# IMPORTANT DATES

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Date</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>January</td>
<td>5</td>
<td>Tuesday</td>
<td>Re-enrolment for previously enrolled students to Friday 15 January inclusive</td>
</tr>
<tr>
<td>March</td>
<td>1</td>
<td>Tuesday</td>
<td>Orientation Week begins</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Monday</td>
<td>First Term begins</td>
</tr>
<tr>
<td>April</td>
<td>1</td>
<td>Friday</td>
<td>Good Friday: University holiday to Tuesday April 5</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Monday</td>
<td>Anzac Day: University holiday</td>
</tr>
<tr>
<td>May</td>
<td>6</td>
<td>Friday</td>
<td>Science Lecture Term ends</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>Monday</td>
<td>Science examinations to Friday 27 inclusive</td>
</tr>
<tr>
<td>June</td>
<td>13</td>
<td>Monday</td>
<td>Queen's Birthday: University holiday</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Tuesday</td>
<td>Second Term begins</td>
</tr>
<tr>
<td>August</td>
<td>5</td>
<td>Friday</td>
<td>Science Lecture Term ends</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Monday</td>
<td>Science examinations to Friday 19 inclusive</td>
</tr>
<tr>
<td>September</td>
<td>5</td>
<td>Monday</td>
<td>Third Term begins</td>
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<tr>
<td>October</td>
<td>28</td>
<td>Friday</td>
<td>Science Lecture Term ends</td>
</tr>
<tr>
<td>November</td>
<td>7</td>
<td>Monday</td>
<td>Science examinations begin</td>
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Notes: 1. Labour Day, Melbourne Show Day and Melbourne Cup Day are not University holidays.

THIS HANDBOOK CONTAINS:

1. The courses offered by the faculty of Science.
2. The relevant University regulations.
3. Other information of importance to students.

This handbook is your book of rules for work towards a Science degree.

Read it carefully and use it to select combinations of units which will allow you to take the units you wish in subsequent years.

Consult faculty or departmental advisers before making your final enrolment.

The complete Statutes and Regulations of the University may be found in the University Calendar which may be seen in the Baillieu Library or bought at the University Bookroom.

Prospective students are referred to another booklet Guide to Courses in Science which is distributed to most Victorian secondary schools. A condensed version, Introduction to Courses in Science, is available from the Science Faculty office.

The Science Faculty Handbook should be read in conjunction with the Student Diary and Directory issued free to all enrolling and re-enrolling students.

A map of the University will be found in the Diary.

In exceptional circumstances the Council is empowered to suspend subjects and to vary the syllabus of a subject. Details of any such alteration will be available from the faculty office and will be announced on departmental noticeboards.
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PREFACE

This handbook is a guide and reference for students, lecturing staff and course advisers for the difficult but exciting task of choosing courses of study in Science. Your course selection is a balance between previous studies and achievements, career choice, personal interest and a desire to obtain a basic scientific education at the tertiary level. It is the established policy of the faculty of Science to make every effort to encourage its students to follow their individual course selections: sometimes practical considerations such as the number of places available can impose limitations.

The faculty of Science offers a wide range of units from which students may select a course for the pass degree of B.Sc. Those students intent on a greater scientific specialization must continue with further studies. The B.Sc. honours degree offers a specialization in a particular branch of Science for which the student has shown a preference during the work for the pass degree. Conditions of entry for the honours degree and its value as a means of entry to the studies for M.Sc. or Ph.D. are described in the later chapters of this book. Whether you wish to obtain a scientific orientation for your career, or to specialize in a certain field of scientific endeavour through full-time or part-time courses, I hope this handbook will be of assistance to you.

For those who are coming to this university for the first time, I welcome you warmly on behalf of the faculty of Science. For those previously enrolled, may you find an ever-increasing interest and satisfaction in the course you have chosen.

THOMAS W. HEALY,
DEAN, FACULTY OF SCIENCE
CHAPTER 1

GENERAL INFORMATION FOR SCIENCE STUDENTS

COURSES IN SCIENCE

For general information on courses, prospective students are referred to the faculty publication *Guide to Courses in Science.*

Subjects in the faculty of Science are called units. Points are awarded for the successful completion of each unit and students must select courses to obtain the required number of points for each year of study. Units vary considerably in the number of lectures and associated work and therefore also in points score. Examinations are usually held at the end of the term in which the unit is completed.

Students should note that the terms "major", "major studies" and "majoring" commonly appear in departmental entries in the Handbook. These terms do not have formal status as far as fulfilling Degree requirements or recording of results are concerned, but are intended to be a guide for students who wish to undertake a B.Sc. course with a particular discipline as a significant component of that course.

**Bachelor of Science**

Undergraduates entering the faculty of Science to qualify for the degree of B.Sc. undertake a three year full-time course. The degree is completed by accumulating 100 points as credit for subjects passed. The majority of students undertake a course which includes a progressive study to third year level of a major branch of Science, together with other supporting subjects. This prepares the graduate to undertake research, to work in industry or to teach in her or his particular specialization. It is also the normal preparation for further study leading to higher degrees. However, considerable flexibility is possible in course planning, and a very wide variety of courses can be planned to meet a student's individual needs and interests.

**Bachelor of Science (Honours)**

This is a degree which includes a greater depth of study in the student's chosen specialization. This may take the form of formal advanced study and/or investigation within the University during the fourth year. This course is the normal method of commencing higher degree study.

**Bachelor of Science (Optometry)**

This degree is obtained on the completion of a prescribed four year course, details of which are given in Chapter 6. The course provides professional qualification for the practice of optometry and graduates are entitled to be registered as optometrists under the various State Acts which govern the practice of optometry in Australia. Students may enter the course at either the first year or second year level. Those seeking
entry at second year complete the equivalent of the first year units as bachelor of science students either at this or another University. The second and third years of the course involve study of the life sciences and the visual sciences; the final year involves clinical training. Students may terminate the course at the successful completion of third year and be admitted to the BSc degree or may proceed to complete the fourth year to obtain professional qualification in optometry.

Master of Science

This degree may be obtained on the completion of not less than one year's advanced studies with experimental and observational work, subsequent to the completion of the course for the BSc (Honours) degree. The work must be undertaken within the University, unless the candidate has obtained special permission from the faculty of Science to work elsewhere.

Bachelors of Science of at least four years' standing may qualify for the Master's Degree on submission of a satisfactory thesis based on original work in a branch of Science approved by the faculty.

Master of Science in Optometry

This degree may be obtained on the completion of not less than one year of advanced study and research following the completion of the BSc Optometry degree or an equivalent qualification. The degree may also be obtained after two years of advanced study, clinical training and training in research. Students are required to submit a thesis reporting the research they have undertaken. Normally the degree is undertaken full time within the department of Optometry, but part time study toward the degree is possible. In addition a graduate of at least three years' standing may submit a thesis for examination which reports original research work or an investigation related to optometry undertaken outside the University. The regulation for the degree will be found in Chapter 10.

Doctor of Philosophy

This is a university degree as distinct from a faculty degree. See Regulation 3.60 in University Calendar.

Doctor of Science

This degree is gained by thesis only. Candidates must be Bachelors of Science of at least five years standing or graduates of the same standing in another faculty who satisfy the faculty of Science that they have received an adequate scientific training. They must have already made substantial published contributions to Science, and may submit their published work together with any unpublished work they may deem appropriate. The subject or subjects dealt with must be approved by the faculty. Three copies of each thesis must be submitted. See Chapter 11 for details.
Faculty of Science

COMBINED COURSES

Science/Engineering (Electrical)
Details of the Science/Engineering (Electrical) course are set out in Chapter 5 under Engineering.

Science/Law
This course consists of the full Law course plus at least 66 Science points to include a minimum of 16 points at the 100-level and a recommended minimum of 18 points at the 300-level. Students should note that prerequisite requirements for 200-level units may include more than the minimum 100-level points. In such a situation students will be expected to complete all prerequisites before permission for proceeding to the next level is given. Also entry into the B.Sc.(Hons.) course is based in part on students achieving a faculty score of at least 65 based on the best 36 300-level Science points attempted. The course would normally take about five years to complete. Students will need to be accepted by both the Faculties of Law and Science before commencing this course. Students who wish to undertake a Law/Science course should approach the Student Adviser (Science) and the Assistant Registrar (Law) for guidance on the details of the course and the method of application.

