FACULTY OF SCIENCE
HANDBOOK 1980

THE UNIVERSITY OF NEWCASTLE
NEW SOUTH WALES 2308
FOREWORD

It gives me great pleasure to welcome you back, or into, the Faculty of Science for this year. I trust that the year will be both profitable and enjoyable for you. Undoubtedly you will hear many people indicate that you will have the opportunity of getting as much from the year as you want, and that what you get from the year will be related to how much effort you put into it. Both of these comments are undoubtedly true. Within the Faculty of Science we trust that you will be well prepared during your time here for the years ahead. The motto of the University “I look ahead” has been chosen with some thought. We look ahead to our graduates making important contributions to Newcastle and the Hunter Region, to Australia and to the world in the future — perhaps in another ten or fifteen years. Our aim is not to produce graduates who can simply capably fill an existing position in industry, education or research. Our aim is to turn out graduates who can go into positions, fill them capably, but then create and bring about developments which will lead to progress. In short, we aim to turn out the leaders who will bring about the necessary developments for the future. For these reasons, understanding and ability to handle principles is fundamentally important.

There is opportunity in the university to learn and to develop. You will learn quite a deal and you will develop quite a deal if you follow the work that is given to you during instructional periods. However, you will learn and develop more if you follow up this work by consulting extra resources such as those available to you within the Library. Consequently, you are encouraged to keep abreast of the instruction you are given but you are also urged to follow up the topics which interest you, or perhaps pose problems to you, by undertaking your own activity outside of class hours.

As well as a pleasant site, this University offers a very great advantage — small numbers and small class sizes. In this way it becomes possible for staff and students to know each other and to have much more effective interplay than in a larger institution. Many staff members have chosen to take up posts here at Newcastle because of this important opportunity. You should be willing to make use of the opportunity of talking directly to staff members and asking questions, as well as seeking additional information. Be prepared to visit staff members outside of class hours. We were all students once and know only too well how reluctant we felt to approach staff members. But, I assure you, we were very similar to you and appreciate the situation that students feel themselves in. There is always someone who can give you advice on any matter. All that is necessary is to approach any staff member who will then, quite certainly, either provide the advice or inform you of the source where you can get help. Be prepared to seek information and advice and I am sure that many of your difficulties will be easily resolved.

As well as indicating to you that you should try to get as much as possible from your association with the Faculty of Science, I also indicate that you should try to get as much as possible from your association with the University, in the broad sense, both on a social and recreational basis as well as educational. There are opportunities for all sorts of activities other than purely formal learning and work, and I am certain that your life will be richer if you avail yourselves of the broader activities of the University.

Again, I hope that you will have a successful and enjoyable year. I trust that you will put in the effort required to achieve success and the satisfaction to be derived from success. The satisfaction is knowing that you have shown marked development, and that this will be of benefit to you, and also the realization that this will be of benefit to our community in the coming years.

B. BOETTCHER,
Dean of Science.
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Faculty of Science

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

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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 members from the Department of Geography;
six members from the Department of Mathematics;
two members from the Faculty of Engineering;
two members from the Faculty of Arts;
one member from the Department of Metallurgy;
one member from the Department of Education;
two members from the Faculty of Medicine; and
four student members elected from the Faculty of Science.

The Role of the Faculty Board is defined by By-law 2.4.4.

"A Faculty Board shall:

(a) encourage and supervise the teaching and research activities of the Faculty;
(b) determine the nature and extent of examining in the subjects in the courses of study for the degrees and diplomas in the Faculty;
(c) determine the grades of pass to be awarded and the conditions for granting deferred or special examinations in respect of the subjects in the courses of study for the degrees and diplomas in the Faculty;
(d) determine matters concerning admissions, enrolment and progression in the courses of study for the degrees and diplomas in the Faculty and make recommendations on such of those matters as require consideration by the Admissions Committee;
(e) consider the examination results recommended in respect of each of the candidates for the degrees and diplomas in the Faculty and take action in accordance with the Examination Regulations made by the Council under By-law 5.9.1;
(f) deal with any matter referred to it by the Senate;
(g) make recommendations to the Senate on any matter affecting the Faculty; and
(h) exercise such other powers and duties as may from time to time be delegated to it by the Council."
Dean
Professor B. Boettcher, BSc, PhD(Adelaide)

Sub-Dean
J. D. Balfe, MSc(Queensland), AlnstP, MAIP

Faculty Secretary

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Associate Professor
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Senior Lecturers
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R. N. Murdoch, BSc(New South Wales), PhD(Sydney)
J. W. Patrick, BScAgr(Sydney), PhD(Adelaide)
T. K. Roberts, BSc(Adelaide), PhD(Flinders)
R. J. Rose, BScAgr(Sydney), PhD(Macquarie)

Lecturer
P. J. Quinn, BAgSc(Adelaide), PhD(Sydney)

Tutors
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Kathleen D. Hall

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B. A. Engel, MSc(New England), PhD
K. H. R. Moelle, Abi, DrPhD(Leipzig), AAusIMM
S. St. J. Warne, BSc(Western Australia), PhD(New South Wales), FGS, FGAA, FMSA, FAIE

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Lecturer
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Senior Demonstrator
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B. L. Jenkins

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Tutor
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J. F. Pearson
T. G. White

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J. L. Seggie, BA, PhD, MAPsS

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J. Miles, BA, PhD
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Margaret T. Callaghan

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R. Giegborn
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E. F. Latimer

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F. Atkinson
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P. W. Smith
R. J. Taylor
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A. D. Tweedie, MA(New Zealand)(Personal Chair)

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Mary R. Hall, MA(Manchester)
R. J. Loughran, BSc(Durham), MSc, PhD(New England)
D. N. Parkes, BA(Durham), MA, PhD
J. C. Turner, BSc(Agr(Sydney), MS, PhD(Wisconsin)

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H. A. Bridgman, BA(Beloit College), MA(Hawaii), PhD(Wisconsin)
W. J. A. Jonas, BA(New South Wales), MA, DipEd(New South Wales)
R. W. Kidd, BSc(New South Wales)
G. N. McIntyre, BA(Tasmania), MA(Australian National), FRMetS

Senior Tutors
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K. W. Lee, BA(Liverpool), MA(New England)

Departmental Office Staff
Jeanette Taylor
Valma M. Wiggins

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L. J. Henderson

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

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

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Associate Professors
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C. A. Croxton, BSc(Leicester), MA, PhD(Cambridge)
J. R. Giles, BA(Sydney), PhD; DipEd(Sydney)
A. J. Guttmann, MSc(Melbourne), PhD(New South Wales) (Head of Department)
P. K. Smrz, PromPhys, CSic, RNDr(Charles)
W. D. Wallis, BSc, Phd(Sydney)

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V. Ficker, PromMat, CSc, RNDr(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(Marian College), BSc(Malaya & London), PhD(Malaya)
R. J. Vaughan, BSc, MEngSc, ME(New South Wales), PhD(Adelaide), FSS

Lecturers
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D. W. E. Blatt, BSc, Phd(Sydney)
J. G. Couper, BSc, Phd(New England)
M. J. Hayes, BA(Cambridge)
W. C. Summerson, BSc(Adelaide), PhD(Flinders)
W. P. Wood, BSc, Phd(New South Wales)

Senior Tutors
C. J. Ashman, BA, Liti(B(New England)
G. W. Southern, BA(New South Wales), DipCompSc

Teaching Assistants
Louise E. Morris, BMath
S. J. Quinn, BMath
Simon, BSc, BA(James Cook), DipCompSc

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

Research Fellow
J. Reeve, BSc, MSc(Canterbury), PhD(Alberta)

Computer Programmer
A. Nymeyer, BMath, DipCompSc

Departmental Office Staff
Julie H. Latimer
Anne M. McKim
Gaylene Morgan

Administrative Assistant
Rae Pease, BEd(Mitchell CAE)
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 1980. However, Science students taking subjects from other faculties must examine the timetable to ensure that clashes do not exist in their proposed courses.

<table>
<thead>
<tr>
<th>Biological Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIA with</td>
</tr>
<tr>
<td>Biology IIB with</td>
</tr>
<tr>
<td>Biology IIIA with</td>
</tr>
<tr>
<td>Biology IIIB with</td>
</tr>
<tr>
<td>Chemistry IIA with</td>
</tr>
<tr>
<td>Chemistry IIB with</td>
</tr>
<tr>
<td>Chemistry IIIA with</td>
</tr>
<tr>
<td>Chemistry IIIB with</td>
</tr>
<tr>
<td>Geology IIA with</td>
</tr>
<tr>
<td>Geology IIB with</td>
</tr>
<tr>
<td>Geology IIIA with</td>
</tr>
<tr>
<td>Geology IIIB with</td>
</tr>
</tbody>
</table>

Because of the interchange of A and B timetables in alternate years, any subjects clashing with Biology IIA and IIB in 1980 will clash with Biology IIB and IIA respectively in 1981 and vice versa.

Chemistry

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

Geology

<table>
<thead>
<tr>
<th>Geology IIA with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry IIA</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
<tr>
<td>Chemistry IIIA</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geology IIB with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIA</td>
</tr>
<tr>
<td>Biology IIB</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geology IIIA with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry IIB</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geology IIIB with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIA</td>
</tr>
<tr>
<td>Biology IIB</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
<tr>
<td>Chemistry IIB</td>
</tr>
</tbody>
</table>
### Advisory Prerequisite for entry to the Faculty

Prospective science degree students are advised to include four units of Science and at least 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 subjects and achieved results in them at the 30th percentile or above.

### Mathematics

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

### Physics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Assumed Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIIB</td>
<td>Nil</td>
</tr>
<tr>
<td>Chemistry IIIA</td>
<td>Mathematics III (some topics)</td>
</tr>
<tr>
<td>Computer Science IIB (some topics)</td>
<td>Computer Science III (some topics)</td>
</tr>
</tbody>
</table>

### Electronics & Instrumentation II

<table>
<thead>
<tr>
<th>Subject</th>
<th>Assumed Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIIB</td>
<td>Nil</td>
</tr>
<tr>
<td>Chemistry IIIA</td>
<td>Mathematics III (some topics)</td>
</tr>
<tr>
<td>Computer Science IIB (some topics)</td>
<td>Computer Science III (some topics)</td>
</tr>
</tbody>
</table>

### Computer Science III

<table>
<thead>
<tr>
<th>Subject</th>
<th>Assumed Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIIB</td>
<td>Nil</td>
</tr>
<tr>
<td>Chemistry IIIA</td>
<td>Mathematics III (some topics)</td>
</tr>
</tbody>
</table>

### Computer Science III (some topics)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Assumed Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology IIIB</td>
<td>Nil</td>
</tr>
</tbody>
</table>

### Psychology

<table>
<thead>
<tr>
<th>Subject</th>
<th>Assumed Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None, although familiarity with a modern language would be of advantage.</td>
</tr>
</tbody>
</table>

### Russian for the Scientist and Mathematician

**FORMAL ENROLMENT NOT NECESSARY**

**Prerequisites**

None, although familiarity with a modern language would be of advantage.

