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

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

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

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

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

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

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

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

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

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

“A Faculty Board shall:
(a) encourage and supervise the teaching and research facilities 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 matters 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 (1978) Professor C. D. Ellyett, MSc(New Zealand), PhD(Manchester), FRAS, FRSNZ, FAIP
(1979) to be decided

Sub-Dean (1978) J. D. Balfe, MSc(Queensland), AlnstP, MAIP
(1979) to be decided

Faculty Secretary

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Associate Professor
R. C. Jones, BSc(Adelaide)

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B. A. Cosroy, BSc, PhD(Sydney)
R. N. Murdoch, BSc(New South Wales), PhD(Sydney)
T. K. Roberts, BSc(Adelaide), PhD(Flinders)
R. J. Rose, BScAgr(Sydney), PhD(Macquarie)

Lecturers
J. W. Patrick, BScAgr(Sydney), PhD(Macquarie)
P. J. Quinn, BSc(London), PhD(Sydney)

Senior Tutor
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Tutors
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L. Rosemary Faris, BSc(Nottingham), DipAnGen(Edinburgh), DipEd
J. D. Stanger, BSc(James Cook)

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Nancy Kirby
Karen E. Blackford

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R. A. Freidel, BSc, PhD(Queensland), ARACI, FCS
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Tutor
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R. J. Irving
Kim M. Marshall
Janette F. Pilarz
W. J. Thompson

Laboratory Assistant
K. W. Langford

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S. St. J. Warne, BSc(Western Australia), PhD(New South Wales), FGS, FGAA, FMSA

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L. J. Henderson

Cartographic Draftsmen
B. R. McEwan
P. B. Reynolds

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P. B. Reynolds

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W. D. Wallis, BSc, PhD (Sydney)

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W. T. F. Lau, MSc (New South Wales), PhD (Sydney), MAIAA
D. L. S. McElwain, BSc (Queensland), PhD (York, Canada)
T. K. Sheng, BA (Marian College), BSc (Malaysia & London), PhD (Malaysia)
P. K. Smir, PromPhys, CSc, RNDr (Charles)
R. J. Vaughan, BSc, MEngSc, ME (New South Wales), PhD (Adelaide), FSS
Information for Undergraduates

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

Professional Employment and Professional Recognition

Geology

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

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

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

Psychology

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

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

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

The University of Newcastle Psychology Students’ Association

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

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

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

Subject Timetable Clashes

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

<table>
<thead>
<tr>
<th>Biological Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio IIIA with Chemistry IIIA</td>
</tr>
<tr>
<td>Bio IIIA with Chemistry IIIB</td>
</tr>
<tr>
<td>Bio IIIA with Geology IIIB</td>
</tr>
<tr>
<td>Bio IIIA with Physics IIIA</td>
</tr>
<tr>
<td>Bio IIIA with Chemistry IIIB</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 1979 will clash with Biology IIB and IIA respectively in 1980 and vice versa.

<table>
<thead>
<tr>
<th>Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem IIIA with Physics IIIB</td>
</tr>
<tr>
<td>Chem IIIB with Biology IIIB</td>
</tr>
<tr>
<td>Chem IIIB with Geology IIIA</td>
</tr>
<tr>
<td>Chem IIIB with Geology IIIB</td>
</tr>
<tr>
<td>Chem IIIB with Physics IIIA</td>
</tr>
<tr>
<td>Chem IIIB with Maths III (some topics)</td>
</tr>
<tr>
<td>Chem IIIB with Physics IIIA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geo IIIA with Biology IIIA</td>
</tr>
<tr>
<td>Geo IIIA with Biology IIIB</td>
</tr>
<tr>
<td>Geo IIIA with Chemistry IIIA</td>
</tr>
<tr>
<td>Geo IIIA with Physics IIIA</td>
</tr>
<tr>
<td>Geo IIIA with Chemistry IIIB</td>
</tr>
<tr>
<td>Geo IIIA with Physics IIIA</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys IIIA with Biology IIIA</td>
</tr>
<tr>
<td>Phys IIIA with Chemistry IIIA</td>
</tr>
<tr>
<td>Phys IIIA with Mathematics III (some topics)</td>
</tr>
</tbody>
</table>
Although prerequisites are not prescribed, some subjects are currently following should be borne in mind.

Prospective science degree students are advised to include four units of Physics IIA and Mathematics III (some topics) with

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

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

Psychology

Nil

Student Academic Progress

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

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

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

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

Advisory Prerequisite for entry to the Faculty

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

Subject | Assumed Level
---|---
Physics IIA, IIB | Physics (2 unit course), grade 1, 2 or 3 or Multistrand (4 unit) Science, grade 1, 2 or 3.
Chemistry I | Chemistry (2 unit course), grade 1, 2 or 3 or Multistrand (4 unit) Science, grade 1, 2 or 3.
Mathematics I | Mathematics (2 unit course), grade 1, 2 or 3.

Student Advice

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

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

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

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

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

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

(b) History | A Part II subject in History

(c) Modern Languages | A Part III subject in a modern language

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

(e) Geography | A Part III subject in Geography

(f) Commerce/Economics | B.A. including Economics II A
| or
| B.Com. including Economics II or
| B.Ec. including Economics II.

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

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

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

(j) Primary | No specific prerequisites.

N.B. A Part II subject assumes as a prerequisite a pass in a Part I subject in the same discipline. A Part III subject assumes a pass in a Part I subject and a Part II subject in the same discipline.
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 six 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;

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).
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) (i) at least one Part III subject and two Part II subjects
       OR
   (ii) 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;
   (b) more than four subjects listed in Schedule A of the Requirements for the degree of Bachelor of Mathematics;
   (c) more than five subjects from any one Department;
   (d) Psychology IIIC together with either Psychology IIA or Psychology IIB;
   (e) Geology IIIC together with either Geology IIIA or Geology IIIB;
   (f) Psychology IIIC together with either Psychology IIIA or Psychology IIIB.