Other Courses
Arrangements can be made for students to study for another degree or diploma concurrently with their Science degree. Courses of most interest and greatest career value for Science students are Arts and Commerce. Students who gain admission to Science and who wish to undertake another course at the same time should approach the Student Adviser (Science) for guidance on the method of applying for another course.

SUBJECTS FROM OTHER FACULTIES
Students enrolled for B.Sc. may, with permission, take subjects available in other faculties up to a maximum of 20 points value. Details of these subjects may be obtained from the handbooks of other faculties in the University or from the faculty offices. The Student Adviser (Science) must be consulted in advance. See also Faculty Rules on this matter in Chapter 5.

PART-TIME STUDY
Part-time study may be undertaken but because few units are offered in the evening, students wishing to study part-time will at most stages in their course be required to take lectures and practical classes during the day-time.
Evening lectures are given in a limited number of units. For details, refer to the timetable.
The Part-Time and External Students’ Association provides an opportunity to meet other part-time students. They can be contacted by leaving your name and address in Box 28, Union Basement.

ATTENDANCE AT THE UNIVERSITY
Attendance at the University is compulsory for all subjects of the Science courses except those subjects which may be undertaken externally as shown below.
Any student absent during the year should notify the Assistant Registrar, (Science), of the dates of absence and the reason together with medical certificate if appropriate. Such information may be considered in conjunction with assessment results.
General Information for Science Students

TIMETABLE
The annual timetable for all Science students is published in December of the previous year and is available from the Science faculty office.

SUMMER LECTURES
Summer lectures may be given in the following unit:
Computer Science 113
Details of the closing date for enrolment for summer lectures will be available from the faculty office.

ADDITIONAL SUBJECTS
The faculty offers a limited number of units for study on a single subject basis depending on the availability of places in quotas after students enrolled for degree courses have been accommodated. Applications close on 31 January. Application forms are obtainable from the faculty office.

EXTERNAL STUDIES
An external student is regarded as one who is residing in Victoria but outside the metropolitan area.
With the approval of the faculty and subject to selection in any quotas operating (see details regarding application and enrolment), the following subjects may be undertaken.
History and Philosophy of Science Unit 103. It may be possible to take other H.P.S. units externally. Interested students should consult the department. Some notes, lists of references and example sheets are sent by post and work may be sent in for correction.

DEPARTMENTAL LIBRARIES
In addition to facilities at the Baillieu and the various Branch libraries the following departments have libraries which may be used by students taking units in these departments:
Geology Microbiology
History and Philosophy of Science Optometry
Meteorology Pharmacology

SCIENCE STUDENTS' SOCIETY
The Science Students' Society is a student organization which plays an important part in the life of the faculty. The Society annually arranges the election of students to act as representatives on the Science faculty and its committees. In this way the Science Students' Society is able to present the student attitude in a formal way to the academic staff of the faculty. By its activities the club helps to provide a broader outlook on science, which cannot be presented in lectures, and to increase contact between students of the various departments.
The society also caters for the social welfare of science students by arranging inter-faculty sporting contests, the annual Science Ball and numerous informal social functions throughout the year. It is very active during Orientation Week and conducts welcoming lectures, guided tours of science departments, and a guidance centre offering advice to new science students.
This society is run by Science students, and students have every opportunity of taking part in its activities. Further details are available from the Science Students' Common Rooms located in the basement of the Physics Annexe.
CHAPTER 2

FOR STUDENTS INTENDING TO ENTER THE FACULTY OF SCIENCE

PREREQUISITES

In addition to satisfying university entrance requirements, applicants must also have satisfied the special course requirements. The prerequisites for admission to the course for the degree of Bachelor of Science or Bachelor of Science in Optometry are a grade of D or higher in a branch of Mathematics and at least one of Chemistry or Physics at the Victorian Certificate of Education (formerly H.S.C.) examination or its equivalent. Exemptions from the prerequisites may be granted in the case of:

(i) applicants who have completed at least the first year of another tertiary course;
(ii) applicants who attempt the V.C.E. (H.S.C.) examination under Mature Age provisions; such students must pass in English and in at least one of the prerequisite subjects, but it is advisable for students to pass in two prerequisite subjects to allow for broader study scope at tertiary level;
(iii) applicants whose selection of prerequisite subjects was made impossible by some extraordinary circumstance;
(iv) applicants whose aggregate score is considered exceptional, despite the lack of prerequisites.

Exemption from the prerequisites is granted at the discretion of the faculty of Science after consideration of an applicant's circumstances and academic record. Further enquiries should be made with the Assistant Registrar (Science).

QUOTAS AND SELECTION

There are approximately 730 places available for first year students in the faculty of Science, but because of shortages of accommodation each subject in the course is subject to quota. The basic subjects Chemistry, Physics and Mathematical Sciences are usually available to all students entering the faculty, but problems have arisen in accommodating all students who wished to enrol in Biology and Psychology in previous years.

The principles governing selection are set out in the University’s Prospectus and may also be seen at the faculty office. For applicants sitting the Victorian Certificate of Education (V.C.E.), selection is based on their performance at these examinations. The quota score used is the normal Victorian Tertiary Admissions Centre (V.T.A.C.) score. Bonuses are allowed for extra subjects and a debit is applied for a second attempt. For details see the V.T.A.C. Guide for Prospective Students. Students who have obtained qualifications by other means, either within Victoria or elsewhere, will be ranked as far as possible on a comparable...
For Students Intending to Enter the Faculty of Science

scale with V.C.E. applicants. Such students will be required to provide full documentation of their academic history. They may be asked to undertake a test in Chemistry, Physics and Mathematics at V.C.E. standard.

CREDIT FOR WORK COMPLETED AT OTHER INSTITUTIONS

Credit towards the B.Sc. may be granted for work completed in other faculties or universities or in other tertiary institutions. Students who have completed a full first year in a science or science-based course at an Australian university may receive 32 points credit which is a normal first year load in the faculty. Students who have completed two full years of a science course at an Australian university may receive credit up to a maximum of 60 points. Credit for students who have completed work in other types of courses or in other tertiary institutions is assessed on an individual basis.

It should be noted that the faculty draws a distinction between granting of credit and satisfaction of prerequisites for particular later year units. Credit is a faculty responsibility and is granted in points value (e.g. 32 points of 100-level credit). Prerequisites are a departmental responsibility; departments will consider the syllabus of a student's previous course and determine whether it is an adequate preparation for the later year units to which entry is sought.

Further information about the faculty's policy on credit may be obtained from the Assistant Registrar (Science) or the Student Adviser (Science).
CHAPTER 3

FOR NEW UNDERGRADUATE STUDENTS

COURSE PLANNING AND APPROVAL

New students planning courses should study carefully this handbook and *Guide to Courses in Science*. For further information on courses or units, consult the Student Adviser, Science faculty office or contact a course adviser in the department relevant to your interest (see below). After selection, all new students are interviewed and asked to nominate the branch of Science in which they wish to major; their course is then planned and approved with this in mind, allowing the maximum flexibility possible for future studies.

See also the *Student Diary and Directory* for enrolment and matriculation procedures and note carefully the instructions displayed at Student Administration or at the point of enrolment.

COMBINED COURSES

Students must consult with representatives of each of the faculties concerned for approval of course. They should then enrol.

FIRST YEAR CO-ORDINATORS

The following members of the academic staff have special responsibility for co-ordinating first year studies in their departments and are available for advice and assistance.