**Hours**

Approximately 27 lecture hours

**Examination**

None

**Content**

This is a voluntary course designed to give students and members of staff a working reading knowledge of scientific and technical Russian. Translation from Russian into English is costly, and only a very small proportion of the Soviet Union's technical literature is routinely translated into English. Often translation of the abstract alone is sufficient to determine whether a complete translation is warranted. Emphasis throughout the course will be on translation from Russian into English, although both written and spoken Russian will necessarily be involved. The course should provide a good introduction for those seeking a somewhat more literary understanding of the language.

Further details may be obtained from Associate Professor Croxton in the Department of Mathematics.

### 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.
REQUIREMENTS FOR THE DEGREE OF
BACHELOR OF SCIENCE
IN THE FACULTY OF SCIENCE

GENERAL PROVISIONS

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

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

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

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

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

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

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

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

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

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

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

12. Degree Patterns
(1) To qualify for admission to the ordinary degree a candidate shall pass nine subjects of which at least three shall be chosen from the Schedule of Subjects. Up to three subjects may be chosen from subjects offered in the courses leading to other degrees of the University with the permission of the Dean, who shall determine the classification of each such subject as a Part I, Part II or Part III subject.
(2) The subjects shall be taken in one of the following degree patterns:
(a) 4 subjects from Part I, 3 subjects from Part II, 2 subjects from Part III;
(b) 4 subjects from Part I, 2 subjects from Part II, 3 subjects from Part III;
(c) 5 subjects from Part I, 2 subjects from Part II, 2 subjects from Part III; or
(d) in exceptional circumstances, with the permission of the Dean, either
(i) 4 subjects from Part I, 4 subjects from Part II, 1 subject from Part III, or
(ii) 5 subjects from Part I, 3 subjects from Part II, 1 subject from Part III.

13. Choice of Subjects
(1) The subjects passed shall include:
(a) at least three of the following:
   Biology I, Chemistry I, Geography I, Geology I, Mathematics I, Physics IA or Physics IB, and Psychology I;
(b) at least one Part III subject and two Part II subjects OR
   (i) at least two Part III subjects and one Part II subject, in either case chosen from the Schedule of Subjects to these Requirements;
(2) A candidate shall not be entitled to count:
(a) more than one of Physics IA and Physics IB;

1 Candidates who enrolled in the B.Sc. degree course prior to 1977 may proceed under these provisions or those in existence in 1976 (see 1976 Faculty Handbook).
2 Candidates enrolled in the course prior to 1978 are deemed to have the permission of the Dean.

14. Prerequisites and Corequisites
Except with the permission of the Faculty Board granted after considering any recommendation made by the Head of the Department offering a subject, no candidate may enrol in that subject unless he has passed the subjects prescribed as its prerequisites at any grade which may be specified and has already passed or concurrently enrols in or is already enrolled in the subjects prescribed as its corequisites.

15. 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.

16. Omitted Sept. 1978

17. Omitted Sept. 1978

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) One of the following shall be regarded as the normal programme for a full-time student:
   Year I
   Four Part I subjects
   Year II
   Three Part II subjects

3 Candidates who enrolled in the course prior to 1972 are exempt from this proviso.
4 These are subjects offered in the Faculty of Mathematics.
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\(^1\)
- 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 honours subject in one year's full-time study or two years' part-time study; and

(ii) pass the 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. **General**

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:

(a) 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;

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

(c) 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;

\(^1\) See section 13(2)(b) of these Requirements.
25. Science/Arts

To qualify for admission to the ordinary degrees of Bachelor of Science and Bachelor of Arts, a candidate shall complete all the requirements for the degree of Bachelor of Arts other than Clause 12 and all the requirements for the degree of Bachelor of Science other than Clauses 12(2) and 18, and shall pass 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.

26. Science/Mathematics

A candidate shall qualify for admission to the ordinary degrees of Bachelor of Science and Bachelor of Mathematics by passing fourteen subjects, as follows:

(a) five subjects, being Mathematics I, Mathematics IIA, Mathematics IIC, Mathematics IIIA and another Part III subject chosen from the Schedules 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:

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

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

(iii) a candidate counting Psychology IIC shall not be entitled to count either Psychology IIA or Psychology IIB;

(iv) a candidate counting Psychology IIIC shall not be entitled to count either Psychology IIIA or Psychology IIIB;

(v) a candidate counting Economics IIIC shall not be entitled to count either Economics IIIA or Economics IIIB;

(vi) a candidate counting Geology IIIC shall not be entitled to count either Geology IIIA or Geology IIIB.

27. Science/Engineering

A candidate shall qualify for admission to the ordinary degree of Bachelor of Science and the degree of Bachelor of Engineering in any specialisation by completing a combined course approved by the Faculty Boards of Science and Engineering.

EQUIVALENT HONOURS

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

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

SCHEDULE OF SUBJECTS

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<tr>
<th>Subject</th>
<th>Remarks, Prerequisites, Corequisites, Preparatory Subjects</th>
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Only one of these subjects may be taken.

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Prerequisite: Biology I
Pre requisite: Chemistry I
Preparatory Subjects: Mathematics I & either Physics IA or Physics IB
Prerequisite: Chemistry I
Corequisite: Chemistry IIA (Advisory)
Prerequisite: Mathematics I
Prerequisite: Physics IA or IB
or
Corequisite: a Part III subject approved by the Faculty Board on the recommendation of the Head of the Dept. of Physics.

Geography IIA
Geography IIB
Geography IIC
Geology IIA
Geology IIB

Prerequisite: Geography I
Prerequisite: Geology I
POSTGRADUATE COURSES

Studies may be undertaken for the following postgraduate qualifications:

- 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

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1 See section 13(2)(b) of these Requirements.
2 The detailed advice in this statement is currently under review — see page 56.
to a degree of the University of Newcastle or another university approved for this purpose by the Faculty, provided that the course completed for that degree by the applicant included a major study in Psychology.

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

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

Educational Specialisation

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

(a) (i) have satisfied all of the requirements for admission to a Bachelor’s degree in the University of Newcastle and have included in the qualifying course for that degree at least one Part III Psychology subject; or

(ii) have satisfied all of the requirements for admission to an equivalent qualification in another university recognised for this purpose by the Faculty Board;

(b) have satisfied all of the requirements for the award of the Diploma in Education in the University of Newcastle or another teaching qualification approved for this purpose by the Faculty Board;

(c) 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.

REGULATIONS GOVERNING MASTERS DEGREES

PART I — GENERAL

1. (1) These Regulations, including the Schedules thereto, prescribe the conditions and requirements relating to the degrees of Master of Architecture, Master of Arts, Master of Commerce, Master of Education, Master of Educational Studies, Master of Engineering, Master of Engineering Science, Master of Mathematics, Master of Psychology (Clinical), Master of Psychology (Educational) and Master of Science.

(2) In these Regulations and the Schedules thereto, unless the context or subject matter otherwise indicates or requires:

“Faculty Board” means the Faculty Board of the Faculty responsible for the course in which a person is enrolled or is proposing to enrol;

“programme” means the programme of research and study prescribed in the Schedule;

“Schedule” means the Schedule of these Regulations pertaining to the course in which a person is enrolled or is proposing to enrol; and

“thesis” means any thesis or dissertation submitted by a candidate.

(3) These Regulations shall not apply to degrees conferred honoris causa.

(4) A degree of Master shall be conferred in one grade only.

2. An application for admission to candidature for a degree of Master shall be made on the prescribed form and lodged with the Secretary to the University by the prescribed date.

3. (1) To be eligible for admission to candidature an applicant shall:

(a) (i) have satisfied the requirements for admission to a degree of Bachelor in the University of Newcastle as specified in the Schedule; or

(ii) have satisfied the requirements for admission to a degree or equivalent qualification, approved for the purpose by the Faculty Board, in another tertiary institution;

or

(iii) have such other qualifications and experience as may be approved by the Senate on the recommendation of the Faculty Board or otherwise as may be specified in the Schedule; and

(b) have satisfied such other requirements as may be specified in the Schedule.

(2) Unless otherwise specified in the Schedule, applications for admission to candidature shall be considered by the Faculty Board which may approve or reject any application.

(3) An applicant shall not be admitted to candidature unless adequate supervision and facilities are available. Whether these are available shall be determined by the Faculty Board unless the Schedule otherwise provides.

1 Subject to confirmation by Council.
4. To qualify for admission to a degree of Master a candidate shall enrol and satisfy the requirements of these Regulations including the Schedule.

5. The programme shall be carried out:—
   (a) under the guidance of a supervisor or supervisors either appointed by the Faculty Board or as otherwise prescribed in the Schedule; or
   (b) as the Faculty Board may otherwise determine.

6. Upon request by a candidate the Faculty Board may grant leave of absence from the course. Such leave shall not be taken into account in calculating the period for the programme prescribed in the Schedule.

7. (1) A candidate may withdraw from a subject or course only by informing the Secretary to the University in writing and such withdrawal shall take effect from the date of receipt of such notification.
   (2) A candidate who withdraws from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty. The relevant date shall be:
      (a) in the case of a subject offered in the first half of the academic year — the eighth Monday in first term;
      (b) in the case of a subject offered in the second half of the academic year — the second Monday in third term;
      (c) in the case of any other subject — the sixth Monday in second term.

8. (1) If the Faculty Board is of the opinion that the candidate is not making satisfactory progress towards the degree then it may terminate the candidature or place such conditions on its continuation as it deems fit.
   (2) For the purpose of assessing a candidate’s progress, the Faculty Board may require any candidate to submit a report or reports on his progress.
   (3) A candidate against whom a decision of the Faculty Board has been made under Regulation 8(1) of these Regulations may request that the Faculty Board cause his case to be reviewed. Such request shall be made to the Dean of the Faculty within seven days from the date of posting to the candidate the advice of the Faculty Board’s decision or such further period as the Dean may accept.
   (4) A candidate may appeal to the Vice-Chancellor against any decision made following the review under Regulation 8(3) of these Regulations.

9. In exceptional circumstances arising in a particular case, the Senate, on the recommendation of the Faculty Board, may relax any provision of these Regulations.

10. The Examination Regulations approved from time to time by the Council shall apply to all examinations with respect to a degree of Master with the exception of the examination of a thesis which shall be conducted in accordance with the provisions of Regulations 12 to 16 inclusive of these Regulations.

11. The Faculty Board shall consider the results in subjects, the reports of examiners and any other recommendations prescribed in the Schedule and shall decide:
   (a) to recommend to the Council that the candidate be admitted to the degree; or
   (b) in a case where a thesis has been submitted, to permit the candidate to resubmit an amended thesis within twelve months of the date on which the candidate is advised of the result of the first examination or within such longer period of time as the Faculty Board may prescribe; or
   (c) to require the candidate to undertake such further oral, written or practical examinations as the Faculty Board may prescribe; or
   (d) not to recommend that the candidate be admitted to the degree, in which case the candidature shall be terminated.

