology (Academic 1973)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Master of Psychology (Clinical)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prerequisites</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Honours degree in Psychology or other qualifications approved by the Faculty Board of the Faculty of Science.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 formal hours of lectures per week and involves, in addition, 2 full days of clinical practicum per week; the part-time course extends over 2 years.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Examination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional proficiency is evaluated through 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 and professional codes is required. Special study in certain areas may be required.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Thesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A thesis will be required embodying the results of a research investigation in an approved clinical area.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Content</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The major sections of the course are as follows:—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(i) Psychodiagnostic practicum (interview, psychometric and neuropsychological techniques and interpretations).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) Therapy practicum (sensitivity training, individual and group psychotherapies, behaviour modification treatment).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) Research projects (group project/s; individual studies).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iv) Professional and interdisciplinary activities.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
An internship (referred to above) is provided for each student in approved training institutions and/or in the field setting appropriate to contemporary concepts of community mental health.

**Master of Psychology (Educational)**

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

**Hours**
18 formal hours and six practical hours per week in the first year. 10 formal hours and 24 practical hours per week in the second year.

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

**Content**

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

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

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

**DEPARTMENT OF GEOGRAPHY**

**351100 Geography I**

**Prerequisites**
Nil

**Hours**
2 lecture hours and 3 hours practical work per week, 1 tutorial hour per fortnight and 3 days of field work.

**Examination**
To be advised.

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

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

**Text**

**Bureau of Meteorology**
Manual of Meteorology rev. edn (Bureau of Meteorology 1977)

**References**
To be advised.

**352100 Geography II A**

**Prerequisites**
Geography I

**Hours**
4 hours of lectures, 2 hours of practical/tutorial work per week and 8 days field work.

**Examination**
To be advised.

**Content**

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

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

(c) 352105 Development Geography — TERM III
This option examines a number of theories and models which have been put forward to explain that some areas of the world are more or less developed than others. The emphasis is on development as a totality and the works treated have, explicitly or implicitly, a spatial component or they offer reasons for spatial inequalities. Empirical evidence is drawn from both the so-called "advanced" and "less developed" countries.
Texts
(a) Historical Geography

(b) Geography of Industrial Location
Smith, D. M. *Industrial Location* (Wiley Paperback 1971)

(c) Development Geography
Brookfield, H. C. *Interdependent Development* (Methuen 1975)

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

Texts
Barry, R. G. & Chorley, R. J. *Atmosphere, weather and climate* 3rd edn (Methuen 1975)
Miller, A. *Meteorology* 2nd edn (Charles & Merrill 1971)
Strahler, A. N. *Physical Geography* 4th edn (Wiley 1975)

References To be advised

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

Texts
Bach, W. *Atmospheric Pollution* (McGraw-Hill paperback 1972)
Lamb, H. H. *The Changing Climate* (Methuen paperback 1966)
McCormack, B. M.  Introduction to the Scientific Study of Atmospheric Pollution (Reidel paperback 1971)
Wiesner, C. J.  Climate, Irrigation and Agriculture (Angus & Robertson 1970)

References  To be advised

**Topic (b) 353102 Advanced Economic Geography**

**Prerequisites**  Geography IIA

**Hours**  2 hours per week and related tutorials and field work

**Examination**  To be advised

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

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

**Texts**  Nil

**References**  To be advised

**Topic (c) 353104 Fluvial Geomorphology**

**Prerequisite**  Geography IIB

**Hours**  2 hours per week and related tutorials and fieldwork

**Examination**  To be advised

**Content**
Fluvial processes within the drainage basin system.

**Text**  Gregory & Walling  *Drainage basin form and process. A geomorphological approach* (Arnold 1973)

**References**  To be advised

**Topic (d) 353106 Geographical Techniques**

**Prerequisites**  Nil

**Hours**  2 hours per week and related fieldwork

**Examination**  To be advised

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

**Topic (e) 353113 Historical Geography**

**Prerequisites**  Nil

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

**Examination**  To be advised

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


**References**  To be advised

**Topic (f) 353108 Southeast Asia**

**Prerequisites**  Nil

**Hours**  2 hours per week and related tutorials and assignments

**Examination**  To be advised

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

**References**  To be advised

The following electives will not be offered in 1978.