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<tr>
<th>Department</th>
<th>Advisers</th>
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<tr>
<td>Director of First Year Studies</td>
<td>Dr P. Y. Ladiges (Botany)</td>
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<tr>
<td>Biology</td>
<td>Dr B. T. O. Lee</td>
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<td>Botany</td>
<td>Dr O. B. Lawson</td>
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<tr>
<td>Chemistry</td>
<td>Dr V. M. McRae</td>
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<tr>
<td>Genetics</td>
<td>Dr J. A. McKenzie</td>
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<tr>
<td>Geography</td>
<td>Dr B. L. Finlayson</td>
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<td>Geology</td>
<td>Dr R. W. Le Maitre</td>
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<td>Mathematical Sciences</td>
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<td>Meteorology</td>
<td>Dr M. J. D. Jenssen</td>
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<td>Physics</td>
<td>Dr G. G. Shute</td>
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<td>Psychology</td>
<td>Dr N. E. McMurray</td>
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<tr>
<td>Statistics</td>
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<td>Zoology</td>
<td>Dr B. K. Evans</td>
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DEPARTMENTAL COURSE ADVISERS

<table>
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<tr>
<td>Anatomy</td>
<td>Dr D. Alcorn; Dr R. Perry; Dr A. Goodwin; Dr C. Briggs</td>
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<tr>
<td>Biochemistry</td>
<td>Mr M. A. Marginson</td>
</tr>
<tr>
<td>Biology</td>
<td>Dr J. McKenzie; Dr B. T. O. Lee; Dr P. Ladiges</td>
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For New Undergraduate Students

Botany
Chemistry
Computer Science
Electrical Engineering
Genetics
Geography
Geology
History and Philosophy of Science
Marine Sciences
Mathematics
Meteorology
Microbiology
Optometry
Pathology
Pharmacology
Physics
Psychology
Statistics
Surveying and Land Information
Zoology

Dr P. Attiwill; Dr O. B. Lawson; Dr D. M. Calder
Dr V. McRae (Co-ordinator)
Dr P. G. Thorne; Professor P. Poole
Dr J. Badcock
Dr J. McKenzie
Dr E. C. F. Bird; Dr B. L. Finlayson
Dr R. W. Le Maitre (Co-ordinator)
Dr K. R. Hutchison; Dr H. E. LeGrand
Dr R. Wetherbee (Botany); Dr R. Day (Zoology);
Dr R. B. Johns (Chemistry); Mr M. Marsden (Geology)
Mrs D. Morley; Dr J. Koliha; Dr W. W. Wood
Dr T. Gibson; Dr R. C. Lile
Dr R. Wilkinson; Dr W. Boyle; Dr C. Cheers; Dr D. Graham;
Dr B. Hodgson; Dr I. Holmes
Professor B. L. Cole
Ms M. M. Ayers; Dr R. N. Le Page; Dr M. S. Sandrin
Dr D. F. Story; Dr R. J. Summers; Professor M. J. Rand;
Dr D. D. Leaver; Dr M. R. Fenessy; Dr M. W. Nott
Dr R. Warner
Dr J. S. McKenzie
Dr N. E. McMurray; Mr G. Bates; Mr F. Findlay
Dr K. Sharpe; Dr R. K. Watson; Dr H. Cohn
Mr S. G. Bervoets
Dr J. R. McLean

CHANGES TO COURSES

Changes to courses will be approved during the following periods only:

Withdrawals
Withdrawals from units are normally permitted up to the end of the second week of a unit.

Additions
Additions of units are normally permitted, subject to the student’s overall points workload, up to the end of the second week of teaching of the unit concerned.

Changes to courses are not permitted without approval so that if you wish to change your course you must first call at the Science Faculty Office for an interview to obtain the necessary approval and change of authorization. If you are in doubt about the possibility of changes to your course you should call at the Faculty Office for an interview.
CHAPTER 4

FOR CONTINUING UNDERGRADUATE STUDENTS

COURSE PLANNING AND APPLICATION FOR SELECTION

All students enrolled in the faculty of Science in 1988 are required to submit in third term a course plan for approval for 1989. Interviews, which students must attend, are arranged with departmental course advisers. Students seeking information on courses or units prior to interview should consult with an appropriate course adviser (See Chapter 3.) At the interviews students are helped to plan their courses and course planning forms are completed. This constitutes application for selection. No further application for selection is required after the publication of results except from:

(a) those students who have any failure at the annual examination;
(b) any students who wish to alter their course plan.

These students are required to attend the faculty office for interview.

Students should note that, in 1989, the University will change to a semester-based teaching year. As a consequence, major course changes affecting most departments will come into effect in 1989 and the units listed in the 1988 Handbook will be substantially changed for 1989. Students will be notified of these changes well in advance of course planning week in September 1988.

DEPARTMENTAL SUGGESTED COURSES

The Faculty of Science has adopted the practice of each department proposing a suggested course which shows what the teaching staff in the Department believe to be a desirable combination of units. When planning their units for the next year students may follow a Department's suggested course, or students may include variations according to individual preference and unit availability. The suggested courses may be found at the beginning of the Details of Units for each Department.

ENROLMENT

See Student Diary and Directory.

PRINCIPLES OF SELECTION INTO UNITS FOR WHICH ENTRY QUOTAS HAVE BEEN IMPOSED

The following principles apply to the selection of students to enrol in units for which entry quotas have been imposed.

1. The Chairman of the relevant Department, or his or her nominee, acting on advice, shall rank students who have applied for selection into such units in order of merit lists and, subject to Paragraph 4 below, places in each unit will be offered in accordance with the relevant list until places available in the unit have been filled.

2. Students who in the preceding year were enrolled in the Bachelor of Science course in this University, or were on leave from that course, will be ranked in the relevant order of merit list having regard to:
For Continuing Undergraduate Students

(a) the student's results in previous University assessment in Science subjects;
(b) the student's results in first or second year level of relevant disciplines and in the unit's prerequisites;
(c) the approved course of study being undertaken by the student;
(d) the student's admission to one unit in relation to the student's admission to other units of his or her approved course;
(e) the likelihood of the student successfully completing the unit; and
(f) any special conditions set out in the details of subjects.

3. Regard will also be had to:
(a) any hardship affecting the student's previous tertiary results. (For example, illness or other serious cause beyond the student's control); and
(b) any hardship involved in the student not undertaking the unit.

4. Students who in the preceding year were not either enrolled in the Bachelor of Science course in this University, or on leave from that course, will be ranked in the order of merit lists having regard to Paragraphs 2 and 3 of these Principles as far as it is possible to equate each student's qualifications with the matters set out in those Paragraphs provided that a student who in the preceding year was not either enrolled in the Bachelor of Science course in this University, or on leave from that course, shall not displace from a unit a student who in the preceding year was enrolled in the Bachelor of Science course in this University, or was on leave from that course, and who, pursuant to Paragraphs 2 and 3 of these Principles, has been ranked in the first 80% of places in the quota for that unit.

In 1987 quota pressure occurred in the following units.
Anatomy 201, 204
Biochemistry 201, 202, 323.
Genetics all 300-level units
Microbiology 201, 202, 312, 313, 314
Pathology all 300-level units
Pharmacology 201
Physiology 201, 202, most 300-level units
Zoology 301.

SUBJECT/UNIT RESULTS INCLUDING CONCEDED PASSES

Official results will be expressed as letter grades, A (80 marks and above), B (70-79), C (60-69), D (50-59), E (40-49) and F (below 40), for all units.

Students may earn a conceded pass (ECP) for units in which they have obtained a mark between 40 and 49, in which case they are credited with the full points score for any unit so passed. In the awarding of conceded passes, each E result is considered in the light of a student's performance in all other units of equivalent or higher level, passed in all departments of the faculty, in the same academic year.

Conceded passes are awarded on the basis of a formula. Essentially, the formula has two principal rules:
(a) the sum of the points for which conceded passes may be awarded shall not exceed 4/7 of the sum of the points for all units genuinely passed; and

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(b) the total weighted excess of marks in units genuinely passed must exceed the total weighted deficiency of marks in the failed unit by a specified factor.

The general thrust of the formula is that, the lower the mark in the failed unit (to a minimum of 40), the greater must be the weighted average mark in the units passed in order to generate a conceded pass. Details of the conceded pass formula, as approved by Faculty and the Academic Board, are available from the Student Adviser.

Following the publication of final results of a unit, the faculty has agreed that students should have an opportunity to see their own examination paper in consultation with the examiner if they so wish.

SPECIAL CONSIDERATION

See entry in Student Diary and Directory.

Students who are unsure whether to apply for special consideration should consult the Student Adviser.

UNSATISFACTORY PROGRESS

The Faculty of Science, in accordance with the provisions of Reg. 2.5, reviews annually the academic progress of all undergraduate students. Students whose progress is considered to be unsatisfactory are given an opportunity to make a written submission or to appear before Faculty's Student Progress Committee, or to do both.

The Committee's function is to consider the student's results and any extenuating circumstances in order to determine the best proposal for the student's academic future and to ensure that quota places are filled by students most likely to succeed in their courses.