PART III — PROVISIONS RELATING TO THESES

12. (1) The subject of a thesis shall be approved by the Faculty Board on the recommendation of the Head of the Department in which the candidate is carrying out his research.
   (2) The thesis shall not contain as its main content any work or material which has previously been submitted by the candidate for a degree in any tertiary institution unless the Faculty Board otherwise permits.

13. The candidate shall give to the Secretary to the University three months’ written notice of the date he expects to submit a thesis and such notice shall be accompanied by any prescribed fee.1

14. (1) The candidate shall comply with the following provisions concerning the presentation of a 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 signed by the candidate that the main content of the thesis has not been submitted by the candidate for a degree of any other tertiary institution; and
      (ii) a certificate signed by the supervisor indicating whether the candidate has completed the programme and whether the thesis is of sufficient academic merit to warrant examination; and

1 At present there is no fee payable.
15. 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 and, subject to the provisions of the Copyright Act, 1968 (Com), may issue it in whole or any part in photocopy or microfilm or other copying medium.

16. (1) For each candidate two examiners, at least one of whom shall be an external examiner (being a person who is not a member of the staff of the University) shall be appointed either by the Faculty Board or otherwise as prescribed in the Schedule.

(2) If the examiners' reports are such that the Faculty Board is unable to make any decision pursuant to Regulation 11 of these Regulations, a third examiner shall be appointed either by the Faculty Board or otherwise as prescribed in the Schedule.

SCHEDULE 9 — MASTER OF PSYCHOLOGY (CLINICAL)

1. (1) The Faculty of Science shall be responsible for the course leading to the degree of Master of Psychology (Clinical).

(2) Unless the context or subject matter otherwise indicates or requires, "the Board" means the Board of Studies in Psychology.

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 and shall be responsible for the collation of all written work submitted by candidates in pursuing those programmes.

3. To be eligible for admission to candidature an applicant shall:

(a) have satisfied all the requirements for admission to a degree of bachelor 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.

4. (1) The Board shall consider each application for admission to candidature and shall make a decision thereon.

(2) Before approving an admission to candidature under Section 3(b) of this schedule the Board may require an applicant to complete such work and pass such examinations at honours level as may be prescribed by the Board.

5. To qualify for admission to the degree the candidate shall:

(a) in not less than two years attend such lectures, seminars and tutorials and complete to the satisfaction of the Board such written and practical work and examinations as may be prescribed by the Board; and

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

6. (1) Examiners shall be appointed by the Faculty Board on the recommendation of the Board.

(2) One examiner appointed pursuant to Regulation 16(1) of these Regulations shall be an internal examiner being a member of the staff of the University.

7. Before a decision is made under Regulation 11 of these Regulations the Board shall consider:

(a) the examiners' reports on the thesis; and

(b) a report of the internal examiner made in consultation with the course controller on the candidate's performance in the work prescribed under section 5(a) of this Schedule;

and shall submit these to the Faculty Board together with its recommendation. The Faculty Board shall make its decision in the light of these reports and on the recommendation of the Board.

SCHEDULE 10 — MASTER OF PSYCHOLOGY (EDUCATIONAL)

1. (1) The Faculty of Science shall be responsible for the course leading to the degree of Master of Psychology (Educational).

(2) Unless the context or subject matter otherwise indicates or requires, "the Board" means the Board of Studies in Psychology.

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 and shall be responsible for the collation of all written work submitted by candidates in pursuing those programmes.

3. To be eligible for admission to candidature an applicant 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; and

(b) have satisfactorily completed a Part III Psychology subject or reached a standard in Psychology deemed by the Board to be equivalent; and
To be eligible for admission to candidature in the Faculty of Science an applicant shall:
(a) have satisfied the requirements for admission to the degree of Bachelor of Science of the University of Newcastle or other university approved for this purpose by the Faculty Board; or
(b) have satisfied all the requirements for admission to the degree of Bachelor of Science of the University of Newcastle or other approved university and have completed such work and passed such examinations as the Faculty Board may have determined and have achieved a standard at least equivalent to that required for admission to a degree of bachelor with second class honours in an appropriate subject; 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 in which the applicant proposes to carry out the programme.

To be eligible for admission to candidature in the Faculty of Engineering an applicant shall:
(a) have satisfied the requirements for admission to a degree with honours in the University of Newcastle or other university approved for this purpose by the Faculty Board in the area in which he proposes to carry out his research; OR
(b) have satisfied the requirements for admission to a degree in the University of Newcastle or other university approved for this purpose by the Faculty Board and have completed to the satisfaction of the Faculty Board such work and examinations as determined by the Faculty Board; 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 in which the candidate proposes to carry out his programme.

To qualify for admission to the degree the candidate shall:
(a) in not less than two years, attend such lectures, seminars and tutorials, and complete to the satisfaction of the Board such written and practical work and examinations as may be prescribed by the Board; and
(b) submit a thesis embodying the results of an empirical investigation.

Examiners shall be appointed by the Faculty Board on the recommendation of the Board.

One examiner appointed pursuant to Regulation 16(1) of these Regulations shall be an internal examiner being a member of the staff of the University.

Before a decision is made under Regulation 11 of these Regulations the Board shall consider:
(a) the examiners’ reports on the thesis; and
(b) a report of the internal examiner made in consultation with the course controller on the candidate's performance in the work prescribed under section 5(a) of this Schedule;
and shall submit these to the Faculty Board together with its recommendation. The Faculty Board shall make its decision in the light of these reports and on the recommendation of the Board.

SCHEDULE II — MASTER OF SCIENCE

1. A candidate for the degree of Master of Science may be enrolled in either the Faculty of Engineering or the Faculty of Science. The Faculty in which the candidate is enrolled shall be responsible for the programme.

2. (1) To be eligible for admission to candidature in the Faculty of Science an applicant shall:
(a) have satisfied all the requirements for admission to the degree of Bachelor of Science with honours Class I or Class II of the University of Newcastle or to a degree, approved for this purpose by the Faculty Board, of this or any other university; OR
(b) have satisfied all the requirements for admission to the degree of Bachelor of Science of the University of Newcastle or other approved university and have completed such work and passed such examinations as the Faculty Board may have determined and have achieved a standard at least equivalent to that required for admission to a degree of bachelor with second class honours in an appropriate subject; 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 in which the applicant proposes to carry out the programme.

3. To qualify for admission to the degree a candidate shall complete to the satisfaction of the Faculty Board a programme consisting of:
(a) such work and examinations as may be prescribed by the Faculty Board; and
(b) a thesis embodying the results of an original investigation or design.

4. The programme shall be completed:
(a) in not less than two academic years except that, in the case of a candidate who has completed the requirements for a degree of Bachelor withhonours or a qualification deemed by the Faculty Board to be equivalent or who has had previous research experience, the Faculty Board may reduce this period to not less than one academic year; and
(b) except with the permission of the Faculty Board, in not more than 5 years.

5. (1) Except with the permission of the Faculty Board, which shall be given only in special circumstances, a part-time candidate enrolled in the Faculty of Science shall:
(a) conduct the major proportion of the research or design work in the University; and
(b) take part in research seminars within the Department in which he is carrying out his research.

(2) Except with the permission of the Faculty Board, a candidate enrolled in the Faculty of Engineering shall take part in the research seminars within the Department in which he is carrying out his research.

Combined Degree Courses
Any student contemplating enrolment in a combined degree course under Sections 24–27 of the Requirements for the degree of Bachelor of Science is required to consult the Deans of both Faculties with a view to determining his individual programme.

Sample programmes are shown below for guidance only.

Science/Arts

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

(a)

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

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

Year III  At least one Science Part III subject and to other subjects including an Arts Group I Part II subject if no Arts Group I Part II subject has so far been passed. At the end of Year III students must have passed at least three Arts Group I subjects.

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

(b)

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

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

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

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

Science/Mathematics

 Normally the combined 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 Part 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

A—CIVIL ENGINEERING

Year I

* (CE111) Statics
* (ME111) Graphics and Engineering Drawing
* (GE112) Introduction to Engineering Design
* (ME131) Dynamics
* CE171 Engineering Surveying I
* GE151 Introduction to Materials Science
* ME121 Workshop Practice
* Mathematics I
* Physics IA
* Subjects counted towards Science degree.

Year II

* Mathematics IIA
* Science Part I
* CE212 Mechanics of Solids I
* CE213 Mechanics of Solids II
* CE221 Properties of Materials
* CE222 Materials Technology
* CE231 Fluid Mechanics I
* CE232 Fluid Mechanics II
* CE241 Water Resources Engineering I
* CE2233 Engineering Geology
* Chemistry IS

Year III

* Science Part II
* Science Part II
* EE131 Circuit Fundamentals
* EE211 Energy Conversion
* CE314 Structural Analysis I
* CE315 Structural Design I
* ME301 Engineering Computations

Year IV

* Science Part II
* Science Part III
* CE324 Soil Mechanics
* CE333 Fluid Mechanics III
* CE334 Fluid Mechanics IV
* CE342 Water Resources Engineering II

Year V

* CE351 Civil Engineering Systems I
* CE372 Transportation Engineering
* CE425 Earth and Rock Engineering
* CE452 Engineering Construction
* CE453 Project
* Structures Elective
* Departmental Elective

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B — ELECTRICAL ENGINEERING

Year I
- (ME111) Graphics and Engineering Drawing
- (GE112) Introduction to Engineering Design
- (ME131) Dynamics
- (CE111) Statics
- EE131 Circuit Fundamentals
- ME121 Workshop Practice
- Mathematics I
- Physics IA
- Chemistry IS

Year II
- Mathematics IIA
- EE211 Energy Conversion
- EE221 Semiconductor Devices
- EE232 Electrical Circuits
- EE262 Systematic Programming
- EE264 Introduction to Logic and Assembly Language
- Ph221 Electromagnetics and Quantum Mechanics
- Science Part I

Year III
- Science Part II
- Science Part II
- EE131 Circuit Fundamentals
- ME20 Experimental Methods I
- ME202 Dynamics of Engineering Systems
- ME214 Mechanics of Solids I
- ME241 Properties of Materials I
- ME251 Fluid Mechanics I
- ME271 Thermodynamics I
- ME203 Experimental Methods II

Year IV
- Mathematics IIA
- Science Part I
- MS212 Engineering Design I
- ME223 Engineering Technology
- ME232 Dynamics of Machines I
- EE211 Energy Conversion
- ME301 Engineering Computations
- ME342 Properties of Materials II
- ME343 Mechanics of Solids II
- ME361 Automatic Control

Year V
- Science Part II
- Science Part III
- ME373 Thermodynamics II
- ME352 Fluid Mechanics II
- ME372 Heat Transfer
- ME302 Experimental Methods III

Year V
- ME333 Dynamics of Machines II
- CE315 Structural Design I
- ME481 Engineering Administration
- ME482 Engineering Economics I
- ME496 Project/Seminar
- Electives — 4 units Departmental Technical Electives
- ME312 Engineering Design II
- ME331 Engineering Design III

D — INDUSTRIAL ENGINEERING

Year I to Year III as for Mechanical Engineering

Year IV
- Science Part II
- Science Part III
- ME312 Engineering Design II
- ME313 Engineering Design III
- ME381 Methods Engineering
- ME383 Quality Engineering
- ME333 Dynamics of Machines II

Year V
- ME482 Engineering Economics I
- ME484 Engineering Economics II
- ME487 Operations Research — Deterministic Models
- ME498 Operations Research — Probabilistic Models
- ME496 Project/Seminar
- Electives — 4 units Departmental Technical Electives
- 1 unit Industrial Engineering Elective
Note: The course proposed for Industrial Engineering totals 81 units. If Psychology I is taken as the Science Part I subject in Year II, the Industrial Engineering Elective in Year V can be dropped. This would require the Electives in Year V to be increased to 4 units.