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 enrolls 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.


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:

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

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

(a) A candidate may be given standing in qualifying subjects in recognition of work completed in another faculty or tertiary institution and be deemed to have passed in these subjects for the purpose of Clause 13. If the candidate is a graduate such standing shall be limited to a maximum of four subjects.

(b) Standing may be granted in subjects not offered in the University. Any such subject shall be regarded for the purpose of these Requirements as being a subject in the Part in the Schedule of Subjects as determined by the Dean at the time such standing is granted.

20. **Honours**

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

(b) A candidate for the honours degree, before enrolling in the honours subject shall:

(i) have completed the requirements for admission to the ordinary degree;

(ii) have been granted approval to enrol in the honours subject from both the Head of the Department concerned and the Dean.

(c) The honours subjects offered shall be:

- Biology IV
- Chemistry IV
- Geography IV
- Geology IV
- Mathematics IV
- Physics IV
- Psychology IV

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

(i) complete the requirements of the honours subject in one year's full-time study or two years' part-time study; and

(ii) pass the honours subject.

1 Please refer to the Notes to the Degree Requirements.

21. **Combined Honours**

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

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

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

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

(c) The combined honours subjects offered shall be:

- Physics/Mathematics IV
- Psychology/Mathematics IV

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

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

and

(ii) pass the combined Honours subject.

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

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

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;
(d) the candidate shall complete the requirements for both degrees except as provided in clauses 25, 26 and 27.

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 degree 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 IIA and either Mathematics IIB or Computer Science III or a Part III subject chosen from Schedule B of the Schedule of Subjects approved for the degree of Bachelor of Mathematics and
(b) six subjects chosen from the other subjects listed in the Schedule of Subjects approved for the degree of Bachelor of Science and
(c) three subjects chosen, with the approval of the Deans of the Faculties of Mathematics and Science, from the subjects approved for any of the degree courses offered by the University provided that:
(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 IIC shall not be entitled to count either Psychology IIIA or Psychology IIIB;
(v) a candidate counting Economics IIC shall not be entitled to count either Economics IIIA or Economics IIIB;
(vi) a candidate counting Geology III 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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Remarks, Prerequisites, Corequisites, Preparatory Subjects</th>
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<tbody>
<tr>
<td>PART I</td>
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<tr>
<td>Biology I</td>
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<td>Chemistry I</td>
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<td>Physics I A</td>
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<td>Physics I B</td>
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<tr>
<td>Psychology I</td>
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Only one of these subjects may be taken.
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 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.

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

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

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

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

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

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

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

REQUIREMENTS FOR THE DEGREE OF MASTER OF PSYCHOLOGY (CLINICAL)

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

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

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

4. An applicant for admission to candidature shall:

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

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

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

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

(a) approve or reject applications made pursuant to section 4 (a); or
(b) make recommendations to the Faculty Board in respect of applications made pursuant to section 4 (b).

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

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

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

10. The candidate shall carry out the investigation and other work prescribed in Section 8 either under the direction of a supervisor or supervisors appointed by the Faculty Board or under such conditions as the Faculty Board may determine.

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

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

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

14. The University shall be entitled to retain the submitted copies of the thesis, accompanying documents and published work. The University shall be free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act (1968) the University may issue the thesis in whole or any part in photostat or microfilm or other copying medium.

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

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

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

18. In exceptional circumstances, the Senate, on the recommendation of the Faculty Board, may relax any provision of these Requirements.
REQUIREMENTS FOR THE DEGREE OF MASTER OF PSYCHOLOGY (EDUCATIONAL)

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

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

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

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

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

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

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

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

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

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

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

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

13. The University shall be entitled to retain the submitted copies of the thesis, accompanying documents and published work. The University shall be free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act (1968) the University may issue the thesis in whole or any part in photostat or microfilm or other copying medium.

1 Separate sheet on the preparation and binding of higher degree thesis is available on application.
14. On the recommendation of the Faculty Board the Senate shall appoint for each candidate two examiners: one, an internal examiner being a member of the staff of the University; the other, an external examiner not being a member of the staff of the University.

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

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

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

REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

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

2. An applicant for registration for the degree of Master of Science shall either:
   (a) have satisfied all the requirements for admission to the degree of Bachelor of Science with Honours Class I or Class II in the University of Newcastle or to an appropriate degree of this or any other university approved for this purpose by the Faculty Board of the Faculty of Science; or
   (b) have satisfied all the requirements for admission to the degree of Bachelor of Science in the University of Newcastle or other approved university; or

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

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

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

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

6. (i) Every candidate for the degree shall be required to submit a thesis embodying the results of an investigation or design, to take such examinations and to perform such other work as may be prescribed by the Faculty Board. The candidate may submit also for examination any work he has published, whether or not such work is related to the thesis.
   (ii) The investigation or design and other work as provided in paragraph 6 (i) shall be conducted under the direction of a supervisor appointed by the Faculty Board or under such conditions as the Faculty Board may determine.
   (iii) A part-time candidate shall, except in special circumstances—
      i. conduct the major proportion of the research or design work in the University; and
      ii. take part in research seminars within the Department in which he is working.
   (iv) Every candidate shall submit annually a report on his work to his supervisor for transmission to the Higher Degree Committee.
   (v) Every candidate shall submit three copies of the thesis as provided under paragraph 6 (i). All copies of the thesis shall be in double-spaced typescript, shall include a summary of approximately 200 words and a certificate signed by the candidate to the effect that the work has not been submitted for a higher degree to any other university or institution. The ORIGINAL copy of the thesis for deposit in the Library shall be prepared and bound in a form approved by the University. The other two copies of the thesis shall be bound in such manner as allows their transmission to the examiners without possibility of their disarrangement.