In considering a student's progress the committee would normally take into account personal, financial and study problems. In accordance with the requirements of Regulation 2.5, Faculty considers that students who have passed 60% or more of the points attempted in any one academic year in any year of the course will be deemed to have made satisfactory progress. However, students who fail to pass 60% or more of the points attempted in any one year in any year of the course have in the opinion of Faculty not made satisfactory progress, and Faculty, having given the student the opportunity to appear before a Student Progress Committee, may make one of the following decisions:

1. In the absence of extenuating circumstances, students who fail to pass 50% or more of the points attempted in any one year in any year of the course will normally be recommended for suspension.
2. Students who pass more than 50% but less than 60% of the points attempted in any one year in any year of the course may be recommended for suspension if in the opinion of Faculty there are no extenuating circumstances.
3. After considering any extenuating circumstances, Faculty may impose course limitations on students who fail to pass 60% or more of the points attempted in any one year in any year of the course.

First-year students should note that they will not normally be allowed to proceed to 200-level units until they have credit for 20 points from 100-level units. Students may repeat failed first-year units while attempting a limited number of 200-level units, subject to the preceding limitation.
For Continuing Undergraduate Students

Students recommended for suspension have the right to be heard by the Academic Board, but if the Board confirms the recommendation the student is suspended from the course.

Students suspended from any course may apply for re-admission. If the Academic Board is satisfied that a student's condition or circumstances are so changed that there is a reasonable probability the student will make satisfactory progress, the Board may authorize the student's re-admission, imposing any conditions it determines to be necessary.

Re-admission is normally gained only after satisfactory completion of relevant studies at another institution.

USE OF ELECTRONIC CALCULATORS IN EXAMINATIONS

The conditions for use of electronic calculators in an examination shall be approved by the Dean of the Faculty on the recommendation of the Examination Board, subject to the following requirements:

1. Specified Use

   1.1 If it is required that students provide their own approved calculators for use in an examination, this requirement must be approved by the relevant Faculty and shall be included in the details of courses given in the Handbook.

   1.2 If calculators of a specified type are to be supplied to students for use in an examination, the following conditions shall be observed:

      (i) students must be informed no later than two weeks after the commencement of teaching in the subject or the unit.

      (ii) the Examination Board in the subject or unit must be satisfied that students are given adequate opportunity during the course to familiarize themselves with the type of calculator to be used in the examination.

      (iii) the Department concerned shall take the responsibility for arranging for the provision of accommodation, together with all necessary facilities and technical supervisory staff.

      (iv) the Department concerned shall be responsible for ensuring that suitable spares are available to provide for immediate replacement in the event of failure of a calculator supplied by the Department.

2. Permitted Use

   2.1 Use of calculators of an approved type may be permitted in an examination on the recommendation of the Examination Board in the subject or unit.

   The Examination Board shall take due account of possible disadvantages to students who do not have approved calculators when making this recommendation. (Possible disadvantages for students who normally use an electronic calculator shall also be taken into account in making a decision not to permit their use.)

   2.2 Students shall be advised at the commencement of the subject or unit if approved types of calculators will be permitted in the examination. In the absence of such advice it shall be assumed that calculators will not be permitted.
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Conditions under which programmable calculators may be used shall be prescribed by the examiner. It will be the responsibility of the examiner to ensure that any prescribed conditions are observed during the examination.

2.3 If calculators are permitted, an instruction to this effect shall be included in the examination paper. If no such instruction is included, calculators will not be permitted, unless the Chairman of the Examination Board, or an Examiner acting on his behalf, declares that the instruction was inadvertently omitted from the examination paper.

3. General Requirements

3.1 Calculators shall be portable, silent, self-powered and able to be accommodated on a standard examination table.

3.2 The serviceability of calculators may be checked by students during the reading time before the examination begins.

3.3 Students shall be responsible for ensuring the proper functioning of their calculators. Power failure or other faults in a calculator provided by a student will not normally be accepted as a basis for special consideration in examinations where use is on the permitted basis.

3.4 A student may not borrow a calculator from another student after entering the examination room.

3.5 Examiners and supervisors have the right to inspect any calculator being used in an examination.

LEAVE OF ABSENCE

Students who wish to interrupt their course must apply to the faculty for leave of absence, stating their reasons for the request. Leave of absence will usually be given for one year only.

Application forms are available from the faculty office.

FACULTY HONOURS

Honours grades are awarded on the basis of merit to some completing students to facilitate their selection into the B.Sc.Hons. course and for use by other bodies in awarding scholarships.

The formula is $\Sigma pm$ based on a student's best Science 300 level points $\frac{36}{36}$

up to a maximum of 36. ($p =$ points score, $m =$ marks obtained).

Students should note that Faculty Honours scores are calculated using the above formula irrespective of whether a student has actually completed 36 points at 300 level. Thus, a Faculty Honours score may be significantly reduced if fewer than 36 300-level points are attempted. This may have implications for admission to Honours candidature and for award of scholarships.
CHAPTER 5

BACHELOR OF SCIENCE

REGULATION

Regulation 3.20—Degree of Bachelor of Science

1. A candidate for the degree of Bachelor of Science shall, after matriculating, pursue his studies for at least three years, and pass examinations in accordance with the conditions prescribed.

2. The subjects of the course for the degree and the conditions on which such subjects may be taken shall be as prescribed from time to time by the Academic Board on the recommendation of the faculty and published with the details of subjects.

3. (1) During each Year a candidate shall attend classes and perform written, practical, laboratory, field and clinical work prescribed by the Academic Board on the recommendation of the faculty and published with the details of subjects unless he satisfies the faculty that he has had appropriate training elsewhere.

   (2) A candidate who enrolls for a second or subsequent time in any subject for which practical work is prescribed shall be required to repeat the whole of such practical work, save insofar as he is exempted by the head of the department responsible for such practical work.

4. (1) A candidate’s progress in his course of study shall be by years. Such years shall be defined by a cumulative total of points to be scored as a credit for examinations passed. The points to be scored for each subject of examination passed shall be as prescribed from time to time by the Academic Board on the recommendation of the faculty and published with the details of subjects.

   (2) A candidate shall be:

      (a) in the first year of his course until such time as his cumulative points score shall equal or exceed twenty-eight points;

      (b) in the second year of his course until such time as his cumulative points score shall equal or exceed sixty points;

      (c) in the third year of his course until such time as his cumulative points score shall equal or exceed one hundred points.

5. (1) A candidate who does not pass in a subject may be credited by the faculty with the points to be scored for that subject, having regard to his performance in all subjects taken by him (whether taken at one annual examination or more), in accordance with the principles determined by the faculty from time to time and approved by the Academic Board.

   (2) A candidate who has without passing in a subject been credited by the faculty with the points to be scored therefor shall not be permitted to proceed to a higher part of that subject, but shall be allowed to proceed with other subjects of a later year of the course for which a pass in that subject may be a prerequisite.
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6. No candidate may pursue a course of study or receive credit for examinations passed unless his proposed selection of subjects and the years of his course in which they are to be taken have been approved by the faculty. Any subsequent alterations in the course of study must be approved by the faculty.

7. Notwithstanding the provisions of section 2 a candidate may with the consent of the faculty and subject to any conditions prescribed by the faculty, undertake studies in a subject or subjects of a University course other than subjects prescribed pursuant to section 2 but the cumulative total points score to be allocated to such subject or subjects shall not exceed 20 points. The points to be obtained in passing the assessment in any such subject or subjects shall be as prescribed by the faculty.

8. A candidate who, having completed or simultaneously being a candidate for any other degree, enrols in the course for the degree of Bachelor of Science may, with the approval of the faculty, be given credit for subjects the equivalent of which have been passed by him in the course for such other degree. The total number of points to be so scored by him in respect of such subjects shall not exceed forty.

9. A candidate who has complied with the prescribed conditions and obtained a cumulative points score equal to or exceeding one hundred points may be admitted to the degree of Bachelor of Science provided that at least 80 of such points have been obtained as a result of satisfactory performance by the candidate in subjects prescribed under section 2 of this Regulation.

10. For the purposes of Regulation 6.1.2 courses in the faculty of Science shall not be deemed to be courses in which specific work is assigned to specific years or in which candidates are required to complete years, but prizes, exhibitions and scholarships in the subjects of the course shall be awarded on such conditions as shall from time to time be prescribed by the faculty and published together with the details of subjects.