E — CHEMICAL ENGINEERING

Either one of two course patterns is recommended for Chemical Engineering.

(1) Year I
* (CHE141) Industrial Process Principles
* (CHE151) Industrial Chemical Processes and Equipment
* (ME111) Graphics and Engineering Drawing
* (GE151) Introduction to Materials Science
* Mathematics I
* Physics IA
* Chemistry I

Year II
* Chemistry IIA
* Mathematics IIA
* (CHE261) Separation Processes I
* (CHE271) Fuels and Combustion
* (CHE251) Structures and Pressure Vessel Design
* (CHE291) Laboratory
* (CHE272) Fluid Mechanics
* (CHE241) Process Analysis I
* (ME121) Workshop Practice

Year III
* Science Part II
* Science Part III
* Finance Part II
* Finance Part III

Year IV
* Science Part III
* (CHE361) Separation Processes II
* (CHE361) Separation Processes II

Year V
* Science Subject — Part I
* Science Subject — Part II
* Science Subject — Part III

Faculty Policy in Regard to the Granting of Standing for Diploma Courses Completed through the CAE

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

GUIDE TO SUBJECT ENTRIES

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

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

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

Texts are books recommended for purchase.

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 during orientation week (25th to 29th February, 1980, 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
Proteins, carbohydrates, lipids.
Organisation of cells, mitosis.

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

Martin, E. A.
Keeton, V. J.

References

Clarke, R. B.
Panchen, A. L.
Holloway, B. W.
Moroney, M. J.
Parker, R. E.
Rayle, D. & Wedberg, L.
Gardner, E. J.

712100 Biology IIA

Molecular and Cellular Biology

Prerequisites

Biology I

Hours

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

Examination

Two 3-hour papers

Content

Biochemistry

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

Genetics

Statistics

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.
Gardner, E. J.

Goodenough, V.
Giese, A. C.
Metzler, D. E.

Conn, E. E. & Stumpf, P. K.

Statistical Methods in Biology (English U.P. 1964)
Principles of Genetics 5th edn (Wiley 1975)
Genetics 2nd edn (Holt, Rinehart & Winston 1978)
Cell Physiology 4th edn (Saunders 1973)
Outlines of Biochemistry 4th edn (Wiley 1976)
References
McDermott, A. Cytogenetics of Man and Other Animals (Chapman & Hall)
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 Populations

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
Evolutionary 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. Genetic analysis of populations. Factors affecting gene frequencies in populations.

Statistics

The practical classes will present exercises relevant to these fields. Tutorials will deal with biological topics of interest, and provide practice in statistical evaluation of biological data.

Texts
Bailey, N. T. J. Statistical Methods in Biology (English U.P.)
Doyle, W. T. The Biology of Higher Cryptograms (Macmillan)
Gordon, M. S. Animal Physiology: Principles and Adaptation 2nd edn (Macmillan)
Krebs, C. J. Ecology (Harper & Row)
Sutcliffe, J. Plants and Water 2nd edn (Arnold 1977)

References
Baker, D. A. Transport Phenomena in Plants (Chapman & Hall 1978)
Bell, P. & Woodcock, C. The Diversity of Green Plants 2nd edn (Edward Arnold 1971)
Bosma, E. Q. & Wilson, W. H. A Primer in Population Biology (Sinuater)
Clark, L. R. et al. The Ecology of Insect Populations in Theory and Practice (Methuen)
Gordon, M. & Doyle, W. T. Organism and Environment (Freeman)
Krebs, C. J. Evolutionary Ecology (Harper & Row)
Leopold, A. C. & Kriedemann, P. E. Physiology and Biophysics. II. Circulation Respiration and Fluid Balance 26th edn (Saunders 1974)

713100 Biology IIIA
Biology IIIA consists of two units, Developmental Biology, and Molecular and Cellular Processes.

It is possible to substitute a unit from Biology IIB for either of these Biology IIIA units, allowing flexibility of choice of topics.

Biology IIIA, Topic 1

713101 Developmental Biology

Prerequisite
Biology IIA

Hours
4 lecture hours and 8 hours tutorial and laboratory classes per week for 14 weeks

Examination
One 3-hour paper

Content
Animals
Various aspects of development in animals at the molecular and cellular level. Topics include cellular differentiation, control mechanisms and gene expression and genetic regulation.

Plants
Cell and molecular biology of plant development. Hormonal, environmental and genetic control are considered. Topics also included are the development, architecture and nucleic acids of chloroplasts; and the application of cell and molecular biology and genetic engineering to plant improvement.

Texts
Leopold, A. C. & Kriedemann, P. E. Plant Growth and Development (McGraw-Hill 1975)
Zar, J. H. Biostatistical Analysis (Prentice-Hall)
References
Ashworth, J. M.
Balinsky, B. I.
Garrod, D.
Graham, C. F. & Wareing, P. F.
Hall, J. L. et al.
Salisbury, F. B. & Ross, C. W.
Smith, H. (ed.)

Cell Differentiation (Chapman & Hall 1974)
An Introduction to Embryology 4th edn (Saunders)
Cellular Development (Chapman & Hall 1974)
The Developmental Biology of Plants and Animals
(Blackwell 1976)
Plant Cell Structure and Metabolism (Longman 1974)
Plant Physiology 2nd edn (Wadsworth 1978)
The Molecular Biology of Plant Cells (Blackwell 1977)

Biology IIIA, Topic 2

713102 Molecular and Cellular Processes

Prerequisites
Biology IIA

Hours
4 lecture hours and 8 hours tutorial and laboratory classes per week for 14 weeks

Examination
One 3-hour paper

Content
Hormones, Blood and Digestion
Biochemical and cellular aspects of mammalian hormones will be considered together with their role in homeostasis. The biochemistry of blood and the digestion and absorption of foodstuffs will also be major topics for consideration.

Immunology
Molecular and cellular aspects. Emphasis will be on understanding at a molecular level both cellular and humoral immunity.

Texts
Cunningham, A. J.
Zar, J. H.

Understanding Immunology (Academic Press 1978)
Biostatistical Analysis (Prentice-Hall)

References
Bellanti, J. A.
Gordon, B. I.
Hobart, M. J. & McConnell, I.
Martin, C. R.
White, A. et al.
Metzler, D. E.

713200 Biology IIIB

Biology IIIB consists of two units, Environmental Physiology, and Community Analysis and Quantitative Genetics.

It is possible to substitute a unit from Biology IIIA for either of these Biology IIIB units, allowing flexibility of choice of topics.

Biology IIB, Topic 3

713201 Environmental Physiology

Prerequisites
Biology IIA or IIB

Hours
4 lecture hours and 8 hours tutorial and laboratory classes per week for 14 weeks

Examination
One 3-hour paper

Content
Plants
Interrelationships between the environment and the operation of key physiological processes including photosynthesis, mineral ion acquisition and assimilate transfer.

Animals
Biology of reproduction in vertebrates with particular emphasis on adaptations to the environment.

Texts
Baker, D. A.
Milthorpe, F. L. & Moorby, J.
Naibandov, A. V.

Transport Phenomena in Plants (Chapman & Hall 1978)
Reproductive Physiology 3rd edn (Freeman 1976)

References
Austin, C. R. & Short, R. V.
Bloom, W. & Fawcett
Evans, L. T.
Leopold, A. C. & Kriessmann, P. E.
Torrey, T. W. & Feduccia, A.

713202 Community Analysis and Quantitative Genetics

Prerequisites
Biology IIA or IIB

Hours
4 lecture hours and 8 hours tutorial and laboratory classes per week for 14 weeks

Examination
One 3-hour paper

Content
Community Analysis
Structure and dynamics of biological communities.

Quantitative Genetics
Chemistry I

**Prerequisites**
Nil

**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 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**
- Atkins, P. W.
- Cotton, F. A. & Wilkinson, G.
- Geissman, T. A.
- Shriner, R. L. et al.
- Physical Chemistry (Oxford 1978)
- Advanced Inorganic Chemistry 3rd edn (Interscience 1972)
- Principles of Organic Chemistry 4th edn (Freeman 1977)
- The Systematic Identification of Organic Compounds 5th edn (Wiley 1964)

Chemistry IIA

**Prerequisite**
Chemistry I

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

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

**Examination**
A student may satisfy the examiners: EITHER by achieving an overall satisfactory performance in the two progressive examinations (Papers 1 & 2). OR by achieving an overall satisfactory performance in the two final papers scheduled for the November examination period (Papers 3 & 4). Students who attempt both sets of examinations will be credited with the higher of the two results. All papers are of 3-hours duration. The 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**
- Aylward, G. H. & Findlay, T. J. V.
- Hart, H. & Schuetz, R. D.
- Brown, T. L. & LeMay, H. E.
- S.I. Chemical Data 2nd edn (Wiley 1974)
- Chemistry — The Central Science (Prentice-Hall 1977) including Students Guide by J. C. Hill

Biology IV

**Prerequisite**
Nil

**Examination**
To be advised
Also advisable, particularly if proceeding to Chemistry IIA.

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

**Shoemaker, D. P. & Garland, C. W.**

### 722300 Chemistry IIB

<table>
<thead>
<tr>
<th><strong>Prerequisites</strong></th>
<th>Chemistry I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corequisites</strong></td>
<td>Chemistry IIA (advisory)</td>
</tr>
<tr>
<td><strong>Hours</strong></td>
<td>3 lecture hours and 6 laboratory hours per week. The subject comprises 7 units of which the student must attempt 6. Each unit consists of approximately 10 lectures, 4 tutorials and associated laboratory or other support activities.</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>One hour examination for each unit. The laboratory mark counts 20% towards the final grading.</td>
</tr>
</tbody>
</table>

**Content**
Each student’s 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; radio-chemistry; chemistry in industrial processes; polymers. In the industrial processes unit, attendance on factory excursions is compulsory.