1 Separate sheet on the preparation and binding of higher degree thesis is available on application.
(vi) It shall be understood that the University retains the three copies of the thesis and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act (1968) the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

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

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

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

Progress Requirements for Students in the Faculty of Science

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

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

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

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

Combined Degree Courses

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.

(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 an Arts Group I Part I subject if no Arts Group I subject has been passed.

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

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

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 II A and Mathematics II C, and another Part I subject.

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

Year IV either Mathematics III B 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 Design
- (ME131 Dynamics
- (CE171 Engineering Surveying
- *Mathematics I
- *Physics I A
- *Chemistry I A

* Subjects counted towards Science degree,
Year II
* Mathematics IIIA
* Science Part I
CE21 Mechanics of Solids
CE22 Properties of Metals
CE22 Materials Technology
CE23 Fluid Mechanics
CE24 Water Resources Engineering
CE233 Engineering Geology

Year III
* Science Part II
* Science Part II
EE131 Circuit Fundamentals
EE211 Energy Conversion
ME121 Workshop Practice
ME271 Thermodynamics I
CE313 Structural Analysis and Design

Year IV
* Science Part II
* Science Part III
CE324 Soil Mechanics
CE332 Fluid Mechanics

Year V
CE351 Civil Engineering Systems I
CE372 Transportation Engineering
ME301 Engineering Computations
GE350 Seminar
CE414 Structural Analysis and Design
CE425 Earth and Rock Engineering
CE452 Engineering Construction
CE453 Project

B — ELECTRICAL ENGINEERING

Year I
(ME111 Graphics and Engineering Drawing
* CE112 Introduction to Design
* ME111 Statics
* EE131 Circuit Fundamentals
* ME121 Workshop Practice
* Mathematics I
* Physics I
* Chemistry I

Year II
* Mathematics II A
* EE111 Energy Conversion
* EE221 Semiconductor Devices
* EE232 Electrical Circuits
* EE262 Systematic Programming
* EE264 Introduction to Logic and Assembly Language
* EE221 Electromagnetics and Quantum Mechanics
* ME182 Electronic Structure of Materials
* Science Part I

Year III
* Science Part II
* Science Part II
CE313 Power Systems

Year IV
* Science Part II
* Science Part III
GE310 Seminar

Elective—1 unit from Faculty of Engineering—non Electrical Engineering

Year V
* EE410 Project
* EE481 Project, or 2 from EE300, 400, 500
* EE491 Seminar 10 from EE300, 400, 500

C — MECHANICAL ENGINEERING

Year I
(ME111 Graphics and Engineering Drawing
* CE112 Introduction to Design
* ME111 Statics
* ME121 Workshop Practice
* Mathematics I
* Physics I
* Chemistry I

Year II
* Mathematics III A
* Science Part I
* ME201 Experimental Methods I
* ME202 Dynamics of Engineering Systems
* ME214 Mechanics of Materials I
* ME241 Properties of Materials I
* ME215 Fluid Mechanics I
* ME271 Thermodynamics I
* ME203 Experimental Methods II
* ME181 Microstructure of Materials

Year III
* Science Part II
* Science Part II
* ME212 Engineering Design I
* ME223 Engineering Technology
* ME232 Dynamics of Materials I
* EE211 Energy Conversion
* ME301 Engineering Computations
* ME342 Properties of Materials II
* ME343 Mechanics of Solids
* ME351 Automatic Control

Year IV
* Science Part II
* Science Part III
* ME371 Thermodynamics II
* ME352 Fluid Mechanics II
* ME372 Heat Transfer
* ME302 Experimental Methods III
### INDUSTRIAL ENGINEERING

**Year I to Year III as for Mechanical Engineering**

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

**Year V**
- ME384 Design for Production  
- ME482 Engineering Economics II  
- ME484 Engineering Economics II  
- ME487 Operations Research—Deterministic Models  
- ME488 Operations Research—Probabilistic Models  
- ME496 Project/Seminar  
- Electives—4 units Departmental Technical Electives  

**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.

### CHEMICAL ENGINEERING

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

1. **Year I**
   - (ChE101 Industrial Process Principles
   - * (CEI11 Statics  
   - (ME111 Graphics and Engineering Drawing  
   - (GEI12 Introduction to Design  
   - ME121 Workshop Practice  
   - Mathematics I  
   - Physics IA or IB  
   - Chemistry I  

2. **Year II**
   - * (Chemistry IIA  
   - Mathematics IIB  

3. **Year III**
   - * Science Part II  
   - * Science Part III  
   - Chemical Engineering IIA Part 1  

4. **Year IV**
   - * Science Part III  
   - Chemical Engineering IIA Part 2  
   - Chemical Engineering IIB  

5. **Year V**
   - Chemical Engineering III  
   - Projects II  

**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. **Prerequisites** are subjects which must be passed before a candidate enrols in a particular subject.

2. **Advisory** subjects which must be passed at the Higher School Certificate. In such cases lectures will be given on the assumption that a pass has been achieved at the level indicated.

3. **Preparatory** subjects are those which candidates are strongly advised to have completed before enrolling in the subject for which the preparatory subject is recommended.

4. **Corequisites** refer to subjects or topics which the candidate must either pass before enrolling in the particular subject or be taking concurrently.
3. **Texts** are books recommended for purchase.
4. **References** are books relevant to the subject or topic which need not be purchased.

**DEPARTMENT OF BIOLOGICAL SCIENCES**

**711100 Biology I**

**Prerequisites** Nil, but a series of 10 lectures in background chemistry will be offered in the last week of February (between 9.30 and 11.30 a.m. each day in the Department of Biological Sciences lecture theatre, JLG08) for those students enrolling in Biology I who have done little chemistry. Attendance at the lectures is optional.

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

**Examination** One 3-hour paper

**Content**

- **Cells and Cell Constituents**
  - 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.