Advanced Urban Geography
354100 Geography IV

Prerequisites
In order to qualify for admission to Geography IV, a student must normally have completed a sequence of Geography I, II and III subjects; two of these, including the Part III subject must have been passed at Credit level or better. The student must also satisfy the Head of the Department of his/her ability in the area of study within which the proposed research topic lies.

Hours
To be advised

Examination
To be advised

Content
This subject is designed in part as an introduction to research work in Geography. Each student is required to submit a thesis embodying the result of an original investigation on a topic approved by the Head of the Department of Geography.

Seminars and field work will be offered in the following:
(a) 354101 The impact of man and society on nature.
(b) 354102 A systematic topic approved by the Head of the Department.

References
To be advised

DEPARTMENT OF MATHEMATICS

Preliminary Notes
The Department offers and examines subjects. Each subject is composed of topics, each single-unit 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 the equivalent of four single unit topics. For Mathematics I, there is no choice of topics; for Mathematics II A, II B, II C there is some choice available to students; for Mathematics III A and III B 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(iv)(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.

Part I Subject

661100 Mathematics I

Prerequisites
Nil

Hours
4 lecture hours and 2 tutorial hours per week

Examination
Two 3-hour papers

Content
Topics AL — Algebra
AN — Real Analysis
CA — Calculus
SC — Statistics and computing

Part I Topics

Algebra (topic AL)—R. B. Eggleton

Prerequisites
Nil

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

Content
Introduction to basic algebraic objects and ideas. Induction. Binomial Theorem. Matrices, algorithms for solution of equations. Complex
numbers. Permutations. Vector spaces, basis and dimension, subspaces.
Homomorphisms, matrix representation, rank and nullity, determinants.
Eigenvectors and eigenvalues. Applications are illustrated throughout
the course.

Text
Lipschutz, S. Linear Algebra (Schaum 1968)

References
Brisley, W. A Basis for Linear Algebra (Wiley 1973)
Kolman, B. Elementary Linear Algebra (Macmillan 1977)
Liebeck, H. Algebra for Scientists and Engineers
(Wiley 1971)
McCoy, N. Introduction to Modern Algebra (Allyn &
Bacon 1968)
Tropp, M. A. Linear Algebra (Nelson 1973)

Real Analysis (topic AN)—M. J. Hayes

Prerequisites Nil

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

Content
Real Numbers. Sequences and series. Functions of one real variable,
continuity, differentiability, integrability. Power series, Taylor Series.

Text Nil

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

Calculus (topic CA)—R. F. Berghout

Prerequisites Nil

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

Content
Vector geometry in three dimensions. Revision of differentiation and
integration of polynomials and trigonometric functions. Differentiation
of rational functions and of implicit and parametrically defined
functions. Definition and properties of logarithmic, exponential and
hyperbolic functions. Integration by parts and by substitution tech-
niques. Integration of rational functions. First order separable and
linear differential equations. Second order linear differential equations
with constant coefficients. Conic sections and simple three-dimensional
geometry of curves and surfaces. Partial differentiation. Tangency.

Text
Ayres, F. Calculus (Schaum 1974)

References
Apostol, T. Calculus Vol. I 2nd edn (Blaisdell 1967)
Hille, E. & Salas, S. First Year Calculus Internat. Textbook Series
(Krieger 1968)
Kaplan, W. & Lewis, D. J. Calculus and Linear Algebra Vol. I (Wiley
1970)
Spivak, H. Calculus (Benjamin 1967)

Statistics and Computing (Topic SC)—A. J. Dobson

Prerequisites Nil

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

Content
Introduction to computers. FORTRAN programming. Calculating the
zeros of functions. Numerical integration. Descriptive statistics, mean
and variance. Probability. Binomial and normal distributions. Sampling
distributions. Confidence intervals; t- and \( \chi^2 \)-tests.
A requirement is the writing of successful computer programmes to
solve problems in statistical and numerical analysis.