**Texts**
To be advised

### CHEMISTRY — PART III SUBJECTS

<table>
<thead>
<tr>
<th><strong>Prerequisites</strong></th>
<th>A pass in Chemistry IIA is a prerequisite for entry into Chemistry IIB; Chemistry IIA is a pre- or corequisite for Chemistry IIB; Mathematics I.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hours</strong></td>
<td>The Chemistry Department offers two Part III subjects, each involving ninety hours of lectures. Associated with each subject are 8 hours per week of laboratory work.</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>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. The laboratory mark counts 25% towards the final grading.</td>
</tr>
</tbody>
</table>

**Content**
Each student enrolling in Chemistry IIB must select nine topics from the list provided by the Department. Likewise, students enrolling in Chemistry IIC must nominate nine topics from the IIB listing. All proposed programmes must be approved by the Head of Department (or his nominee) before the start of the academic year.

**Texts**
To be advised: see departmental topic summaries.

### 724100 Chemistry IV

<table>
<thead>
<tr>
<th><strong>Prerequisites</strong></th>
<th>Completion of ordinary degree requirements and permission of Head of Department.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hours</strong></td>
<td>To be advised</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Content**
A subject extending over one full-time academic year or its equivalent comprising:
(i) a minimum of 50 hours of lectures and tutorials, and a course of directed reading;
(ii) a supervised research project, the results of which are to be embodied in a thesis and presented at a seminar.

The lecture and tutorial course will be assessed progressively, whereas the directed reading course will be examined by two papers, each of three hours duration.

Assessment of the grade of Honours to be awarded will be based on the standard achieved in the formal courses; the quality of the research project and thesis; and performance in the undergraduate programme.

**Texts**
To be advised

### DEPARTMENT OF GEOLOGY

#### 731100 Geology I

<table>
<thead>
<tr>
<th><strong>Prerequisite</strong></th>
<th>Nil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hours</strong></td>
<td>3 lecture hours and 2½ laboratory hours per week and 2 days field work</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>Two 3-hour papers, class assignments and practical examinations</td>
</tr>
</tbody>
</table>

**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. 
EITHER 
Press, F., & Siever, R. OR
Sawkins, F. J. et al. 
EITHER 
Read, H. H. OR 
Mason, B. & Berry, L. G. 
Uyeda, S.

732200 Geology IIA
Prerequisite 
Geology I

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

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

Content

Mineralogy
Crystallography and 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 and sedimentary rocks.

Stratigraphy and Palaeontology
Stratigraphy of Australia; invertebrate palaeontology.

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

Texts
Bishop, A. C. Brown, D. A. et al. 
Deer, W. A. et al. 
EITHER 
Hatch, F. H. et al. OR 
Noel,coolds, S. R. et al. OR 
Hobbs, B. E. et al. OR 
Moore, R. C. et al.

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

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.

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.

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.

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

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

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.

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

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

Texts
Francis, P. 
Till, R. 
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

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.

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.

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.

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

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

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.

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

Content

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

Sedimentology
Petogenesis 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, geotectonics and tectonophysics; aerial 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, genesis, 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
Stanton, R. L. Ore Petrology (McGraw-Hill 1972)
EITHER Winkler, H. J. F. Petrogenesis of Metamorphic Rocks 4th edn (Springer Verlag 1976)
OR Mason, R. Petrology of the Metamorphic Rocks (Allen & Unwin 1978)

For others, consult lecturers concerned.

733200 Geology III B

Prerequisites Geology I & II A
Corequisite Geology III A
Hours 4 lecture hours and 4 laboratory hours per week and 12 days field work
Examination Two 3-hour papers, class assignments and practical examinations

734100 Geology IV

Prerequisites Geology III A, 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; geochemistry; 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 of laboratory and tutorial work per week.

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

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

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

Texts
Halliday, D. & Resnick, R. Physics (3rd combined edn) (Wiley 1977)

741300 Physics IB

Prerequisite Nil

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

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

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

Texts Refer to Physics Dept. notice board.

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 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
Malnstadt, 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.
Advisory Co-requisite

While Mathematics II is not an essential co-requisite for Physics II, 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 B and one of the Topics D, F, and H.

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

Texts

Refer to the Physics Department notice board.

743100 Physics IIIA

Prerequisites

Physics II, at least one Mathematics II subject which should include, in addition to Topic CO (which counts as two topics), topic B and one of the topics D, F and H.

Hours

Approximately 120 lecture hours and 240 laboratory and tutorial hours.

Examination

Assessment to the equivalent of 10 hours 25 minutes of examination time.

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.

743200 Physics IIIIB

This subject will not be offered in 1980.

Corequisite

Physics IIIA

Hours

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

Examination

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

Content

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

The Physics lecture course will treat the following topics:

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

Texts

Refer to the Physics Department notice board.

744100 Physics IV

Prerequisite

Physics IIIA

Hours

100 lecture hours and, in addition, a research project

Examination

Assessment will be on the basis of one 45 minute formal examination question per 5 hours of lectures. Individual lecturers may choose to assess, in part, by other means, e.g. essays, problems, etc. Occasionally, where appropriate, there may be an open book examination. In addition the research project is evaluated and normally an oral examination is conducted.

Content

Physics IV is intended to give students an advanced understanding of the fundamentals of modern physics appropriate for an Honours graduate in the discipline as well as an exposure to the current interests of the Department...
viz. solid state theory, surface physics, geophysics, biophysics and aspects of applied physics.

In seeking to achieve these aims the subject is divided into two parts, a compulsory core of fundamental principles and a group of optional topics, reflecting the specific interests of staff members. The details are as follows:

**Compulsory part — Fundamental Principles**

- Quantum Mechanics (15 lectures)
- Interaction of Radiation with Matter
- Statistical Physics
- Relativity

**Elective part — Special Interests**

- Applied Nuclear Physics (10 lectures)
- Surface Physics
- Biophysics
- World Energy Resources
- Principles of Magnetic Resonance
- Radio Astronomy
- High speed processes
- Fourier transforms and physical applications
- Advanced Electromagnetic Theory
- Time Domain Measurement

*** Not all topics will necessarily be offered in any one year.

**Research Project**

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

**Texts**

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

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**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, statistical analysis of data, human information processing, and humanistic psychology.

**Texts**

To be advised

### 752100 Psychology II A

**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, mathematical models, cognition, motivation, and animal behaviour. Statistical methods will be taught and tested during the year.

**Texts**

To be advised

### 752200 Psychology II B

**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 psychobiology, drugs and behaviour, clinical neuropsychology, personality, social psychology, abnormal psychology, child development and test construction. 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, genetic constraints on learning, human information processing, physiological psychology, animal communication, statistical analysis, experimental method, consciousness, social psychology, vision and perceptual development.

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 IIIB

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

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

Content
Such topics as social psychology, psychopathology development, and neuropsychology, quantitative psychology, cross-cultural psychology, abnormal psychology, ethology, statistics, non-verbal behaviour, ergonomics and human factors. 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 a Pass at or above Credit level in Psychology IIIA or IIIB, as well as a Pass at any level in both Psychology IIA and IIB, and permission of the Head of Department.

Hours  To be advised

Examination  Assessment of thesis and essay. Seminar material may be examined either by assignment during the year or by examination at the end of the year.

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

664200 Psychology/Mathematics IV

Prerequisites  Mathematics IIIA & Psychology IIIC

Hours  To be advised

Examination  To be advised

Content
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).

(i)  Psychological Measurement — J. A. Keats

Prerequisites  Nil

Hours  1½ hours per week

Examination  To be advised

Content
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.

Text  Nil

References
Atkinson, R. C. (ed.)  Studies in Mathematical Psychology (Stanford U.P. 1964)
Campbell, N. R.  Foundations of Science: The Philosophy of Theory and Experiment (Dover 1957)
Coombs, C. H.  A Theory of Data (Wiley 1964)
Lord, F. M. & Novick, M. R.  Statistical Theories of Mental Test Scores (Addison-Wesley 1968)
Ross, S.  Logical Foundations of Psychological Measurements (Aarhus Stiftsbogtrykkerie A-S 1964)
Torgerson, W. S.  Theory and Methods of Scaling (Wiley 1958)
Mathematical Models in Perception and Learning — R. A. Heath

Prerequisites
Part II Mathematics Topic H recommended

Hours
1½ hours per week

Examination
To be advised

Content
An introduction to the application of stochastic process models to the analysis of psychological processes involved in perception and learning. Use of a real-time computer.

Text
Nil

References
Cox, D. R. & Miller, H. D. The Theory of Stochastic Processes (Methuen 1965)
Laming, D. Mathematical Psychology (Academic 1973)

Master of Psychology (Clinical)

The course leading to the degree of Master of Psychology (Clinical) is offered in the Faculty of Science.

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

It is considered highly desirable, if not essential, that candidates for this degree be concurrently employed in a position related to the practice of Clinical Psychology.

Hours
The course is a part-time course extending over 2 years. There are 8 hours of classwork per week plus a clinical internship organised either as two full days per week or an equivalent period of time in longer blocks.

Examination
Assessment is continuous and is achieved by:
1. Evaluation of practical performance by academic and field supervisors.
2. Evaluation of written or other exercises required in specific course components.
3. Evaluation of case presentation with viva voce defense to an interrogation panel.
4. Internal and external examination of research thesis.

Content
There are three major sections of the course:

(i) Classwork includes both didactic and practical components and covers topics such as: Professional Practice and Forensic Psychology; Psychopathology; Psychological Assessment and Clinical Decision Making; Therapy; Preventative Psychology; Programme Development; Clinical Child Psychology; Psychotropic Drugs.

In the second year of the course a limited degree of specialization is offered in the following areas: Clinical Neuropsychology; Clinical Child Psychology; Psychosomatic Psychology; Counselling.

(ii) Clinical internship provides 2 days per week (or equivalent blocks) supervised clinical experience in professional settings outside that of the candidates' regular employment. It is intended to augment and consolidate instruction provided in classwork. A wide range of institutions and agencies are available for internship placements.

(iii) A Research Thesis is required embodying the results of a research investigation in an approved area.

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 formal 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.

Texts

References To be advised

Part II Subjects

The Geography Department offers three Part II subjects each comprising three topics chosen from the list below.

Students selecting two or more topics from Topics A-D to make up a subject must nominate that subject Geography IIA; those selecting Topics E and F for one subject must nominate that subject Geography IIB. Those selecting Topics G and H for one subject must nominate that subject Geography IIC.

LIST OF TOPICS FOR PART II GEOGRAPHY

<table>
<thead>
<tr>
<th>Topic Corequisite</th>
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</thead>
<tbody>
<tr>
<td>A Economic Geography</td>
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<tr>
<td>B* Historical and political geography</td>
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<tr>
<td>C Urban social geography</td>
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<tr>
<td>D Development geography</td>
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<tr>
<td>E Climatology</td>
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<tr>
<td>F Geomorphology</td>
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<tr>
<td>G Monsoon Asia I (Eastern)</td>
</tr>
<tr>
<td>H Monsoon Asia II (Southern and Southeastern) G</td>
</tr>
<tr>
<td>I Geographic data processing</td>
</tr>
<tr>
<td>J* Australia</td>
</tr>
<tr>
<td>K Map and fieldwork skills for teachers of geography</td>
</tr>
</tbody>
</table>

* Not offered in 1980.