**Preliminary Reading**

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

**Texts**

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

**References**

- Clarke, R. B. & Panchen, A. L. *Synopsis of Animal Classification* (Chapman & Hall)
- Holloway, B. W. *Genes and Chromosomes in Action* (Thomas Nelson)
- Moroney, M. J. *Facts from Figures* (Penguin)
- Srbi, A. M. et al. *General Genetics* 2nd edn (Freeman)

**712100 Biology IA**

**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**

- **Genetics**

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

40
Texts
Bailey, N.T.J.  Statistical Methods in Biology (English U.P. 1964)
Gardner, E. J.  Principles of Genetics 5th edn (Wiley 1975)
Giese, A. C.  Cell Physiology 4th edn (Saunders 1973)
Conn, E. E. & Stumpf, P. K.

References
Brock, D. & Mayo, O. (eds)  The Biochemical Genetics of Man (Academic)
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 Population
Prerequisites  Biology I
Hours  3 lecture hours and 6 hours tutorial and laboratory classes per week.
Examination  Two 3-hour papers

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

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

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

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

References
Barnes, R. D.  Invertebrate Zoology 2nd edn (Saunders 1974)
Bell, P. & Woodcock, C.  The Diversity of Green Plants 2nd edn (Edward Arnold 1971)
Clark, L. R. et al.  The Ecology of Insect Populations in Theory and Practice (Methuen)
Darnell, R. M.  Organism and Environment (Freeman)
Gordon, M.S.  Animal Physiology: Principals and Adaptation 2nd edn (Macmillan)
Pianka, E. R.  Evolutionary Ecology (Harper & Row)
Russell-Hunter, W. D.  Biology of Lower Invertebrates (Collier Macmillan)
Russell-Hunter, W. D.  Biology of Higher Invertebrates (Collier Macmillan)
713100 Biology IIIA
Molecular and Cellular Biology

Prerequisites
Biology IIA

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

Examination
Two 3-hour papers

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

Texts

OR


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

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

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

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

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

Bellanti, J. A. Immunology (Saunders 1971)

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

Garrod, D. Cellular Development (Chapman & Hall 1974)

Graham, C. F. & Wareing, P. F. The Developmental Biology of Plants and Animals (Blackwell 1976)


Martin, C. R. Textbook of Endocrine Physiology (Williams & Wilkins 1976)

44

713200 Biology IIB
Biology of Organisms and Populations

Prerequisites
Biology IIA or IIB

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

Examination
Two 3-hour papers

Content
Fundamentals of Population and Quantitative Genetics

Community Analysis
Structure and dynamics of biological communities.

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

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

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

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

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

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

References
Bannister, P. Introduction to Physiological Plant Ecology (Blackwell 1976)

Connell, P. W. Water Pollution (Queensland U.P.)


Daubenmire, R. F. Plants and Environment 3rd edn (Wiley 1974)

Ford, E. B. Ecological Genetics (Methuen 1975)


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

45
### 714100 Biology IV

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Examination</th>
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<tr>
<td>Nil</td>
<td>To be advised</td>
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**Evolutionary Ecology** (Harper & Row)

**Ecological Energetics** (Arnold)

**Introduction to Quantitative Ecology** (McGraw-Hill)

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### 721100 Chemistry I

<table>
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<tr>
<th>Prerequisite</th>
<th>Hours</th>
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<tr>
<td>Nil</td>
<td>About 3 lecture hours and 3 hours of tutorial and laboratory classes per week.</td>
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</table>

**Content**

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

**Organic Chemistry** (30 lectures)

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

**Texts**

Aylward, G. H. & Findlay, T. J. V. *S.I. Chemical Data* 2nd edn (Wiley 1974)

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### 722200 Chemistry IIA

<table>
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<tr>
<th>Prerequisite</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Chemistry I</td>
<td>About 3 lecture hours and 6 hours of tutorial and laboratory classes per week</td>
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**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**


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### 742100 Chemistry III

<table>
<thead>
<tr>
<th>Prerequisite</th>
<th>Preparation Subjects</th>
<th>Examination</th>
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<tbody>
<tr>
<td>Nil</td>
<td>Mathematics I &amp; either Physics IA or IB</td>
<td>A student may satisfy the examiners: EITHER by achieving an overall satisfactory performance in the two progressive examinations (Papers 1 &amp; 2). OR by achieving an overall satisfactory performance in the two final papers scheduled for the November examination period (Papers 3 &amp; 4). Students who attempt both sets of examinations will be credited with the higher of the two results. All papers are of 3-hours duration. The average laboratory mark counts 20% towards the final grading.</td>
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**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**


Chemistry IIIA

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

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

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

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

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

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

**List of Topics**

**723100 Chemistry IIIA**

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

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

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

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

**723200 Chemistry IIIB**

**Radiocchemistry**
- Thermodynamics
- Organic Reaction Mechanisms
- Biologically Important Organic Molecules
- Biogenesis
- Plant Growth Regulators, Insecticides & fungicides

**Examination**
To be advised
Texts

To be advised: see departmental topic summaries.

724100 Chemistry IV

Prerequisites

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

Hours

Examination

To be advised

Content

A subject extending over one full-time academic year or its equivalent comprising:

(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

Prerequisite

Nil

Hours

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

Examination

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

Content

Material Geology

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

Physical Geology

Erosion cycle; agents of erosion; diastrophism; structural geology; marine geology; geomorphology.

Historical Geology

Introductory palaeontology and stratigraphy; brief geological history of New South Wales.

Texts

Press, F. & Siever, R. Earth (Freeman 1974)
EITHER
Read, H. H. Rutley’s Elements of Mineralogy 24th edn (Murby 1960)
OR
Mason, B. & Berry, L. G. Mineralogy (Freeman 1959)
(for students intending to proceed beyond Geology I)
Uyeda, S. The New View of the Earth (Freeman 1978)

732200 Geology II

Prerequisite

Geology I

Hours

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

Examination

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

Content

Mineralogy

Optical mineralogy.