11. In this Regulation the expression ‘subject’ shall include part of a subject.

B.Sc. COURSE—FACULTY RULES

1. Prerequisites and Special Conditions
   (i) Except where otherwise provided, or with the special permission of the Science Faculty, no candidates shall be admitted to examination in any unit of the course unless they have the specified prerequisite units, and satisfy any special conditions associated with that unit.

   (ii) A candidate who has, without passing a unit, been credited with the points for that unit (i.e. graded ECP), shall not proceed to higher level units in that course, but shall be allowed to proceed to higher levels of other courses for which a pass in that unit is a prerequisite.

   (iii) Credit is not normally available for both pass and honours level units of the same course.

2. For the purpose of Regulation 3.20
   (i) Each unit at first-year level shall be known as a 100-level unit, and shall be designated within the relevant department by numbers between 100 and 199.
(ii) Each unit at second-year level shall be known as a 200-level unit, and shall be designated within the relevant department by numbers between 200 and 299.

(iii) Each unit at third-year level shall be known as a 300-level unit, and shall be designated within the relevant department by numbers between 300 and 399.

3. Availability of Units

The Science faculty reserves the right not to offer a unit in a particular year if a minimum enrolment is not reached. The availability of some units will also depend on staffing.

4. Points Distribution

(i) An approved course of study must contain units selected from the 100 level such that the cumulative total of possible points scored as a credit for passing examinations in these units shall be not less than twenty-eight (28) nor more than forty-eight (48).

(ii) A first year student is one who has earned less than 28 points.

A second year student is one who has earned 28 or more but less than 60 points.

A third year student is one who has earned 60 or more but less than 100 points.

See Reg. 3.20.4.

5. Workloads

Set out below are details of workloads considered normal by the faculty for the various year levels. Heavier workloads may be approved in special circumstances by the Associate Dean (Students).

100-level

The minimum number of 100-level points required for a degree is 28, however, normal first year courses lie in the range 31 to 34 points.

200-level

Normal second year workloads lie in the range 33 to 38 points.

300-level

Normal third year workloads lie in the range 36 to 44 points.

(Thus it may be inferred that a ‘normal’ Science degree varies between 100 and 116 points.)

6. Non-Science Units

Students may, with faculty permission, enrol in subjects or units taught by other faculties (and not listed in the Science Handbook) up to a maximum of 20 points. Permission to enrol in such subjects or units will only be granted if it can be shown that the subjects/units concerned are relevant to the B.Sc. course and form part of an academically coherent programme. Permission to enrol in more than 8 points of non-science subjects is normally limited to cases where the enrolment occurs in two sequential years and where the unit(s) in the second year are in the same discipline as or build directly on the unit taken in the first year.

7. Transfers from other Universities or Institutions

Students who transfer to Science, having completed relevant subjects in other university courses or courses in approved institutions may be granted credit by the faculty for subjects deemed equivalent to Science units. The maximum number of points awarded to those transferring to BSc is sixty and those transferring to LLB/BSc is forty.
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8. Combined Courses and Credit for Graduates
Candidates who, having completed or being enrolled in a course for any other degree, are selected into the course for the degree of Bachelor of Science may with the approval of the faculty of Science be given credit for not more than forty points for work completed in such other course.

DETAILS OF UNITS
Vacation Reading: Students are advised that they are expected to use a considerable part of the summer vacation for reading purposes. In some cases specific references are made in the following details; in others, a list of suitable books will be posted on the appropriate notice boards, in all cases the lecturers concerned should be consulted.
Prescribed textbooks are essential, and students should possess them. Students are advised to consult their tutors or lecturers regarding the relative value of different recommended textbooks before purchasing.

200 AGRICULTURE AND FORESTRY
Science students should note that the unit, National Park and Urban Forest Management is available on a non-Science subject credit basis. See Faculty of Agriculture and Forestry Handbook for details.

516 ANATOMY

DEPARTMENTAL SUGGESTED COURSE
100-level Biology 101, or 102 ± 103; Chemistry 101; Physics 100 level and any 100 level Mathematical Sciences unit.
200-level Histology 201 and/or Human Anatomy 204 with 200 level units selected from Biochemistry, Chemistry, Genetics, Microbiology, Pharmacology, Physiology, Zoology.
300-level (a) Cellular and Developmental Biology 301 with other units in Anatomy, Biochemistry, Pathology, Physiology or Zoology.
(b) Neuroanatomy 302 with units of Neuropsychology or Neurophysiology.
(c) Neuroscience 303 with other units in Anatomy, Biochemistry, Pathology, Physiology or Zoology.

B.Sc.(HONS.) ADMISSION REQUIREMENTS
Students considering enrolling for the Honours programme in the department of Anatomy should discuss their plans with a senior member of staff in the area of their special interest, or with the Chairman.
In general, students should have completed the following studies with a grade of C or better:
200-Level Histology 201 or Human Anatomy 204, plus units in Physiology or Biochemistry.
300-Level Cellular and Developmental Biology 301 or Neuroanatomy 302 or Neuroscience 303 or equivalent studies in an appropriate field of biological science.
These requirements may be waived by the Chairman in special circumstances.
200 LEVEL

201 HISTOLOGY

27 lectures throughout the year: 48 hours practical work. Practical lectures and demonstrations will be arranged in practical class times. 5 points.

PREREQUISITSES Biology 101 (or 102 + 103) and Chemistry 100 level. Physics 100 level recommended.

SPECIAL CONDITIONS Students must be studying, or must have studied 200 level Physiology or Biochemistry.

SYLLABUS The light and electron microscopic structure of cells, tissues and organs of mammals. Emphasis is placed on the relationship between structure and function.

A set of slides is available on loan which must be returned at the end of the course. Microscopes will be available for use within the department.

ASSESSMENT Continuous assessment of practical work will be made throughout the course. The annual examination will be held in fourth term. It will comprise a 2-hour written examination and a ½-hour practical examination.

Weightings of assessment components will be made known at commencement of the unit.

203 OCULAR ANATOMY (OPTOMETRY)

26 lectures; 26 practical hours; 1st, 2nd and 3rd terms. 4 points.

PREREQUISITSES Biology 101, or 102 and 103, Chemistry 101, Physics 120, 140 or 160.

SYLLABUS The macroscopic and microscopic anatomy of the orbit, its contents and adjacent structures. An outline of the anatomy of the head and neck; the cranial nerves associated with vision and their cortical connections. The embryology of the nervous system in outline, with a more detailed study of the embryology of the face, eye and associated structures. Studies in comparative anatomy to illustrate the evolution of the visual apparatus.

PRACTICAL WORK Examination of prepared dissections; microscopical study.

ASSESSMENT FOURTH TERM: One 2-hour written paper; oral examination; practical examination.

Weightings of assessment components will be made known at commencement of the unit.

204 HUMAN ANATOMY

48 lectures, 24 1-hour demonstrations, 120 hours practical; 1st, 2nd and 3rd terms; 12 points.

PREREQUISITSES Biology 101 (or 102 + 103).

SYLLABUS A core course will be provided covering the topographic anatomy of the human body (excluding the central nervous system). In addition, students will be required to study either (a) the limbs or (b) the trunk in greater detail.
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PRACTICAL WORK Dissection of the limbs, back, head, neck, thorax, abdomen and pelvis of the human body.

REQUIREMENTS Students must provide themselves with a set of dissecting instruments and a half set of bones. Students are required to wear white coats in the dissecting room.

ASSESSMENT Continuous assessment of practical work will be made throughout the course. One 3-hour written paper and an oral examination in fourth term.

Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL

301 CELLULAR AND DEVELOPMENTAL BIOLOGY
(including Advanced Histology, Cell Culture and Electron Microscopy)

72 lectures. 3 lectures per week throughout the year. 36 hours practical work to be held in conjunction with parts (a) and (d) of the course, largely comprising 3 hours per week with part (a). 108 hours project. This will commence at the beginning of term II and will run for two terms.

20 points.

PREREQUISITE Histology 201.

SYLLABUS The course has four components:
(a) Lectures, lecture/demonstrations and laboratory work related to some of the techniques used in cellular and developmental biology, such as histological preparation, histochemistry, electron microscopy and cell culture.
(b) A project of 108 hours duration to be undertaken by each student. Techniques available will include electron microscopy, light microscopy, histochemistry and cell culture.
(c) A series of lectures using selected examples to demonstrate how modern cell biology has affected current concepts in a number of controversial research areas.
(d) Lectures and lecture/demonstrations on developmental processes, embryogenesis and fetal structure and function.