Text
Blatt, J. M. Basic Fortran IV Programming: Version
MDITRAN (Computer Systems of Aust.
1969)
Bellamy, C. J. & Whitehouse, L. G. An Introduction to Computer Programming in
Fortran (monecs Fortran) (Monash Uni.
Comp. Centre 1976)

References
Hine, J. & Wetherill, G. B. A Programmed Text in Statistics Vols 1, 2, 3
(Chapman & Hall 1975)
Hoel, P. G. Introduction to Mathematical Statistics
(Wiley 1971)
Ralston, A. A First Course in Numerical Analysis
(McGraw-Hill 1965)
Spiegel, M. R. Statistics (Schaum 1968)
Wilkes, M. V. A Short Introduction to Numerical Analysis
(Cambridge U.P. 1971)
Part II Subjects

The Department offers three Part II subjects. Students whose course restricts them to one such subject must study Mathematics IIA or Mathematics 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 eleven 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>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Mathematical Models CO or C*</td>
</tr>
<tr>
<td>B</td>
<td>Complex Analysis CO or C*</td>
</tr>
<tr>
<td>CO</td>
<td>Vector Calculus &amp; Differential Equations</td>
</tr>
<tr>
<td>D</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>F</td>
<td>Numerical Analysis &amp; Computing</td>
</tr>
<tr>
<td>G</td>
<td>Finite Mathematics</td>
</tr>
<tr>
<td>H</td>
<td>Probability &amp; Statistics CO or C*</td>
</tr>
<tr>
<td>I</td>
<td>Topic in Statistics H</td>
</tr>
<tr>
<td>J</td>
<td>Topic in Applied Mathematics CO or C*, E*</td>
</tr>
<tr>
<td>K</td>
<td>Topic in Pure Mathematics</td>
</tr>
<tr>
<td>L</td>
<td>Group Theory</td>
</tr>
<tr>
<td>L</td>
<td>Real Analysis</td>
</tr>
</tbody>
</table>

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

**662100 Mathematics IIA**

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Mathematics I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>4 lecture hours and 2 tutorial hours per week</td>
</tr>
<tr>
<td>Examination</td>
<td>Each topic is examined separately</td>
</tr>
<tr>
<td>Content</td>
<td>Topics B, CO and D. 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.</td>
</tr>
</tbody>
</table>

**662200 Mathematics IIB**

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Mathematics I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>4 lecture hours and 2 tutorial hours per week</td>
</tr>
<tr>
<td>Examination</td>
<td>Each topic is examined separately</td>
</tr>
<tr>
<td>Content</td>
<td>Four topics chosen from A to H, where CO counts as two topics, 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.</td>
</tr>
</tbody>
</table>

**662300 Mathematics IIC**

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Mathematics IIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>4 lecture hours and 2 tutorial hours per week</td>
</tr>
<tr>
<td>Examination</td>
<td>Each topic is examined separately</td>
</tr>
<tr>
<td>Content</td>
<td>Topics K, L and one of the pairs of topics G and J, H and I or G and H. 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.</td>
</tr>
</tbody>
</table>

**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 eleven topics and offer them for examination.
5. Students whose courses include Physics IIA are advised to include topics CO, H and one of B, D or F 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 1974-1978 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.
7. Topics C and E existing before 1977 are no longer offered as separate topics.

**Texts for Part II Topics**

**662101 Topic A—Mathematical Models**

Nil
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 IIIA and IIC are prerequisite for entry to Mathematics IIIB. It will be assumed that students taking a third-year subject in 1978 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>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM</td>
<td>Foundations of Mathematics</td>
</tr>
<tr>
<td>*M</td>
<td>General Tensors</td>
</tr>
<tr>
<td>N</td>
<td>Variational Methods</td>
</tr>
<tr>
<td>O</td>
<td>Mathematical Logic</td>
</tr>
<tr>
<td>P</td>
<td>Ordinary Differential Equations</td>
</tr>
<tr>
<td>PD</td>
<td>Partial Differential Equations</td>
</tr>
<tr>
<td>PL</td>
<td>Programming Languages and Advanced Applications in Computing</td>
</tr>
<tr>
<td>Q</td>
<td>Fluid Dynamics</td>
</tr>
<tr>
<td>R</td>
<td>Theory of Statistics</td>
</tr>
<tr>
<td>*S</td>
<td>Geometry</td>
</tr>
<tr>
<td>*T</td>
<td>Group Theory</td>
</tr>
<tr>
<td>TC</td>
<td>Theory of Computing</td>
</tr>
<tr>
<td>U</td>
<td>Operations Research</td>
</tr>
<tr>
<td>V</td>
<td>Measure Theory and Integration</td>
</tr>
<tr>
<td>W</td>
<td>Analysis of Normed Linear Spaces</td>
</tr>
<tr>
<td>X</td>
<td>Rings and Fields</td>
</tr>
<tr>
<td>Y</td>
<td>Topic in Applied Probability</td>
</tr>
<tr>
<td>*Z</td>
<td>Mathematical Principles of Numerical Analysis</td>
</tr>
</tbody>
</table>