Petrology

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

Stratigraphy and Palaeontology

Stratigraphy of Australia; invertebrate palaeontology.

Photogrammetry and Photogeology

Basic principles of photogrammetry and photogeological interpretation; aerial photographs and their use in cartography and in stratigraphic and structural studies.
Structural Geology and Geotectonics
Nomenclature and origin of diastrophic and non-diastrophic structures.

Texts
Bishop, A. C.  *An Outline of Crystal Morphology* (Hutchinson 1967)
Moore, R. C. et al.  *Invertebrate Fossils* (McGraw-Hill 1952)

Prerequisite
Geology I

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

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

Content
The subject comprises 8 units of 14 lectures each, 3 laboratory hours per week and 8 days field work. The units to be offered in 1979 are:

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

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

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

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

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

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

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

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

Texts
Francis, P.  *Volcanoes* (Penguin 1976)
Micropalaeontology and Theoretical and Evolutionary Palaeontology

Micropalaeontology, principles of taxonomy, quantitative methods; species concepts, genetics, evolution; selected evolutionary patterns from the palaeontological record.

Geochronology and World Stratigraphy

Principles of age dating; regional geology of selected provinces of the world.

Exploration Geophysics

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

**Texts**

Carmichael, I. S. E., et al.  
Hobbs, B. E., et al.  
Stanton, R. L.  
Winkler, H. J. F.  

*Igneous Petrology* (McGraw-Hill 1974)  
*An Outline of Structural Geology* (Wiley Int. edn 1976)  
*Ore Petrology* (McGraw-Hill 1972)  
*Petrogenesis of Metamorphic Rocks* 4th edn (Springer Verlag 1976)

For others, consult lecturers concerned.

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### 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.

**Content**

**Economic and Exploration Geology**

Source, transport and precipitation of ore minerals; sulphide mineralogy, wallrock alteration; ore-forming fluids; sulphur, oxygen and lead isotopes in ore mineral genesis; fluid inclusions; geochemical environments; dispersion of metals; geochemical exploration.

**Mineralogical and Geochemical Techniques**

X-ray diffraction and fluorescence; X-radiography; atomic absorption, infra-red and optical spectroscopy; differential thermal and thermogravimetric analysis; scanning and transmitted electron microscopy; the electron microprobe; differential staining techniques.

**Sedimentology**

Lithologic associations in relation to the depositional facies of their environment of formation with emphasis on the genetic connection between the geological setting of a depositional area and its sedimentary fill (basin analysis).

**Stratigraphic Principles**

Stratification; top and bottom criteria; stratigraphic breaks; facies changes; factors in lithostratigraphy (rock units, lithofacies, lithosomes); catastrophic stratigraphy, uniformitarianism and the processes of sedimentation; stratigraphic nomenclature; biostratigraphic zones; correlation; stratigraphic palaeontology.

**Types of stratigraphic maps and sections; numerical analysis of data strings; numerical map analysis.**

**Coal Geology**

Origin, distribution, classification and economic potential of coal.

**Petroleum Geology**

Origin, source, migration, entrapment and distribution of petroleum and gas; the exploration and exploitation techniques for its detection, evaluation and recovery.

**Tectonophysics and Engineering Geology**

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

**Igneous Petrology**

Interpretation and representation of chemical analyses of minerals and rocks, micrometric analysis; petrology of selected igneous rock associations.

**Metamorphic Petrology**

Examination of the texture of metamorphic rocks; determination of processes involved in the production of grain shapes and deformation features within grains.

**Texts**

Consult lecturers concerned.

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### 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; 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

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

Other Texts Refer to Physics Department notice board.

742100 Physics II
Prerequisites Mathematics I, Physics IA or normally a credit pass or better in Physics IB.
Hours 3 lecture hours and 6 laboratory hours per week. Engineering students refer to Engineering Faculty Handbook.
Examination Equivalent of 6 hours total examination.
Physics II students who have completed only Mathematics I, should include a Mathematics II subject. It is suggested that in addition to Topic CO this should include Topic H and one of Topics B, D, and F.

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

**743100 Physics IIIA**

**Prerequisites**
Physics II, a Mathematics subject with Topics C, E, G, and H or B or D recommended. For Mathematics II in 1979 Topics CO, H, and B or D or F are recommended.

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

**Examination**
Assessment to the equivalent of 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 IIIB**
This subject will not be offered in any one year unless there are three or more enrolments.

**Corequisite**
Physics IIIA

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

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

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

The Physics lecture course will treat the following topics:

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

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

**744100 Physics IV**

**Prerequisite**
Physics IIIA

**Hours**
To be advised.

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

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

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

- **Atomic Physics** — Associate Professor Ramsey & Mr Roberts
  - Solid state physics and physics of surfaces.
Quantum Mechanics—Dr Smith
Advanced quantum mechanics.

Relativistic Physics and Electromagnetics—Dr McGovern
Special relativity theory (tensor analysis developed as required and not prerequisite), advanced electromagnetic theory, applied electromagnetics, experimental basis of gravitational theories.

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

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

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

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

664300 Physics/Mathematics IV
Prerequisites
Physics IIIA and Mathematics IIIA
Hours
To be advised
Examination
In the Physics IV and Mathematics IV topics selected, a project of mathematical and physical significance, jointly supervised.

Content
Four topics from Mathematics IV chosen for relevance to Physics, and topics from Physics IV, as approved by Head of Physics Department. Project work will normally begin in the first week of February.
753100 Psychology IIA

**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, learning, information processing, physiological psychology, animal behaviour, statistical analysis, experimental method, memory and perception.

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 IIB

**Prerequisite**  Psychology IIB

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

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

**Content**
Such topics as social psychology, psychopathology, personality, developmental psychology, quantitative psychology and cross-cultural psychology, abnormal psychology, ethology, statistics, non-verbal communication. Practical work comprises workshop and laboratory work for up to 3 hours per week plus a supervised independent experimental project.