ASSESSMENT Upon completion of 108 hours project time, students must present results in the form of a poster presentation. This poster forms the basis for assessment of this part of the course. There will also be a 3-hour written examination during term four and a ½-hour practical examination at the end of part (a).

Weightings of assessment components will be made known at commencement of the unit.

302 NEUROANATOMY

20 lectures. 18 hours practical; 1st term; 4 points.

PREREQUISITES Human Anatomy 204 or students accepted into Physiology 311 or final honours students of the department of Psychology.

SYLLABUS The gross and microscopic structure and development of the nervous system and organs of special sense.

PRACTICAL WORK Dissection of the brain and spinal cord.
**Biochemistry**

REQUIREMENTS Students must provide themselves with a set of dissecting instruments and are required to wear white coats in the laboratory.

ASSESSMENT One 2-hour written paper and an oral examination if necessary at the end of first term.

Weightings of assessment components will be made known at commencement of the unit.

**303 NEUROSCIENCE**

32 lectures (2/week in Terms 1 and 2); 16 seminars (2/week in Term 3); laboratory course 120 hours (5 hours/week in Terms 1, 2 and 3); 15 points.

PREREQUISITES The combined point-score in Anatomy, Physiology, Zoology, Pharmacology or Biochemistry at the 200-level is to be 10 or more. Other combinations of 200-level subjects may be appropriate, but these must be considered individually by the Chairman of the Department of Anatomy.

SYLLABUS This course focuses on the nervous mechanisms underlying the interaction of man and the monkey with the surrounding world: how primates sense, manipulate and move in this world, and selectively attend to events around them. The course has three components: (a) a lecture course in Terms 1 and 2 on the evolution and development of the primate brain, the functional organization of the major sensory systems in the primate, the nervous mechanisms determining and controlling movement, especially of the hand, and which form the substrate for the sensorimotor interplay that is essential in daily life; (b) a series of seminars in Term 3 based on original papers on a particular topic. In the period covered by this Handbook the proposed topic is "The Developing Primate Brain"; (c) laboratory work through Terms 1, 2 and 3. In Term 1, each student will prepare a detailed atlas of the human or monkey brain, and in later terms methods for studying the structure and function of the monkey's peripheral and central nervous system will be examined. This includes single nerve fibre recording, tracing connections using histological methods, and the recording of single nerve cell activity in the monkey's central nervous system during the performance of specific sensorimotor tasks.

ASSESSMENT Term 1: assignments (1,000-1,500 words in total), and assessment of brain atlas. Term 2: written examination (1½ hours), and assignments (1,000-1,500 words in total). Term 3: written examination (3 hours), and assignments (1,000-1,500 words in total).

Weightings of assessment components will be made known at commencement of the unit.

**521 BIOCHEMISTRY**

DEPARTMENTAL SUGGESTED COURSE

100-level Biology 101 or 102 and 103 or 102 and 104; Chemistry 101; Physics 140 or 160; Mathematical Sciences 140.

200-level Biochemistry 201 and 202 together with one of the following selection of units:
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(a) Chemistry 201, 221 and 242; either Genetics 201 and 202 or Microbiology 201 and 202; and either Chemistry 260 or Pharmacology 201 or Genetics 201.

(b) Anatomy 201; Pharmacology 201; Physiology 202; and either Genetics 201 and 202 or Microbiology 201 and 202.

(c) Genetics 201 and 202; Microbiology 201 and 202; and either Physiology 202 or Pharmacology 201 and Physiology 201 or Chemistry 221 and Pharmacology 201.

(d) Botany 201, 202, 203 and 204; Genetics 201 and 202.

(e) Zoology 201, 202, 203 and 204; Genetics 201 and 202.

300-level major in Biochemistry — at least 12 points from lecture units and 10 points from practical units. Lecture units appropriate to a second major study are:

- Anatomy-Biochemistry 301, 302, 304, 305.
- Pathology-Biochemistry 301, 302, 304, 305, 307.

Biotechnology: Students pursuing a course with an emphasis on biotechnology should consult the entry under that name in the Guide to Courses in the Faculty of Science for suggested courses.

The 300 level Biochemistry units of particular relevance are 302, 303 and 323.

B.Sc.(HONS.) ADMISSION REQUIREMENTS

To obtain entry to the B.Sc. (Hons.) course in Biochemistry (unit 401), students must have obtained third class honours or better in their final year and should have obtained credit for 22 points of Biochemistry of the 300 level, including 10 points for practical units and 12 points for lecture units.

200 LEVEL

Prerequisite for both units: Chemistry 101. It is recommended that students also take Biology and Physics (see 'Departmental Suggested Courses').

Students intending to proceed to 300-level Biochemistry are required to take Biochemistry units 201 and 202, and are strongly advised to take at least 5 points of 200-level Chemistry, preferably including Organic Chemistry 221. Priority for enrolment in 201 will be given to students also taking 202.

201 BIOCHEMISTRY (LECTURES)

Dr Davidson, Mr Marginson and Dr Sawyer

A course of 48 lectures.
3 terms; 6 points.

SYLLABUS A general course of Biochemistry which includes (i) Bioenergetics. Amino acid chemistry. Preparation and purification of proteins. Structure and function of proteins with special reference to haemoglobin and immunoglobulin G. Properties of enzymes and regu-
Biochemistry

202 BIOCHEMISTRY (PRACTICAL WORK)

72 hours practical work; 3 terms; 3 points.

SYLLABUS Three hours per week of experimental work designed to give an introduction to techniques used in the study of the biochemistry of animal and plant tissues. In order that they may be allocated to a particular practical session students must report to the Russell Grimwade School of Biochemistry (either in person or by telephoning 344 5903) during the second last week of the long vacation, stating the other units they will be taking. Before arranging practical work in other units with alternative sessions, students must confirm that the arrangement is one which will allow them to be accommodated in a Biochemistry session. Students absent from Melbourne may communicate by letter. The apparatus used for practical biochemistry is supplied by the Biochemistry Department. Students are required to supply their own laboratory coat.

ASSESSMENT Continuous assessment will be made throughout the course and examinations will be held during the year.

Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL

Prerequisites for all 300 level units: Biochemistry 201 and 202. 200 level Chemistry, including Organic Chemistry, is strongly recommended. Students wishing to proceed to graduate work in the Biochemistry Department should take units equivalent to at least 22 points. These should include 10 points for practical units and 12 points for lecture units. Lecture unit 303 is a prerequisite for practical unit 323. Lecture units are of 12 or 24 lectures (2 or 4 points).

All practical units are of 92 hours (5 points). Students wishing to take 8 or more points in lecture units are obliged to take a practical unit. The Department of Biochemistry reserves the right to withdraw any unit if selected by only a small number of students.

Special conditions may be waived by the Chairman of the Biochemistry Department.

ASSESSMENT Units of 12 and 24 lectures will be examined by a one- and two-hour paper, respectively, held in the specified examination period following completion of that unit. Each practical unit assessment...
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will comprise three equally weighted components (i) assessment of laboratory skills and the practical management of the experimental programme as demonstrated over the sessions scheduled for the class, (ii) a maximum of 4 written reports of not more than 2,000 words each, and where appropriate an oral report of not more than 15 minutes, and (iii) a written assignment of not more than 2,000 words or a 11/2-hour written test; whether an oral report will be deemed appropriate and whether a written assignment or a written test will be given will be made known at the commencement of the unit.

301 MOLECULAR ASPECTS OF BIOMEMBRANES AND CELL BIOLOGY
Drs Grant and Sawyer
12 lectures.
SYLLABUS.

302 PROTEINS: STRUCTURE, FUNCTION AND INTERACTIONS
Drs Augusteyn, Howlett and Sawyer
24 lectures.

303 GENE STRUCTURE AND EXPRESSION
Drs Davidson and Mauritzen
24 lectures
SYLLABUS
The unit will cover the following topics, using examples from both procaryotes and eucaryotes:
The structure of genes and chromosomes; molecular aspects of tran-
scription and mRNA maturation; regulation of gene expression at the transcriptional and translational levels; post-translational modification of proteins; re-arrangements of the genome; molecular aspects of evolution; recombinant DNA technology in the study of both procaryotic and eucaryotic systems.