*This topic will not be offered in 1978.*

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

Prerequisites
Mathematics IIA & IIC

Hours
4 lecture hours and 2 tutorial hours per week

Examination
Each topic is examined separately

Content
A subject comprising four topics, which must include O or FM or both, 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 IIB

Pre- or Corequisite
Mathematics IIA

Hours
4 lecture hours and 2 tutorial hours per week

Examination
Each topic is examined separately

Content
A subject comprising four topics chosen from the unstarred topics above.

Notes
1. In order to take both Mathematics IIA and Mathematics IIB, a student must study eight topics from the above with the restriction that Topic O or Topic FM, 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

663210 Topic FM—Foundations of Mathematics
Nil

663101 Topic M—General Tensors—not offered in 1978

663102 Topic N—Variational Methods
Nil

663103 Topic O—Mathematical Logic
Mendelson, E. Introduction to Mathematical Logic (Van Nostrand 1964)

663104 Topic P—Ordinary Differential Equations

663108 Topic PD—Partial Differential Equations
Nil

663211 Topic PL—Programming Languages & Advanced Applications in Computing
Nil

663105 Topic Q—Fluid Dynamics
Nil

663106 Topic R—Theory of Statistics
Nil

663107—Topic S—Geometry
Nil

663201—Topic T—Group Theory—not offered in 1978

663209 Topic TC—Theory of Computing
Nil

663202 Topic U—Operations Research
Nil

663203 Topic V—Measure Theory & Integration
Nil

663204 Topic W—Analysis of Normed Linear Spaces

663205 Topic X—Rings and Fields
Nil

663206 Topic Y—Topics in Applied Probability
Dieckhoff, E. Information Theory

663207 Topic Z—Mathematical Principles of Numerical Analysis
Nil

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

Part IV Subject

664100 Mathematics IV

Prerequisites
Mathematics IIA and IIB, and additional work as prescribed by the Head of the Department of Mathematics.
A student desiring admission to this subject must apply in writing to the Head of Department before 7th December of the preceding year.

**Hours**

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

**Examination**

At least eight 2-hour final papers.

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

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

**Content**

A selection of topics, each of about 27 lectures, will be offered. Summaries of topics which may be offered in 1978 will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.

---

### RESEARCH 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, with special reference to the Major Histocompatibility Complex.

Dr Angus’s field of interest is evolution in the genus Drosophila. He is currently investigating hybrid sterility between races. A further interest is the development of selection indices for pig breeding.

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

Associate Professor Jones’s research interests are in the biology of spermatozoa. Current studies are on the maturation and assessment of fertilizing capacity of spermatozoa and on the structure and function of the epididymis.

---

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’s field of research is the developmental biology of mammals. Factors influencing the fertilization, cleavage and implantation of embryos are currently being investigated.

Dr Roberts’s research interests are in the field of protein chemistry and immunoreproduction. Current projects include a study of proteins in blood plasma and external secretions, and of the immunological consequences of vasectomy.

Dr Rose’s field of interest is developmental cell physiology with particular interests in the control of chloroplast development and plant cell growth.

### 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, environmental chemistry.

**Chemical Education**

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 catalysis, electrosorption, corrosion and the co-ordination chemistry of ore deposition.
Associate Professor C. F. K. Diessel is studying the pattern of Carboniferous and late Devonian floras of Eastern Australia.

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

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

Radiochemistry and Radiation Chemistry (E. B. Jacobs) applications of tracer techniques particularly in equilibrium and kinetics studies in solvent extraction systems. Polymerisations — particularly 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. Mass spectral fragmentation of organic molecules.

Thermodynamics (Associate Professor G. C. Curthoys) absorption on solids from gaseous and liquid phases. Zeolites; structure and properties.

Chromatographic methods of Analysis (Dr G. Orr)

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 andesite associations of eastern New South Wales. Her other interest is in the conditions of formation of secondary minerals in basic lavas.

Associate Professor C. F. K. Diessel is studying the pattern of coalification and graphitization of dispersed organic matter in sediments and their metamorphic derivatives. Other research interests are sedimentology of clastic sediments, coalfield geology and coal formation.