**Texts**  To be advised

754100 Psychology IV

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

**Hours**  To be advised

**Examination**  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**

**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  (Aahuus 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)

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

Hours
9 formal hours of lectures per week and involves, in addition, 2 full days of clinical practicum per week; the part-time course extends over 2 years.

Examination
Professional proficiency is evaluated through examinations and the continual assessment provided by reports of academic and field supervisors. Written contributions are required in the form of research reports and essays. Familiarity with relevant legal acts and regulations and professional codes is required. Special study in certain areas may be required.

Thesis
A thesis will be required embodying the results of a research investigation in an approved clinical area.

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

(i) Psychodiagnostic practicum (interview, psychometric and neuropsychological techniques and interpretations).
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.


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. Topics G and H cannot be taken singly and students selecting them to make up a subject must nominate that subject Geography IIC.

LIST OF TOPICS FOR PART II GEOGRAPHY

<table>
<thead>
<tr>
<th>Topic</th>
<th>Corequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Economic Geography</td>
</tr>
<tr>
<td>B</td>
<td>Historical and political geography</td>
</tr>
<tr>
<td>C</td>
<td>Urban social geography</td>
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<tr>
<td>D</td>
<td>Development geography</td>
</tr>
<tr>
<td>E</td>
<td>Climatology</td>
</tr>
<tr>
<td>F</td>
<td>Geomorphology</td>
</tr>
</tbody>
</table>

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 relevant variables in the location decision making process are discussed in the context of various theories of
location with reference to specific case studies in both developed and developing worlds.

**Text**

Nil.

**352102 Topic B—Historical and Political Geography—J. C. R. Camm**

**Content**

An introduction to the methods and concepts of historical and political geography. These are explored with reference to aspects of the geography of Western Europe and the British Isles.

**Text**

To be advised.

**352103 Topic C—Urban Social Geography—D. N. Parkes**

**Content**

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

**Text**

To be advised.

**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**

To be advised.

**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**

Linacre, E. & J. Hobbs

*The Australian climatic environment* (Wiley 1977)

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

**Content**

Geomorphic processes and problems of historical geomorphology.

**Text**

Nil.

**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, D. N. Parkes**

**Content**

The elements of geographic data processing.

**Text**

To be advised.

**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>Prerequisite</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>
</tr>
<tr>
<td>N'</td>
<td>Genetic geomorphology</td>
</tr>
<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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</tbody>
</table>
### 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 IIIB.

### 353101 Geography IIB

**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.

**Texts**  
- Wiesner, C. J. *Climate, irrigation and agriculture* (Angus & Robertson 1970)

#### 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.

**Texts**  

#### 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**  
- Bates, M. *The forest and the sea* (Vintage paperback 1960)
- Kellman, M. C. *Plant geography* (Methuen paperback 1975)
- Leopold, A. *A sand country almanac, with other essays on conservation from Round River* (Oxford U.P. paperback 1966)

#### 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

**Content**  
The study of human behaviour in urban systems with an emphasis on temporal characteristics.

**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, P. G. Irwin

**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 three basic sections: identification of the relevant tools for interpretation; study of the history of geography through the history of cartography; study of sample texts from the mid-19th century and the period after 1960.


Text
Nil.


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
To be advised

Examination
To be advised

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

Seminars and field work will be offered in the following:—

(a) 354101 The impact of man and society on nature.

(b) 354102 A systematic topic approved by the Head of the Department.

References
To be advised
Part I Subject

661100 Mathematics I

Prerequisites Nil

Hours 4 lecture hours and 2 tutorial hours per week

Examination Two 3-hour papers

Content

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

Part I Topics

Algebra (topic AL)—R. B. Eggleton

Prerequisites Nil

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

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

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

References
Brisley, W. A Basis for Linear Algebra (Wiley 1973)
Kolman, B. Elementary Linear Algebra (Macmillan 1977)
Liebeck, H. Algebra for Scientists and Engineers (Wiley 1971)
Lipschutz, S. Linear Algebra (Schaum 1968)
Tropper, M. A. Linear Algebra (Nelson 1973)

Real Analysis (Topic AN)—R. F. Berghout

Prerequisites Nil

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

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

Text

References
Apostol, T. Calculus Vol. I 2nd edn (Blaisdell 1967)
Giles, J. R. Real Analysis—an Introductory Course (Wiley 1973)
Spivak, M. Calculus (Benjamin 1967)

Calculus (Topic CA)—M. J. Hayes

Prerequisites Nil

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


Text
Ayres, F. Calculus (Schaum 1974)

References
Apostol, T. Calculus Vol. I 2nd edn (Blaisdell 1967)
Hille, E. & Salas, S. First Year Calculus Internat. Textbook Series (Blaisdell 1968)
Spivak, H. Calculus (Benjamin 1967)

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

Prerequisites Nil

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


A requirement is the writing of successful computer programmes to solve problems in statistical and numerical analysis.

**Text**


**References**


Hoel, P. G. *Introduction to Mathematical Statistics* (Wiley 1971)

**Part II Subjects**

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

When selecting topics for Part II subjects, students are advised to consider the prerequisites needed for the various Part III subjects offered in the Faculty of Mathematics (Mathematics IIIA, Mathematics IIIB, Statistics III and Computer Science III).