304 MAMMALIAN METABOLISM
Drs Mauritzen and Livett
24 lectures.
SYLLABUS
Whole animal metabolism. Integrated aspects of carbohydrate, lipid and amino acid metabolism, protein turnover; aspects of the metabolism of selected tissues such as liver, muscle, adipose tissue, kidney, lung, brain, skin and blood; the adjustments necessary to maintain homeostasis after disturbance of the internal environment by exercise, feeding and fasting; the controls exerted by cellular and endocrine regulatory processes. Metabolic abnormalities as examples of disease processes will be referred to where appropriate.

305 BIOCHEMISTRY OF HUMAN NUTRITION
Mr Marginson
12 lectures.
SYLLABUS
Calorimetry, energy requirements; major nutrients, intake, absorption and requirements. Food and food composition; food storage, preservation and cooking; toxins and hazards in foodstuffs. Major elements and trace elements; ethanol as a nutrient; water- and fat-soluble vitamins. Problems of nutrition in lesser developed countries, metabolic effects of inanition; obesity and other nutritional problems in developed countries.

306 PHOTOSYNTHESIS AND RELATED TOPICS
Dr Grant
12 lectures.
SYLLABUS The range of processes involved in the conversion of photon energy to chemical bond energy. The biochemistry of the pigment systems and the structure of the light receptor complex. The organisation of the photosynthetic membrane and its generation of proton gradients and ATP formation. The fixation of CO₂ and its regulation. Photorespiration, nitrate and sulphate reduction. The emphasis in the course will be on photosynthesis in eukaryotes but discussion of photosynthesis in prokaryotes will be included where it is helpful from a comparative view point. The course concludes with a discussion of chloroplast development and evolution.

307 GLYCANS, GLYCOPROTEINS AND PROTEOGLYCANS
Drs Bacic and Finch
12 lectures.
SYLLABUS Separation and analysis of glycans, proteoglycans, glycoproteins and glycolipids. Structure and biological functions of plant and animal glycans and glycoconjugates. Structure, function and biosynthesis of
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321 PRACTICAL BIOCHEMISTRY A
11 1/2 hours per week for 8 weeks; 1st term.

SYLLABUS
This unit is designed to introduce the modern techniques used in the study of metabolic aspects of biochemistry. These techniques will be applied to detailed studies of mitochondrial metabolism including oxidative phosphorylation and to protein synthesis and secretion in the endoplasmic reticulum and associated organelles. Experiments will include preparation of subcellular organelles and characterisation of their biochemical functions; isolation and purification of proteins and their analysis; estimation of enzymic activities and of the levels of metabolic intermediates.
Techniques may include spectrophotometry, gel electrophoresis, column chromatography and radioisotope analyses. Some of the experiments may be computer linked for data processing of signals from the experimental systems. Students will also have the opportunity to design some of their own experiments.

322 PRACTICAL BIOCHEMISTRY B
11 1/2 hours per week; 8 weeks; 2nd term.

SYLLABUS
This course consists of experiments with emphasis on the interactions of proteins in solution, solid-phase immunochemical assays, and the dynamics of the erythrocyte membrane. The unit includes exercises in presenting written and oral accounts of experimental methods.

323 PRACTICAL BIOCHEMISTRY C
11 1/2 hours per week; 8 weeks; 3rd term.

SYLLABUS
A series of experiments dealing with nucleic acids, plasmid purification, gene cloning, restriction endonuclease mapping and other aspects of recombinant DNA technology; exercises in the use of computers in the storage, retrieval and analysis of nucleotide sequence data. Experimental methods for the study of nucleic acids will be discussed in seminars and students may be given exercises in literature research and required to make an oral presentation of their findings.

324 PRACTICAL BIOCHEMISTRY D
5 3/4 hours per week for 16 weeks; 1st and 2nd terms.

SYLLABUS
Experiments designed to familiarize students with theory and techniques in protein purification, enzyme assay, use of radioisotopes and organelle isolation.
The following courses are offered.

### 101 Biology:
This course emphasises the unity underlying the diversity of life; that is, the features and problems shared by all living organisms. These range from molecular and cellular organisation to genetic control, reproduction, development, physiology and evolution. Some emphasis is given to the biology of man. 101 Biology prepares students to proceed to the 200 level in the biological and paramedical sciences.

### 102 Cell Biology and Genetics:

### 103 Animal Biology:

### 104 Plant Biology:

Taken together these three units provide a detailed and integrated course in biology which especially directs students into studies in the biological sciences. They also emphasise the more applied aspects of biology.

102 Cell Biology and Genetics may *not* be taken as a single unit. Students taking 103 Animal Biology and/or 104 Plant Biology must take 102 Cell Biology and Genetics.

Credit may only be held for one of the following combinations: 101; 102 + 103 + 104; 102 + 103; 102 + 104. As the number of places in 102, 103, 104 is limited, preference will be given to students taking all three units.

### 101 BIOLOGY

Co-ordinator: Dr. B. Lee (Genetics) for the Departments of Botany, Genetics and Zoology.

72 lectures; 72 hours practical; 20 hours tutorials and weekly half-hour demonstrations; all three terms; 9 points.

A knowledge of H.S.C. Biology is not assumed but would be an advantage. A knowledge of some aspects of Chemistry and Physics is assumed.

**SYLLABUS**

*Basic Life Processes:* Chemistry and program of life, cell structure, function and reproduction. Inheritance, genes and chromosomes, molecular basis of heredity, human genetics.

*Reproduction and Development:* Sexual reproduction in land plants, with emphasis on floral structure, seed and embryo development, sexual reproduction and development in animals including differentiation, morphogenesis, epigenesis, totipotency, determination, the genetics of development, cancer, aging and death.

*Functioning of organisms:* Heterotrophic nutrition, micro-organisms, herbivores and carnivores; gas exchange in aquatic and terrestrial plants and animals; transport in land plants and comparison with animal circulatory systems; components of human blood and the immune system; excretion and homeostasis. Responsiveness and co-ordination in plants and animals, hormonal and nervous control; the human nervous system and brain. Biological movement, muscular and non-muscular.

*Evolutionary Biology:* Animal Behaviour and population ecology, species interactions, regulation of numbers, competition, predation, mutualism
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and parasitism. Microevolution, natural selection and speciation. Macro-
evolution, origin of life, trends and patterns in the Australasian region. Classification and an overview of animal and plant diversity; modern and classical approaches to taxonomy. Human evolution.

PRACTICAL WORK Students must provide themselves with the laboratory manual, a razor or single-edged razor blades, dissecting instruments, a number of microscope slides, cover-slips, a fine paint brush and a hand lens (x10). Microscopes are provided in the laboratory in the Redmond Barry Building.

ADDITIONAL FACILITIES Students are advised to attend weekly tutorials; the time tables for these will be arranged in the first week of term.

ASSESSMENT Three written papers (each of 2-hours duration) will be held, one in each of the Science faculty examination periods. These examinations will cover both theory and practical work. Practical work completed in the practical class will be assessed throughout the course and students who do not perform satisfactorily will be required to sit for a 3-hour practical examination in November. Final marks will be based on assessment of the written paper (90%) and practical work (10%). A pass in practical work is necessary to pass in the subject.

102 CELL BIOLOGY AND GENETICS

Dr McKenzie (Convener)

24 lectures; 24 hours practical work; weekly 1-hour demonstrations; two 1-hour tutorials; 1st term; 3 points.

Knowledge of H.S.C. Biology is not assumed but would be an advantage. A knowledge of some aspects of Chemistry and Physics is assumed.

SYLLABUS

An Introduction to the Cell: Evolution of the cell; molecules to the cell; prokaryotes to eukaryotes; cell organelles; food, energy and cellular organisation; aerobiosis, anaerobiosis and the maintenance of order; introduction to photosynthesis and its evolutionary role.

The Cell and its Survival: Basic genetic mechanisms — DNA, replication, recombination, transcription and translation; the cell nucleus — DNA and chromosomes; cell growth and division; repair.

From Cells to Multicellular Organisms: The benefits of sex; meiosis; meiosis and Mendelism; genes in development; linkage, polygenic variation.

Interaction between Multicellular Organisms: Populations, gene pools and gene frequencies; Hardy-Weinberg Law; factors that alter gene frequencies.