352100 Geography IIA

Prerequisite Geography I

Hours Six hours per week of lectures, practical classes and tutorials. Each topic may require up to 3 days fieldwork or its equivalent per year

Examination To be advised

Content Three topics selected from the list above and not included in Geography IIB or IIC.

352200 Geography IIB

Prerequisite Geography I

Hours Six hours per week of lectures, practical classes and tutorials. Each topic may require up to 3 days fieldwork or its equivalent per year

Examination To be advised

Content Three topics selected from the list above and not included in Geography IIA or IIC.

352300 Geography IIC

Prerequisite Geography I

Hours Six hours per week of lectures, practical classes and tutorials. Each topic may require up to 3 days fieldwork or its equivalent per year

Examination To be advised

Content Three topics selected from the list above and not included in Geography IIA or IIB.

Part II Topics

352101 Topic A — Economic Geography — M. R. Hall

Content An introduction to the methods and concepts of economic geography. The 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 regions.

Text Nil
352103 Topic C — Urban Social Geography — D. N. Parkes

Content
An introduction to the study of the spatial characteristics of cities. Emphasis is placed on the structures, patterns and processes which contribute to the geography of socio-demographic and behavioural components of cities in industrial societies. Lectures cover the following components: (1) An overview of the urban condition; (2) the study of urban geography; (3) urbanisation; aspects of adaptive social systems; (4) settlement systems and urban growth: an Australian emphasis; (5) classical and neo-classical urban ecology; (7) critical pivotal spaces in the city; (8) (a) classical social area analysis, (b) introduction to factorial ecology, (c) neighbourhood and community, (d) ecological aspects of cities (Asia and South America); (9) urban image studies: a basis for the study of urban spatial behaviour; (10) residential mobility; (11) human activity analysis and travel behaviour principles.

Text
Nil

352104 Topic D — Development Geography — W. A. Jonas

Content
An examination of a number of theories and models which have been put forward to explain why 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 so-called advanced and less developed countries.

Text
Nil

352201 Topic E — Climatology — H. A. Bridgman, G. N. McIntyre

Content
A study of processes and patterns in man’s physical environment. The course examines the behaviour of the atmosphere, including its interaction with the earth’s surface over wide ranges of scale in space and time.

Text

352202 Topic F — Geomorphology — R. W. Kidd, R. J. Loughran

Content
Geomorphic processes and problems of historical geomorphology.

Text
Rice, R. J. Fundamentals of Geomorphology (Longman 1977, paper)

352301 Topic G — Monsoon Asia I — P. G. Irwin

Content
A study of the broad patterns of the physical and human geography of Monsoon Asia with particular reference to China and Japan.

Text
Nil

352302 Topic H — Monsoon Asia II — R. E. Barnard, K. W. Robinson

Content
A study of the broad patterns of the physical and human geography of Monsoon Asia with particular reference to South and Southeast Asia.

Text
Nil

352303 Topic I — Geographic Data Processing — R. W. Kidd, G. N. McIntyre

Content
Elementary Fortran computer programming skills developed during first term are drawn upon subsequently to examine contemporary statistical and manipulative techniques used in analysis of geographic data. This topic is recommended strongly to all students intending to proceed to Honours.

Text
To be advised

352106 Topic K — Map and fieldwork skills for teachers of Geography — J. C. R. Camm, P. G. Irwin

Content
With the aim of developing cartographic, statistical and fieldwork skills for the teaching of geography in secondary schools, the following areas of study are covered: (1) topographic map reading and interpretation; (2) small scale maps, map projections and atlases; (3) thematic mapping; (4) annotated sketch maps and diagrams; (5) photographic interpretation; (6) synoptic charts; (7) application of statistics; (8) fieldwork techniques; (9) regional geography; (10) geography in the local region. Special importance is placed on (8) and (9).
The programme includes ten hours of school-based observations. Students holding Teacher Education Scholarships awarded by the N.S.W. Department of Education are advised that this is an approved education-oriented study. Students undertaking this topic qualify for the higher rate of scholarship awarded to 2nd year scholarship holders who undertake such studies.

Part III Subjects

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

LIST OF TOPICS FOR PART III GEOGRAPHY

<table>
<thead>
<tr>
<th>Topic</th>
<th>Content</th>
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</thead>
<tbody>
<tr>
<td>L</td>
<td>Advanced climatology</td>
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<tr>
<td>M</td>
<td>Advanced geomorphology</td>
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<tr>
<td>N*</td>
<td>Genetic geomorphology</td>
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<tr>
<td>O</td>
<td>Biogeography</td>
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<tr>
<td>P</td>
<td>Advanced economic geography</td>
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<tr>
<td>Q</td>
<td>Advanced urban geography</td>
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<tr>
<td>R</td>
<td>Historical geography</td>
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<tr>
<td>S*</td>
<td>Political geography</td>
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<tr>
<td>T</td>
<td>Southeast Asia</td>
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<tr>
<td>U*</td>
<td>East Asia</td>
</tr>
<tr>
<td>V</td>
<td>Explanation in geography</td>
</tr>
<tr>
<td>W</td>
<td>Geographical techniques</td>
</tr>
</tbody>
</table>

* Not offered in 1980.

353100 Geography IIIA

Prerequisite: Geography IIA, IIB or IIC

Hours: Six hours per week of lectures, practical classes and tutorials. Each topic may require up to 3 days of fieldwork or its equivalent per year.

Examination: To be advised

Content: Three topics selected from the list above and not included in Geography IIIA.

353200 Geography IIIB

Prerequisites: Geography IIA, IIB or IIC

Hours: Six hours per week of lectures, practical classes and tutorials. Each topic may require up to 3 days of fieldwork or its equivalent per year.

Examination: To be advised

Content: Three topics selected from the list above and not included in Geography IIIA.

Part III Topics

353202 Topic L — Advanced Climatology — H. A. Bridgman, G. N. McIntyre

Content: Processes in agricultural climatology. Meso- and macro-scale pollution problems and trends, and their relation to climatic change.


353203 Topic M — Advanced Geomorphology — R. W. Kidd, R. J. Loughran

Content: Sediment and solutes in the drainage basin system. Processes and landforms of the coastal zone.


353204 Topic O — Biogeography — J. C. Turner

Content: Study of some basic concepts in biogeography; an introduction to ecology with emphasis on man as an inseparable part of nature; approaches towards ecological harmony between man and the rest of nature.

Texts: The forest and the sea (Vintage paperback 1960)

353205 Topic P — Advanced Economic Geography — W. A. Jonas

Content: The main topic areas studied are agricultural location theory, transportation networks and impact studies, markets and marketing, and underdevelopment.

Text: To be advised
353206  Topic Q — Advanced Urban Geography — D. N. Parkes


Text  To be advised

353207  Topic R — Historical Geography — J. C. R. Camm

Content  An investigation and interpretation of some of the main themes in Australian development, including rural settlement, attitudes to and appraisals of the natural environment, urbanisation, and transport and industrialisation from the beginning of settlement to 1914.

Text  Nil

353209  Topic T — Southeast Asia — R. E. Barnard

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 relationship between the modern and traditional sectors of Southeast Asia's economy are particularly emphasised.

Text  Nil

353211  Topic V — Explanation in Geography — M. R. Hall

Content  The course emphasises the study of primary sources. It consists of two basic sections: (i) Knowing the world: identification of the relevant tools for interpretation; (ii) the known world: study of the development of geography through the history of cartography and the study of sample texts for the mid 19th century and the period since 1960.


Text  Baumer, F. L. Modern European Thought: Continuity and Change in Ideas, 1600-1930 (Macmillan 1977)


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

Text  Nil

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
Examination  To be advised

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

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

Note: A candidate who wishes to proceed to Honours should notify the Head of Department by the commencement of Third Term 1980, and must confirm this as soon as final results for the year are known. Candidates are expected to commence work on their theses early in the new year.

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, III, IIC and Statistics III there is some choice available to students; for Mathematics IIIA and IIIB there is a wider choice. No topic may be counted twice in making up distinct subjects. (Students who passed some mathematics subjects before this arrangement of subjects was introduced should consult the "transition arrangements" set out on p.155 of the 1970 Faculty of Arts handbook, and p.76 of the 1973 Faculty of Mathematics handbook. Note that the "code letters" for the topics may vary slightly from year to year.)
The subject Computer Science II is taught and examined jointly by the Departments of Electrical Engineering and Mathematics. There is no choice of topics.

Students should take particular note of Clause 13(2)(b) of the 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. 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.

661100 Mathematics I

**Part 1 Subject**

**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 1 Topics**

**Algebra (Topic AL) — R. B. Eggleton**

**Prerequisites**
Nil

**Hours**
1 lecture hour and ½ tutorial hour per week

**Content**

**Text**
Anton, H. *Elementary Linear Algebra* 2nd edn (Wiley 1977)

**References**

- Brisley, W.
- Kolman, B.
- Liebeck, H.
- Lipschutz, S.
- Trotter, M. A.

**Real Analysis (Topic AN) — J. G. Couper**

**Prerequisites**
Nil

**Hours**
1 lecture hour and ½ tutorial hour per week

**Content**

**Text**

- Apostol, T.
- Spivak, M.

**Calculus (Topic CA) — W. P. Wood**

**Prerequisites**
Nil

**Hours**
1 lecture hour and ½ tutorial hour per week

**Content**

**Text**
Ayres, F. *Calculus* (Schaum 1974)

**References**

- Apostol, T.
- Hille, E. & Saks, S.
- Kaplan, W. & Lewis, D. J.
- Spivak, H.

- *Calculus* Vol. I 2nd edn (Blaisdell 1967)
- *First Year Calculus* Internat. Textbook Series (Blaisdell 1968)
- *Calculus* (Benjamin 1967)
Statistics and Computing (Topic SC) — A. J. Dobson

**Prerequisites**
Nil

**Hours**
1 lecture hour and ½ tutorial hour per week

**Content**

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 MIDITRAN (Computer Systems of Aust. 1969)

**References**
Conte, S. D. & de Boor, C. Elementary Numerical Analysis (McGraw-Hill 1972)
Hoel, P. G. Introduction to Mathematical Statistics (Wiley 1971)

**Part II Subjects**
The Department offers three Part II Mathematics subjects and Computer Science II. Students whose course restricts them to one such subject must study Mathematics IIA or Mathematics IIB or Computer Science II. The subject Mathematics IIA is a pre- or corequisite for Mathematics IIC, and IIA and IIB together a prerequisite for any Part III subject, so students wishing to take two Part II subjects would normally choose Mathematics IIA and IIB. 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.

When selecting topics for Part II subjects, students are advised to consider the prerequisites needed for the various Part III subjects offered by the Department of Mathematics (Mathematics IIIA, Mathematics IIIIB and Statistics III).