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

Radiochemistry and Radiation Chemistry (Mr J. Williams) investigations into the relationships between metamorphic grade and reflectance of coalfied and graphitized plant fragments.

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

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 Gove-Vaughall 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 coalfied and graphitized plant fragments.

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

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

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

Mr A. J. Williams is investigating the structural geology of the Peel Fault System, northeastern New South Wales.

DEPARTMENT OF PHYSICS

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

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

Surface Physics (Associate Professor Ramsey, Mr Roberts)

Studies are proceeding in the area of adsorption of oxygen on the low index faces of aluminium. The electronics for LEED system has been completed and tested. Modifications to the CMA Auger electron spectroscopy system are in progress to improve the resolution and sample handling facilities. Surface potential studies on polycrystalline
films by the retarding field diode and Kelvin vibrating plate methods have been commenced. A retarding field low energy electron spectrometer is under construction for the analysis of the spectra of thermally stimulated exoelectrons.

Theoretical studies on the A1(111) surface and oxygen adsorbed thereon have shown that our model is feasible. Experimental studies await the completion of the specimen manipulator of the apparatus.

**Radar Meteor Studies** (Associate Professor Keay, Dr Kennewell)

Digital techniques employing integrated circuit logic and high speed mini-computer with microsecond cycle times have been combined to enable signal processing to be carried out in real time. This, and a new HF pulse transmitter, are being developed for a fully automated radar meteor detection system at a new field station being established north of Newcastle.

**Geomagnetic Pulsaions** (Associate Professor Fraser)

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

**Internal friction in metals** (Mr Cleary)

Work on the measurement of internal friction in metals has been carried out in collaboration with the Metallurgy Department. Electronic equipment for measuring the frictional loss in a sample vibrating at constant amplitude has been constructed and is now operating. Refinements are being made to this equipment.

**Theoretical Solid State Physics** (Dr Smith)

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

**Analog IC techniques** (Dr McGovern)

Novel analog integrated circuit configurations have been developed and used in instrumentation applications.

**Electromagnetic wave propagation** (Dr McGovern)

Theoretical and experimental work is being undertaken to yield simple and practical descriptions for base band EM waves propagating in grossly nonuniform transmission lines.

**Medical Physics** (Dr Kennewell)

The application of microprocessors to various biomedical systems is being studied, including extended ECG data analysis.

**Visual Pathway Studies** (Mr Balfe)

A study of cataractous lenses is being continued. Stimulus-response studies using micro electrode techniques are being developed.

**DEPARTMENT OF PSYCHOLOGY**

**Research Interests**

Research in the Department if grouped under broad headings which reflect the active research activities of staff members.

**Abnormal Psychology**

The use of biofeedback as a therapeutic technique and as a means of investigating learning processes is being studied particularly in relation to psychosomatics.

**Animal Behaviour**

Effects of prenatal and neonatal experience on adult behaviour are being examined in several species. Early learning is being investigated in mammals and avian species.

**Cognitive Processes**

Research into the development of cognitive processes has continued with particular emphasis on factors associated with the acquisition of concepts. Several theoretical formulations are being explored as part of this research.

**Cross-Cultural Research**

The development of values and the relationship between norms, behaviour, alcohol and youth culture are being studied with an international team from the U.S.A., Norway and France. Research on the role of language and the concept acquisitions is being carried out with bilingual children in Australia and Malaysia.

**Developmental Psychology**

The efficacy of various types of treatments on behavioural development in infancy is being studied. Pattern preference in infants is being studied using fixation data and autonomic measures.

**Educational Psychology**

In a study of the social psychology of the classroom the development of social skills, the social learning of isolated children and small group interaction are being examined.
Learning, Perception and Memory
The research interests in this area include instrumental avoidance conditioning, structure and parameters of perception, perceptual learning, and short-term memory.

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 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. Central nervous control of the autonomic nervous system in stress and aversive learning is being investigated, with special emphasis on catecholamines and neuropeptides. 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.