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**LIST OF TOPICS FOR PART II MATHEMATICS**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Corequisite or Prerequisite Topic</th>
<th>Part III Topic</th>
<th>Requirement this Part II Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Mathematical Models</td>
<td>CO or C*</td>
<td>—</td>
</tr>
<tr>
<td>B</td>
<td>Complex Analysis</td>
<td>CO or C*</td>
<td>Q</td>
</tr>
<tr>
<td>C</td>
<td>Vector Calculus &amp; Differential Equations</td>
<td>M, N, P, PD, Q, S, TC, Y, Z</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Linear Algebra</td>
<td>—</td>
<td>M, N, P, PD, Q, S, TC, Y, Z</td>
</tr>
<tr>
<td>E</td>
<td>Numerical Analysis &amp; Computing</td>
<td>—</td>
<td>T, X, Z</td>
</tr>
<tr>
<td>F</td>
<td>Finite Mathematics</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>G</td>
<td>Probability &amp; Statistics</td>
<td>—</td>
<td>—</td>
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<tr>
<td>H</td>
<td>Applied Statistics</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>I</td>
<td>Topic in Applied Mathematics e.g. Dynamics</td>
<td>CO or C*, E*</td>
<td>—</td>
</tr>
<tr>
<td>J</td>
<td>Topics in Pure Mathematics e.g. Group Theory</td>
<td>—</td>
<td>FM, O, T, X</td>
</tr>
<tr>
<td>K</td>
<td>Analysis of Metric Spaces</td>
<td>—</td>
<td>FM, O, P, V, W</td>
</tr>
</tbody>
</table>

*No longer offered*

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

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76
Pre-or Corequisite: Mathematics IIA

Hours: 4 lecture hours and 2 tutorial hours per week

Examination: Each topic is examined separately

Content:
Topics K, L and one of the pairs of topics G and J, H and I or G and H. Students who may wish to proceed to Statistics III as a Part III subject should select topics H and I. Subject to the consent of the Head of Department one topic from A to J may be substituted for one of the topics I or J.

Texts for Part II Topics

662101 Topic A—Mathematical Models
Nil

662102 Topic B—Complex Analysis

662109 Topic CO—Vector Calculus and Differential Equations

Notes:
1. Mathematics IIB is no longer offered in two parts in the Faculty of Science.
2. Students who passed Mathematics IIB part (i) before 1971 should consult Note 1 on page 90 of the 1971 handbook.
3. Mathematics IIA is a corequisite or prerequisite for Mathematics IIC.
4. In order to pass all topics A to H above and offer them for examination.
5. Students whose courses include Physics IIIA are advised to include topics CO, H and one of B, D or F in their Part II Mathematics subjects. This may require the use of the substitution rules.
6. Students who passed a Part II Mathematics subject prior to 1974 and who wish to take further Part II Mathematics subjects should note that the topic coded "L" in 1974-78 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.

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

662202 Topic F—Numerical Analysis and Computing
Conte, S. D. & deBoor, C. Elementary Numerical Analysis (McGraw-Hill 1972)

662203 Topic G—Finite Mathematics
Nil

662204 Topic H—Probability and Statistics
Freund, J. E. Mathematical Statistics 2nd edn (Prentice-Hall 1971)
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)

662302 Topic J—Topic in Applied Mathematics
Nil
e.g. Dynamics

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. Students wishing to proceed to Honours in Mathematics are required to take both Mathematics IIIA and IIB or Mathematics IIIA and Computer Science III.
Passes in both Mathematics IIA and IIC are prerequisite for entry to Mathematics IIIA, and Mathematics IIIA is pre- or corequisite for Mathematics IIIIB. It will be assumed that students taking a Part III subject in 1979 have already studied topics CO, D, K and L in 1978 (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, and students wishing to enrol in Computer Science III should note that topics O, PL, TC and Z may be chosen as topics in either Mathematics IIIA or Computer Science III, but not both.

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

LIST OF TOPICS FOR PART III MATHEMATICS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM</td>
<td>Foundations of Mathematics</td>
</tr>
<tr>
<td>M</td>
<td>General Tensors</td>
</tr>
<tr>
<td>N</td>
<td>Variational Methods</td>
</tr>
<tr>
<td>O</td>
<td>Mathematical Logic</td>
</tr>
<tr>
<td>P</td>
<td>Ordinary Differential Equations</td>
</tr>
<tr>
<td>PD</td>
<td>Partial Differential Equations</td>
</tr>
<tr>
<td>PL</td>
<td>Programming Languages and Advanced Applications in Computing</td>
</tr>
<tr>
<td>Q</td>
<td>Fluid Dynamics</td>
</tr>
<tr>
<td>R</td>
<td>Theory of Statistics</td>
</tr>
<tr>
<td>S</td>
<td>Geometry</td>
</tr>
<tr>
<td>T</td>
<td>Group Theory</td>
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<tr>
<td>TC</td>
<td>Theory of Computing</td>
</tr>
<tr>
<td>U</td>
<td>Design and Analysis of Experiments</td>
</tr>
<tr>
<td>V</td>
<td>Measure Theory and Integration</td>
</tr>
<tr>
<td>W</td>
<td>Analysis of Normed Linear Spaces</td>
</tr>
<tr>
<td>X</td>
<td>Rings and Fields</td>
</tr>
<tr>
<td>Y</td>
<td>Theory of Probability</td>
</tr>
<tr>
<td>Z</td>
<td>Mathematical Principles of Numerical Analysis</td>
</tr>
</tbody>
</table>

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

"This topic will not be offered in 1979.

663200 Mathematics IIIB

**Pre- or Corequisite**  Mathematics IIA

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

**Examination**  Each topic is examined separately

**Content**  A subject comprising four topics, 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.

663300 Statistics III

**Prerequisites**  Mathematics IIA and IIC (including topics H, I and CO).

**Hours**  Four lecture hours and two 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. 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
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.
RESEARCH IN THE FACULTY OF SCIENCE

DEPARTMENT OF BIOLOGICAL SCIENCES

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

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

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

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

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

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

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

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

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

DEPARTMENT OF CHEMISTRY

Research Interests

The special interests of the Department are listed below. The overall programme provides sufficient overlap for effective internal discussion and criticism.

Analytical Chemistry (Professor W. F. J. Pickering)

studies of the role of solution equilibria in reactions involving a solid phase and a solvated species; development of methods, environmental chemistry.

Chemical Education

development of new experiments for undergraduate courses in Chemistry.