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**LIST OF MATHEMATICS PART II TOPICS**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Corequisite or Prerequisite Topic</th>
<th>Part III Topic Requiring this Part II Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Mathematical Models</td>
<td>CO</td>
<td>Q</td>
</tr>
<tr>
<td>B Complex Analysis</td>
<td>CO</td>
<td>M, N, P, PD, Q, S, TC, Y, Z</td>
</tr>
<tr>
<td>CO Vector Calculus &amp; Differential Equations</td>
<td></td>
<td>TC, Y, Z</td>
</tr>
<tr>
<td>D Linear Algebra</td>
<td></td>
<td>T, X, Z</td>
</tr>
<tr>
<td>F Numerical Analysis &amp; Computing</td>
<td></td>
<td>PL, TC</td>
</tr>
<tr>
<td>G Finite Mathematics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H Probability &amp; Statistics</td>
<td></td>
<td>R, U, Y</td>
</tr>
<tr>
<td>I Applied Statistics</td>
<td></td>
<td>U</td>
</tr>
<tr>
<td>J Topic in Applied Mathematics</td>
<td>CO</td>
<td></td>
</tr>
<tr>
<td>e.g. Mechanics, Potential Theory and Fluid Dynamics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K Topics in Pure Mathematics</td>
<td></td>
<td>FM, O, T, X</td>
</tr>
<tr>
<td>e.g. Group Theory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Analysis of Metric Spaces</td>
<td></td>
<td>FM, O, P, V, W</td>
</tr>
<tr>
<td>ML Introduction to Logic and Assembly Languages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI Introduction To Structuring of Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP Systematic Programming</td>
<td></td>
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</tr>
</tbody>
</table>

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

**662100 Mathematics IIA**

**Prerequisite** Mathematics I

**Hours** 4 lecture hours and 2 tutorial hours per week

**Examination** Each topic is examined separately

**Content**
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.

In addition, students taking Mathematics IIA will be required to prepare a report on some aspect of the history of the mathematics studied in this subject.

**662200 Mathematics IIB**

**Prerequisite** Mathematics I

**Hours** 4 lecture hours and 2 tutorial hours per week

**Examination** Each topic is examined separately

**Content**
Four topics chosen from A to H, 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.
662300 Mathematics IIC

Prerequisite
Mathematics I

Pre- or Corequisite
Mathematics IIA

Hours
4 lecture hours and 2 tutorial hours per week

Examination
Each topic is examined separately

Content
Topics H, K, L and one of the topics A, F, G, I, J. Students who may wish
to proceed to Statistics III as a Part III subject should select topic I.

662400 Computer Science II

Prerequisite
Mathematics I

Hours
168 hours of lectures, tutorials and practical
work as listed below

Examination
See component descriptions below

Content
Topics SI — Introduction to Structuring of Information
SP — Systematic Programming
ML — Introduction to Logic and Assembly Languages
F — Numerical Analysis and Computing

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 I 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 course includes Physics IIIA are advised to include topics CO, Band one of D,
F and H in their Part II Mathematics subject/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 1978 are no longer offered as separate topics.

Texts for Part II Topics

662101 Topic A — Mathematical Models
Nil

662102 Topic B — Complex Analysis
Spiegel, M. R. Theory and Problems of Complex Variables
(McGraw-Hill 1964)

662109 Topic CO — Vector Calculus and Differential Equations
Either
Kreyszig, E. Advanced Engineering Mathematics 4th edn
or
Greenberg, M. D. Foundations of Applied Mathematics (Prentice-Hall
1978)

662104 Topic D — Linear Algebra
Lipschutz, S. Linear Algebra (Schaum 1974)
Rorres, C. & Anton, H. Applications of Linear Algebra (Wiley 1977 or 2nd edn
1979)

662202 Topic F — Numerical Analysis and Computing

662203 Topic G — Finite Mathematics
Goodman, A. W. & Ratti, J. S. Finite Mathematics with Applications 3rd edn
(Macmillan 1979)

662204 Topic H — Probability and Statistics
Freund, J. E. Mathematical Statistics 2nd edn (Prentice-Hall 1971)
or
Hoel, P. G. Introduction to Mathematical Statistics 4th edn
(Wiley 1971)
or
Mendenhall, W. & Schaeffer, R. L. Mathematical Statistics with Applications (Duxbury
1973)

662301 Topic I — Applied Statistics
Freund, J. E. Mathematical Statistics 2nd edn (Prentice-Hall 1971)
or
Hoel, P. G. Introduction to Mathematical Statistics 4th edn
(Wiley 1971)

662302 Topic J — Topic in Applied Mathematics
e.g. Mechanics, Potential Theory and Fluid Dynamics
Nil

662303 Topic K — Topic in Pure Mathematics
e.g. Group Theory
Nil

662304 Topic L — Analysis of Metric Spaces
Giles, J. R. Analysis of Metric Spaces (University of Newcastle
1974)
Part III Subjects

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

Pases in both Mathematics IIA and IIC are prerequisite for entry to Mathematics IIIA. It will be assumed that students taking a Part III subject in 1980 have already studied topics CO, D, K and L in 1978 or 1979 (or C, D, E, K and L if done prior to 1978) in their Part II subjects.

Students wishing to enrol in Statistics III should avoid taking topics R, U and Y as Mathematics IIIA topics.

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>
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</thead>
<tbody>
<tr>
<td>FM</td>
<td>K, L</td>
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<tr>
<td>M</td>
<td>CO</td>
</tr>
<tr>
<td>N</td>
<td>CO</td>
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<tr>
<td>O</td>
<td>K, L</td>
</tr>
<tr>
<td>P</td>
<td>CO, D, L</td>
</tr>
<tr>
<td>PD</td>
<td>CO</td>
</tr>
<tr>
<td>PL</td>
<td>F</td>
</tr>
<tr>
<td>Q</td>
<td>B, CO</td>
</tr>
<tr>
<td>R</td>
<td>H</td>
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<tr>
<td>S</td>
<td>CO</td>
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<tr>
<td>ST</td>
<td>H</td>
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<tr>
<td>T</td>
<td>D, K</td>
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<tr>
<td>TC</td>
<td>CO, F</td>
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<td>U</td>
<td>H</td>
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<td>V</td>
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<td>W</td>
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<tr>
<td>X</td>
<td>D, K</td>
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<tr>
<td>Y</td>
<td>CO, H</td>
</tr>
<tr>
<td>Z</td>
<td>CO, D</td>
</tr>
</tbody>
</table>

* If demand is insufficient, some topics may not be offered in any one year. The selection rules and definitions of the Part III subjects follow.

663100 Mathematics IIIA

Prerequisites: Mathematics IIA & IIC

Hours: 4 lecture hours and 2 tutorial hours per week

Examination: Each topic is examined separately

Content: A subject comprising four topics, which must include O 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 IIIB

Pre- or Corequisite: Mathematics IIIA

Hours: 4 lecture hours and 2 tutorial hours per week

Examination: Each topic is examined separately

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

663300 Statistics III

Prerequisites: Mathematics IIA & IIC (including topic I)

Hours: 4 lecture hours and 2 tutorial hours per week

Examination: Each topic is examined separately

Content: A subject comprising four topics: Topics R, U, Y and one other Part III Mathematics topic. (Topic ST is particularly recommended). Before selecting a particular topic as the optional fourth topic in Statistics III, students should seek advice from a lecturer giving one of the compulsory topics, or from the Head of the Department.

Notes:
1. In order to take both Mathematics IIIA and Mathematics IIIB, 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

Enderton, H. B. Elements of Set Theory (Academic 1977)
663101 Topic M — General Tensors
Nil

663102 Topic N — Variational Methods
Nil

663103 Topic O — Mathematical Logic
Mendelson, E. *Introduction to Mathematical Logic* 2nd edn (Van Nostrand 1979) paperback

663104 Topic P — Ordinary Differential Equations

663108 Topic PD — Partial Differential Equations
Nil

663121 Topic PI. — Programming Languages and Systems
Nil

663105 Topic Q — Quantum, Relativistic, Statistical and Fluid Mechanics
Nil

663106 Topic R — Theory of Statistics
Nil

663107 Topic S — Geometry
Nil

663129 Topic ST — Stochastic Processes
Feller, W. *An Introduction to Probability Theory and its Applications* (Wiley)

663201 Topic T — Group Theory
Nil

663209 Topic TC — Theory of Computing
Nil

663202 Topic U — Design and Analysis of Experiments
Nil

663203 Topic V — Measure Theory and Integration
Bartle, R. G. *The Elements of Integration* (Wiley 1966)

663204 Topic W — Analysis of Normed Linear Spaces
Giles, J. R. *Analysis of Normed Linear Spaces* (University of Newcastle 1976)

663205 Topic X — Rings and Fields
Nil

663206 Topic Y — Theory of Probability
Nil

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 IIIA and at least one of Mathematics IIIB, Computer Science III or Statistics III, 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.

Content
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*.

A selection of topics, each of about 27 lectures, will be offered. Summaries of topics which may be offered in 1980 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

Current experiments in the field of mammalian reproduction involve assessing the interactions between spermatozoa and ova during fertilization in the rat and mouse and also the induced fusion of human spermatozoa with rodent ova.

The differentiation of the cleaving mouse embryo is also being studied along with the influence of uterine fluids on the activation of the embryo at the time of implantation.

The biology of spermatozoa and comparative structure and function of the vertebrate epididymis.

Current research efforts are directed at the isolation and characterization of uterine alkaline phosphatase. Elucidation of the mode of regulation and the functional significance of the enzyme during early pregnancy are prime objectives of the research.

Cell-free system analyses of the translational efficiencies of various uterine messenger RNA molecules are currently being developed in order to increase our understanding of biochemical and molecular events occurring in the uterus during implantation of the conceptus.

Foetotoxic effects of cadmium are also being studied during early pregnancy to determine the site of action of the cation in the foeto-placental complex.

Within the field of immunological influences on fertility, the following topics are currently under investigation: the radioimmunoassay of antibodies to LDH-X in sera from infertile and vasectomized men; the detection of antispermatozoal antibodies; the isolation and characterization of human spermatozoal auto- and iso-antigens.

The correlation between HLA antigens and hepatitis B virus carrier status is being studied.

In a study on a hypothesis on the initiation of cancer, histones HI are being compared in chromatin from normal and malignant cells.

Investigation into infertility in humans resulting from auto- and isoinmunity to spermatozoa. Development of a radioimmunoassay technique for detection of antibodies to LDH-X in humans. The study of non-immunological spermagglutinins in human sera.

Studies are being conducted on proteins of boar seminal plasma with a view to developing an effective method for the cryopreservation of boar semen.

Preservation by freezing of human spermatozoa for artificial insemination.

Reproductive biology of fish.

The topics under investigation in the field of population genetics include the effect of parental age on heritability of quantitative traits in different species of Drosophila and the development of selection indices based on factors affecting growth rates in swine.

A transmissible factor capable of inducing sterility in Drosophila is being studied.

The ecology and genetics of populations, geographic variation and hybrid zones in Lepidoptera are currently being studied.

The effects of fluorides upon plant communities and fluoride uptake and transfer within ecosystems.