DEPARTMENT OF GEOGRAPHY

Biogeography
Altitudinal gradation of rainforest at Barrington Tops. Vegetation on lime-rich rocks of the Upper Hunter (J. C. Turner)

Climate
Microclimatology in vineyards (G. N. McIntyre)
Air pollution on a meso and micro scale; solar radiation; climatic change (H. A. Bridgman)

Development Geography
The economic development of less developed countries, with specific reference to the role of forestry production. (W. J. A. Jonas)
The change from a tribal to a peasant economy by the small-holder rubber growers in Papua New Guinea. (P. G. Irwin)
Impact of a High Yielding Varieties Package on a Malay rice producing community, Kedah, Malaysia. (R. E. Barnard)

Geographical theory and philosophy
Time-space and social behaviour (D. N. Parkes)
Towards the creation of “ethical space” (M. R. Hall)
Time-space and socio-technical systems, with particular emphasis on shiftwork systems (K. W. Lee)

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

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

Migration
Internal migration in Australia (L. A. de Castro Lopo)
Networks in relation to the location of Greek immigrants in Newcastle (A. Burns)

Perception
Perception of and adjustment to flood hazard (S. M. Macey)

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

DEPARTMENT OF MATHEMATICS

Algebra
Associate Professor W. Brisley is working on some problems relating to the lattices of subvarieties of certain varieties of groups, and on some applications of algebra to some data-processing problems.

Astrophysics and High-Energy Particle Physics
Professor J. A. Campbell is investigating astrophysical problems in which the use of techniques and results from particle physics is essential. Examples of such problems are: determination of equations of state for material at densities higher than nuclear density, pion condensation, superfluidity in neutron stars, and the release and transport of energy in astrophysical material by neutrino reactions.

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

Combinatorial Theory and Operations Research
Dr R. B. Eggleton is interested in all aspects of combinatorial mathematics, particularly graph theory.
Professor R. W. Robinson is applying combinatorics to the counting of various structures, such as graphs and search trees.

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

Associate Professor W. D. Wallis is carrying out research on block designs and graph theory.

**Computing and Numerical Analysis**

Professor J. A. Campbell is concerned with all aspects of computer science that include the use of models of dynamic occupancy of computer storage by programmes and data, analysis of algorithms and computational complexity, methods for automatic programming, debugging and formation of plans or hypotheses, and computations with symbolic expressions.

Associate Professor A. J. Guttmann is interested in methods of function approximation, particularly from the viewpoint of using a differential equation representation. He is also interested in the analysis of theoretical and experimental data.

Dr W. Summerfield is working on ways of determining the "condition" of linear systems of equations. Further, he is interested in the solution by linear marching schema of ordinary differential equations, in particular "stiff" systems. He is also investigating the finite element method of solution for partial differential equations.

**Differential Geometry and Relativity**

Dr P. K. Smrz is working on generalizations of Einstein's theory of relativity using modern differential geometry—in particular, the theory of Lie groups and fibre bundles.

**Dynamical Systems**

Dr J. G. Couper is working on stable and generic properties of flows and diffeomorphisms.

**Environmental and Urban Studies**

Dr. R. W. Gibberd is studying the art of population projections and various models of urban structure and urban development. He is also interested in urban sociology, voting patterns and urban demographic models.

Dr R. J. Vaughan is investigating mathematical models in urban geography.

Associate Professor W. D. Wallis is working on mathematical models in urban geography and urban sociology.

**Epidemic Theory**

Professor J. A. Campbell is applying mathematical methods and results developed to describe the spread of infectious diseases to other processes, which have some basic properties in common with epidemics, e.g., growth of data structures during computations, and tourism.

---

**Fluid Mechanics**

Associate Professor A. J. Guttmann is studying the problem of extrapolating regular perturbation series in fluid mechanics.

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

**Functional Analysis**

Associate Professor J. R. Giles is involved in determining properties of Banach spaces which can be derived from relations between the points of the space and their support functionals. In particular, he is examining differentiability properties of the norm. He is also working on the development of the theory of the numerical range of operators on locally convex spaces, and of elements of locally m-convex algebras.

Dr V. Ficker and Mr C. J. Ashman are working in measure theory, particularly in some problems of families of sets.

**Geophysical Fluid Dynamics**

Dr W. Summerfield is currently studying the dynamics of estuarine systems. He is also interested in all ocean wave (and turbulence) phenomena.

**History of Mathematics**

Mr R. F. Berghout is pursuing research into the development of algebra, notably modern algebra, as well as the relations between this and classical occidental and oriental algebra.

Mr Berghout, together with Mrs Frost, is working on Greek algebra. Mrs Frost is currently translating into English some of Euclid's as yet untranslated works.