Molecular Structure (H. R. Tietze)

X-ray structure determination of selected inorganic crystalline solids.

Electrochemistry (Dr R. A. Fredlein)

electrosorption at solid metal-solution interphases and catalysis of the electroreduction of oxygen on oxide bronzes.

Applied Spectroscopy (Dr R. P. Cooney)

laser Raman and infrared spectroscopy applied to catalysis, electroreduction, corrosion and the co-ordination chemistry of ore deposition.

Metal Complexes (Associate Professor W. R. Walker)

studies of Interactions of Metal ions with biogenic amines, amino acids, drugs, purines, pyrimidines; both in vivo and in vitro.

Natural Products (Associate Professor H. Duewell)

elucidation of the components of Xanthorrhoea resin and the synthesis of related compounds. 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.

Organic Synthesis and Medicinal Chemistry (Dr K. H. Bell)

development of new, selective reactions. Preparation, properties and mode of action of local anaesthetics and strong analgesics.

Radiochemistry and Radiation Chemistry (E. B. Jacobs)

tracer applications for determination of equilibrium constants and rate constants in solvent extractions. Kinetics of ion transport in plants and plant tissue.

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

synthesis with particular reference to the preparation of new fungicides and plant growth regulators and studies of their mode of action. Mass spectral fragmentation of organic molecules.

Thermodynamics (Associate Professor G. C. Curthoys)

absorption on solids from gaseous and liquid phases. Zeolites; structure and properties.

Chromatographic methods of Analysis (Dr G. Orr)
DEPARTMENT OF GEOLOGY

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

Professor B. Nashar is investigating the mineralogy, geochemistry and genetic relations of the Carboniferous and Permian andesitic associations of eastern New South Wales. Her other interest is in the conditions of formation of secondary minerals in basic lavas.

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

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

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

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

Dr R. Offler is carrying out investigations on the low grade metamorphic rocks of Carboniferous and Devonian age, north of Newcastle, and of Cretaceous and Tertiary age, Peru, South America. He is also carrying out a joint project with Professor Diesel on the relationship between metamorphic grade and reflectance of coalified and graphitised plant fragments.

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

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

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

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

DEPARTMENT OF PHYSICS

Airborne infra-red (Professor Ellyett, Dr Chandra, Mr Pratt)

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.

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 plasmon oscillations on metal surfaces and their dependence on adsorbed gases. A retarding field low energy electron spectrometer is under construction for the analysis of the spectra of thermally simulated exoelectrons.

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

Geomagnetic 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
of this research.

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

DEPARTMENT OF PSYCHOLOGY

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

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

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

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

Cross-Cultural Research
The development of values and the relationship between norms, behaviour, alcohol and youth culture are being studied with an international team from the U.S.A., Norway and France. Research on the role of language and the concept 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. Pattern preference in infants is being studied using fixation data and autonomic measures.

Educational Psychology
In a study of the social psychology of the classroom the development of social skills, the social learning of isolated children and small group interaction are being examined.

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

Mathematical Psychology
In mathematical psychology, experimental studies of new methods of measuring abilities and personality are continuing. Stochastic process models for decision making in information processing tasks are being explored. Work on the computer control of real-time psychological experimentation is being pursued.

Physiological Psychology
Physiological and biochemical systems involved in behaviour are being investigated with both human and infrahuman subjects. Drugs and evoked responses in the nervous system are being used to study children with reading difficulties. Central nervous control of the autonomic nervous system in stress and aversive learning is being investigated, with special emphasis on catecholamines and neuropeptides. Several parameters of the cardiac response during a range of behaviours, e.g., aversive conditioning, open field activity, are being investigated using biofeedback and telemetric devices.

DEPARTMENT OF GEOGRAPHY

Biogeography
Altitudinal gradation of rainforest at Barrington Tops. Vegetation on lime-rich rocks of the Upper Hunter (J. C. Turner)
Climate
Microclimatology in vineyards (G. N. McIntyre)
Air pollution on a meso and micro scale; solar radiation; climatic change (H. A. Bridgman)

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

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

Geomorphology
Suspended-sediment and solute transport from Congewai Creek drainage basin (R. J. Loughran)

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

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

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

DEPARTMENT OF MATHEMATICS

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

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 non-equilibrium phenomena in gases, using the Master Equation approach.

Combinatorial Theory and Operations Research
Dr R. B. Eggleton is interested in all aspects of combinatorial mathematics, particularly graph theory.
Professor R. W. Robinson is applying combinatorics to the counting of various structures, such as graphs and search trees.
Dr R. J. Vaughan is interested in the application of optimisation methods to industrial production problems.
Associate Professor W. D. Wallis is carrying out research on block designs and graph theory.

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 and urban sociology.

**Fluid Mechanics**

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

Dr W. T. F. Lau is concerned with potential flow and viscous flow problems. 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. Attention is being given to the generalising of this work to convex analysis.

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 who are active in the study of signal processing. This work involves the study of non-linear systems with stochastic inputs.

**Lexicostatistics**

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

**Mathematical Models of Tumour Growth**

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

**Medical Statistics, Epidemiology**

Dr R. W. Gibberd and Dr A. J. Dobson are collaborating with the Medical Faculty in analysing mortality data in Australia and smaller areas in New South Wales, as well as data coming from the Hunter Valley heart attack study.

**Models of Learning**

Dr A. J. Dobson works on the mathematical formulation of learning theories and on the statistical analysis of experimental data.

**Number Theory**

Dr R. B. Eggleton is interested in number theory, particularly in combinatorial aspects of the subject.

Dr T. K. Sheng studies the structure of humanly manageable numbers, application of dispersive and explosive linear operators, distribution of algebraic numbers in the complex plane, and functions defined on rational numbers. Lines determined by lattice points and application of the results obtained to statistical mechanics are studied. 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**

Dr A. J. Dobson is interested in circular distributions, non-linear estimation problems and the application of statistics to psychology.

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

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