The role of phytohormones as regulators of long-distance carbon transfer and distribution within plants.

Strategies of phosphorus acquisition by and distribution within eucalypt seedlings growing under conditions of phosphorus limitation.

In the area of chloroplast development and chloroplast DNA in plant cells, research is being carried out into the organisation of chloroplast DNA in chloroplasts and chloroplast genetic interaction in protoplasts. Chloroplasts are being examined as possible vehicles for genetic change in plants.

DEPARTMENT OF CHEMISTRY

The research interests of members of the Department are as follows.

Analytical and Environmental Chemistry (Professor W. F. J. Pickering)
Trace analysis studies; sorption of heavy metal ions by clays; metal gluconate complexes.

Analytical Chemistry; Wine Science (Dr G. L. Orr)
Instrumental methods of chemical analysis; application to oenology.

Aliphatic, Aromatic 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.

Chemical Education; and Molecular Structure (H. R. Tietze)
Development of new experiments for undergraduate courses in Chemistry; X-ray structure determination of selected inorganic crystalline solids.

Electrochemistry (Dr R. A. Fredlein)
Semiconductor electrochemistry, electroosorption at solid metal-solution interphases and the electrocatalysis of oxygen reduction.

Molecular Spectroscopy (Associate Professor R. P. Cooney)
Laser Raman and infrared spectroscopy applied to metal complexes, molecules adsorbed on oxide surfaces of catalytic interest, species at metal electrode surfaces, polymers, and chemistry of coal.

Metal Complexes (Associate Professor W. R. Walker)
Studies of interaction of metal ions with biogenic amines, amino acids, drugs, purines, pyrimidines; both in vivo and in vitro. The bio-inorganic chemistry of zinc and copper — the role of copper in inflammation.

Natural Products (Associate Professor H. Duewell)
Elucidation of the components of Xanthorrhoea resin and the synthesis of related compounds. Pericyclic reactions, oxygen heterocycles.

Organic Reaction Mechanism (Associate Professor L. K. Dyall)
Studies on the mechanism of oxidations which involve a neighbouring group in a cyclization process; the chemistry of N-chloro compounds.
Organic Synthesis and Stereochemistry (Dr K. H. Bell)

Radiochemistry (E. B. Jacobs)
Applications of tracers in studies of equilibria in solvent extractions and kinetics of transport of inorganic ions in plants and plant tissue.

Surface Chemistry (Associate Professor G. Curthoys)
Studies on zeolites — structure, ion exchange, spectra of adsorbed molecules, heats of adsorption, surface acidity and catalysis of reactions.

DEPARTMENT OF GEOLOGY

Coalfield Geology (Associate Professor C. F. K. Diessel)
Coal formation and sedimentology of associated clastic sediments.

Coal Petrology (Associate Professor C. F. K. Diessel)
Coal petrography, reflectance of coalified and graphitised dispersed organic matter in sediments and its application to metamorphic grade and petroleum exploration. Petrographic studies of solid residues of coal liquefaction.

Economic Geology (Dr P. K. Secombe)
Geochemistry and ore genesis, with a special emphasis on the study of sulphur isotope distributions in ore minerals. Current projects include sulphur isotope studies of copper and nickel deposits in Western Australia, Kuroko ores of Japan and base metal mineralization in New South Wales.

Engineering Geology (Associate Professor K. H. R. Moelle)
Application of geology to engineering problems, directional mining and foundation stability.

Geology of the Hunter Valley (all staff)
Detailed geology, including stratigraphy, structural geology, petrology, sedimentology, palaeontology and palaeoecology.

Igneous Petrology (Professor B. Nashar and Dr J. A. Gamble)
Professor Nashar is studying the mineralogy, geochemistry and genetic relations of the Carboniferous and Permian andesitic associations of eastern New South Wales and Dr Gamble is studying geochemical and petrogenetic processes in volcanic and subvolcanic igneous rocks. Projects at present being undertaken by him include a field and geochemical study of a Tertiary igneous volcanic centre in central New South Wales and electron microprobe mineralogical investigations of differentiation processes in subvolcanic tholeiitic rocks from North East Ireland and shallow alkali basaltic sills from the Hunter Valley.

Metamorphic Petrology (Dr R. Offler)
Mineralogy and geochemistry of low-grade metamorphic rocks, north of Newcastle, and Central Peru, South America; and the structure and metamorphism of rocks south-east of Mudgee.

Mineralology (Associate Professor S. St. J. Warne)
Multi-method investigations into the development and application of advanced mineralogical techniques to mineral mixtures in and associated with coal and oil shales.

Palaeontology (Associate Professor B. A. Engel)
Carboniferous trilobites, fenestrate bryozoans and brachiopods from the marine faunas of Eastern Australia.

Structural Geology (Associate Professor K. H. R. Moelle)
Assessment of brittle deformation features and their interpretation in a regional setting; aspects of faulting in the northern fringe area of the Sydney Basin, New South Wales.

DEPARTMENT OF PHYSICS

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

Theoretical work is also being undertaken to produce models of soil temperature under different evaporative conditions. This topic may be phased out in 1980.

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 complete and the system is currently under test. It is proposed initially to examine surface plasma oscillations on metal surfaces and their dependence on adsorbed gases.

Theoretical studies on the Al(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 minicomputer 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 newfield station being established north of Newcastle.

Geomagnetic Pulsations (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 pulsations recorded at Newcastle, Woomera, Launceston, Perth, Macquarie Island and Auckland.
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.

Instrumentation Techniques (Dr McGovern)
Some new results in approximate network synthesis have arisen in the course of work on nanosecond passive voltage probes for oscilloscopes. Novel analog integrated circuit functions have been developed and applied to signal processing in a range of microwave measurement functions of low cost and high accuracy.

Electromagnetic wave propagation (Dr McGovern)
The major components of a fast reflectometer system are now available for experimental study of EM wave propagation in non-uniform structures. Theoretical work involves application of perturbation theory to structures with gross nonuniformity.

Medical Physics (Dr Kennewell)
Signal processing studies of ECG data have been commenced with a view toward the development of a low cost diagnostic system utilizing a micro-computer.

Visual Pathway Studies (Mr Balf)
A study of cataractous lenses is being continued. Stimulus-response studies using micro electrode techniques are being developed.

DEPARTMENT OF PSYCHOLOGY

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

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

Cognitive Processes
Research into the development of cognitive processes has continued with particular emphasis on factors associated with the acquisition of concepts. 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 the youth culture are being studied with an international team from U.S.A., Norway and France. Research on the role of language in concept acquisition is being carried out with bilingual children in Australia and Malaysia.

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

Educational Psychology
A programme of research is being carried out on the social psychology of the classroom. In the programme the development of social skills, the social learning of isolated children and small group interaction are being studied.

Perception and Performance
The Perception and Performance Laboratory is currently conducting research in the areas of image processing, filtering, models for reaction time and motion perception.

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

Mathematical Psychology
In mathematical psychology, experimental studies of new methods of measuring abilities and personality are continuing. Geometric and network approaches to the structure and processing of images and motion perception are of current interest, in conjunction with scaling procedures relevant to the analysis of perceptual data. Also work on stochastic models for reaction time is being carried out.

Physiological and Comparative Psychology
Physiological and biochemical systems involved in behaviour are being investigated with both human and infrahuman subjects. Both human and infrahuman subjects are being used to investigate the role of the autonomic nervous system in stress and emotion. Several parameters of the cardiac response during a range of behaviours, e.g., aversive conditioning, open field activity, are being investigated using biofeedback and telemetric devices. The infrahuman subjects effects of early experience on adult behaviour are being examined.

Neuropsychology
Developmental norms for evoked responses and other electrophysiological measures are being assembled for children of primary school age. Cerebral lateralization of response is the focus of interest. Studies in progress include the electrophysiology of post-concussive states, validation of neuro-psychological tests, and event-related potentials in linguistic and other complex stimulation schedules.
DEPARTMENT OF GEOGRAPHY

Biogeography
Altitudinal gradation of rainforest at Barrington Tops. Vegetation on lime-rich rocks of the Upper Hunter (J. C. Turner)
Vegetation of the N.S.W. Coast (L. A. de Castro Lopo)

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
Explanation in Geography (Mary R. Hall)
Time-space and socio-technical systems, with particular emphasis on shiftwork systems (K. W. Lee)
Development of theory and applications in chronogeography (D. N. Parkes)

Geomorphology
Sediment erosion, storage and transport in a small steep drainage basin at Pokolbin, N.S.W. (R. J. Loughran)
Morphodynamics of metropolitan beaches in Newcastle. Shore platform morphology (R. W. Kidd)

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)

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)

Settlement
Human activity structures in remote and especially arid and tropical settlements in Australia (D. N. Parkes)

DEPARTMENT OF MATHEMATICS

Algebra
Associate Professor W. Brisley is working on some problems in group theory which arise from graph theory, and also on some applications of algebra to data-processing problems.

Biomathematics
Dr W. Summerfield is currently studying fluid mechanical features of the cardiovascular circulatory system. He is interested in the mathematical modelling of all functions of the human body.

Chemical Kinetics
Dr D. L. S. McElwain is working on the mathematical modelling of nonequilibrium 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 arrays and graph theory.

Computer Science and Numerical Analysis
Dr D. W. E. Blatt is working on models of programme referencing behaviour and studying performance of memory management systems. He is also interested in analysis of algorithms and computational complexity, and the development of programming languages and systems.
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, urban sociology and meteorology.

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 viscous flow problems. Meniscus profiles are also of current interest.
Dr W. Summerfield is interested in all phenomena in which fluid dynamics plays a significant role; for example, ocean waves, turbulence, estuarine-dynamics, weather prediction, sailing vessels, surfing, animal propulsion.

Functional Analysis
Associate Professor J. R. Giles is carrying out research in the particular area of the geometry of Banach spaces, and interest there is focused on various smoothness and rotundity properties of the norm and their implications for the space. This work is being generalised to a study of differentiation of convex functions on Banach spaces. Particular attention is being given to characterising Banach spaces where the continuous convex functions have various differentiability properties.
Dr V. Ficker and Mr C. J. Ashman are working in measure theory, particularly in some problems of families of sets.

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

Information Theory
Professor R. G. Keats and Dr A. J. Dobson are continuing to work in co-operation with research scientists at the Defence Research Centre at Salisbury, S.A. Current work is concerned with processing clipped data from a number of receivers arrayed in various geometric patterns.

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.

Medical Statistics and Epidemiology
Dr A. J. Dobson and Dr R. W. Gibberd collaborate with the Faculty of Medicine to investigate various problems in epidemiology and biostatistics. Current research includes: regional variations in mortality; age and sex-specific death rates from ischaemic heart disease in Australia; collection and analysis of data from the Hunter Valley Heart Attack Study; design and analysis for a survey of smoking habits of schoolchildren and the evaluation of an intervention programme; development and validation of an index of quality of life in patients with chronic diseases.

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 manly 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. Convexity indices and their applications to transport networks, etc.

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
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.

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