**Information Theory**

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

**Lexicostatistics**

Dr A. J. Dobson studies the historical and geographical relationships between languages by statistical analysis of their vocabularies. Stochastic models of language evolution are developed.

**Mathematical Models of Tumour Growth**

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

**Models of Learning**

Dr A. J. Dobson works on the mathematical formulation of learning theories and on the statistical analysis of experimental data.
Molecular Biology
Professor J. A. Campbell is concerned with the algebraic modelling of the process of folding which converts proteins from the strings or chains in which they are first formed to their final complex three-dimensional molecular structure.

Number Theory
Dr R. B. Eggleton is interested in number theory; particularly in combinatorial aspects of the subject.
Dr T. K. Sheng studies the structure of humanly manageable numbers, application of dispersive and explosive linear operators, distribution of algebraic numbers in the complex plane, and functions defined on rational numbers. Lines determined by lattice points and application of the results obtained to statistical mechanics are studied.

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

Statistics
Dr A. J. Dobson is studying stochastic models of events which occur periodically subject to random variation; in particular, tropical cyclones and circadian rhythms.
Associate Professor W. D. Wallis is working on the theory and application of Room square designs and paired comparison designs.

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

Subject Computer Numbers for the B.Sc. Degree Course
The subjects selected should be written on the enrolment form in the following manner.

<table>
<thead>
<tr>
<th>Computer Number</th>
<th>SUBJECT NAME</th>
<th>Computer Number</th>
<th>NAMES OF COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>711100</td>
<td>Biology I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>721100</td>
<td>Chemistry I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>351100</td>
<td>Geography I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>731100</td>
<td>Geology I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>661100</td>
<td>Mathematics I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>741200</td>
<td>Physics IA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>741300</td>
<td>Physics IB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>751100</td>
<td>Psychology I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>712100</td>
<td>Biology IIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>712200</td>
<td>Biology IIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>722200</td>
<td>Chemistry IIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>722300</td>
<td>Chemistry IIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>742200</td>
<td>Electronics &amp; Instrumentation II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>352100</td>
<td>Geography IIA</td>
<td>352105</td>
<td>Development Geography</td>
</tr>
<tr>
<td>352115</td>
<td>Historical Geography</td>
<td>352125</td>
<td>Geography of Industrial Location</td>
</tr>
<tr>
<td>352200</td>
<td>Geography IIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>352300</td>
<td>Geography IIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>732200</td>
<td>Geology IIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>732300</td>
<td>Geology IIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>662100</td>
<td>Mathematics IIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>662200</td>
<td>Mathematics IIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>662300</td>
<td>Mathematics IIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>742100</td>
<td>Physics II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>752100</td>
<td>Psychology IIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>752200</td>
<td>Psychology IIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>713100</td>
<td>Biology IIIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>713200</td>
<td>Biology IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>723100</td>
<td>Chemistry IIIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>723200</td>
<td>Chemistry IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>353100</td>
<td>Geography IIIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>353101</td>
<td>The History &amp; Philosophy of Geography</td>
<td>353101</td>
<td></td>
</tr>
<tr>
<td>353200</td>
<td>Geography IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>353201</td>
<td>Problems of the Australian Region Electives (select 2)</td>
<td>353115</td>
<td>Advanced Climatology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>353102</td>
<td>Advanced Economic Geography</td>
<td>353104</td>
<td>Fluvial Geomorphology</td>
</tr>
<tr>
<td>353106</td>
<td>Geographical Techniques</td>
<td>353113</td>
<td>Historical Geography</td>
</tr>
<tr>
<td>353108</td>
<td>Southeast Asia</td>
<td>353115</td>
<td>Advanced Climatology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Number</td>
<td>SUBJECT NAME</td>
<td>Names of Components</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>--------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>733100</td>
<td>Geology IIIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>733200</td>
<td>Geology IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>663100</td>
<td>Mathematics IIIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>663200</td>
<td>Mathematics IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>743100</td>
<td>Physics IIIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>743200</td>
<td>Physics IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>753100</td>
<td>Psychology IIIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>753200</td>
<td>Psychology IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>714100</td>
<td>Biology IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>724100</td>
<td>Chemistry IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>354100</td>
<td>Geography IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>734100</td>
<td>Geology IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>664100</td>
<td>Mathematics IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>744100</td>
<td>Physics IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>754100</td>
<td>Psychology IV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>