The Evolution of Multicellular Organisms: Evolution and natural selection; populations and species — microevolution; mechanisms of speciation; macroevolution.

LABORATORY WORK Students must provide themselves with the laboratory manual, a razor or single-edged razor blades, dissecting instruments, a number of microscope slides, cover-slips, a fine paint brush for insect manipulation and a hand lens (x10). Microscopes are provided in the laboratory in the Redmond Barry Building.

ASSESSMENT One 2-hour written examination in May. The examination will cover both theory and practical work.
103 ANIMAL BIOLOGY
Dr B. Evans (Convener)
48 lectures; 48 hours practical work; weekly 1-hour demonstrations; four 1-hour tutorials; 1st and 2nd terms; 6 points.
A knowledge of H.S.C. Biology is not assumed but would be an advantage. A knowledge of some aspects of Chemistry and Physics is assumed.
Prerequisite: 600-102 (concurrently).
SYLLABUS
Functional Aspects of the Vertebrate Way of Life: An introduction to the vertebrate using a comparative approach and emphasising mammals; functional topics covered will include general body design, exchanges with the environment, internal transport, digestion, integration of systems and homeostasis, reproduction and development.
Functional Strategies used by other Animals: A comparative consideration of the same issues in selected invertebrates and chordates.
Evolutionary Zoology: The theory of evolution, evolution and the Australian continent, principles of systematics and phylogeny.
LABORATORY WORK Students must provide themselves with the laboratory manual, dissecting instruments, a number of microscope slides, cover-slips and a hand lens (x10). Microscopes are provided in the laboratory in the Redmond Barry Building.
ASSESSMENT One 2-hour written examination in May; one 2-hour written examination in August. These examinations will cover both theory and practical work. Practical work completed in the practical class will be assessed throughout the course and students who do not perform satisfactorily will be required to sit for a 3-hour practical examination in August. A pass in practical work is a hurdle requirement for a pass in the subject. Final marks will be based on assessment of the written papers.
Weightings of assessment components will be made known at commencement of the unit.

104 PLANT BIOLOGY
Dr Lawson (Convener)
48 lectures; 48 hours practical work; weekly 1-hour demonstrations; four 1-hour tutorials; one whole-day excursion may be held; 2nd and 3rd terms; 6 points.
A knowledge of H.S.C. Biology is not assumed but would be an advantage. A knowledge of some aspects of Chemistry and Physics is assumed.
Prerequisite: 600-102.
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LABORATORY WORK Students must obtain the laboratory manual, single-edged razor blades, dissecting instruments, microscope slides, cover slips and hand lens (x10). Microscopes are provided in the laboratory in the Redmond Barry Building.

ASSESSMENT One 2-hour written examination in August; one 2-hour written examination in November. Assessment will be also based on practical work completed in the practical classes. Practical work completed in the practical class will be assessed throughout the course and students who do not perform satisfactorily will be required to sit for a 1 1/2-hour practical examination in November.

Weightings of assessment components will be made known at commencement of the unit.

606 BOTANY
DEPARTMENTAL SUGGESTED COURSE

The courses outlined below lead to a major in Botany in the following four directions:

Course 1 General plant diversity and evolution
Course 2 Cell biology including biotechnology and plant physiology
Course 3 Ecology
Course 4 Phycology and marine botany

The suggested course plan for 1st Year which would lead to a major in any of these is:

100 Level Biology 101, or 102 and 104; Chemistry 101; with 100 Level units selected from the following: Geology, Mathematical Sciences, Physics. For course (4), units may also be taken in Geography and Meteorology.
Co-ordinator: Dr. O. Lawson.

200 Level Course 1 Botany 201, 202, 203, 204; Genetics 201 with other 200 Level units selected from: Genetics, Biochemistry, Chemistry, Geology, Microbiology, Zoology.
Course 2 Botany 201, 202, 203, 204; Genetics 201 and 202; Biochemistry 201 and 202 or Chemistry 201, 221 or 223, 242 or 243, 260. (Other 200 Level units selected from Mathematics, Zoology.)
See also the biotechnology entry in Guide to Science Courses.
Course 3 Botany units as for Course 1, plus Botany 207, Zoology 204; with 200 Level units selected from Computer Science, Geography, Geology, Meteorology, Microbiology, Statistics, Zoology.
Course 4 See the Marine Studies Undergraduate Booklet.

300 Level Course 1 At least one Botany unit from each of the following groups, plus at least two other units from any of these groups:
Botany

Group A: 301, 302.
Group B: 304.
Group D: 307, 308, 309.

Course 2 Botany 303, 305, 306, 311 plus units selected from other 300 Level Botany units and Biochemistry (e.g., 301, 302, 306, 307), Chemistry, Genetics, Meteorology, Statistics, Zoology.
See also the biotechnology entry in Guide to Science Courses.

Course 3 At least 20 points Botany units selected from 301, 302, 303, 304, 307, 308, 309, 311; plus Zoology 301, 303, 304 and other 300 Level units for which a student has prerequisites.

Course 4 See Marine Studies Undergraduate Booklet.

See also 600 Marine Science section.

B.Sc.(HONS.) ADMISSION REQUIREMENTS
Twenty or more points in 301 to 311 is the normal requirement for admission to Fourth Year honours in Botany.

200 LEVEL

201 BOTANY: THE LAND PLANTS
Dr Duigan
21 lectures; 56 hours practical work and up to 1½ days of excursions. All three terms. 5 points.
Prerequisites: Biology 101, or 102 and 104.
SYLLABUS A survey of the land plants—lichens, Bryophyta, Pteridophyta, Gymnospermae and Angiospermae—with emphasis on morphology, evolution, classification, nomenclature and identification.
ASSESSMENT One 3-hour theory examination at the end of the lecture series.
Practical examinations; lower plants (1½ hours), higher plants during practical classes in terms 1 and 3. Students will be required to submit a plant collection, the assessment of which may also be used in the final grading.
Weightings of assessment components will be made known at commencement of the unit.

202 BOTANY: PLANT FORM AND FUNCTION
Professor Knox, Drs Neales and Guest (course organizer)
24 lectures; 48 hours practical work; terms 2 and 3; 5 points.
Prerequisites: Biology 101 or 102 and 104; Chemistry 101.
SYLLABUS The structure of plant cells and tissues, and techniques for their examination. Plant cell metabolism. Whole-plant physiology: inorganic nutrition, the water relations of plant cells, the control of water loss by plants, components of the energy budget of leaves, leaf photosynthesis and the transport of assimilates. Plant growth and development: plant hormones and growth substances, photomorphogenesis and photo-periodism, reproductive physiology.
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ASSESSMENT A 2-hour examination at the end of the structural aspects of the course at the end of term 2, and a 2-hour theory examination in November on the remainder of the unit. A maximum of 12 practical reports, one of which will be a maximum of 10 pages and the remainder a maximum of 4 pages, assessed during the course.

To pass the unit, a student must achieve a satisfactory performance in both theory and practical components.

Weightings of assessment components will be made known at commencement of the unit.

203 BOTANY: ALGAE AND FUNGI
Dr Swart, with Drs Kraft and Wetherbee

16 lectures; 32 hours practical work including excursions; term 1; 3 points.

Credit NOT given for both 606-203 and 606-208, or for both 606-203 and 600-203.

Prerequisites: Biology 101 or 102 and 104.

SYLLABUS A survey of the major groups of Algae and Fungi, their role in the ecosystem and their importance to man. Representative examples will be examined, wherever possible as living material. Some basic techniques in algal and fungal research will be introduced.

ASSESSMENT One 1 1/2-hour theory paper; two 1 1/2-hour practical tests at end of unit.

Weightings of assessment components will be made known at commencement of the unit.

204 BOTANY: ECOLOGY
Dr Ashton

16 lectures; 30 hours practical work in the form of a compulsory excursion in the May or August vacation; in addition, one full-day excursion may be held near Melbourne; terms 1, 2; 3 points.

Prerequisites: Biology 101 or 102 and 104.

SYLLABUS The environmental factors affecting plant distributions; the interaction between climate, soils, fire and animals; the process of succession and competition; the origin of weeds and quantitative aspects of plant communities.

ASSESSMENT One 2-hour examination at the completion of the course; a report on the major excursion (maximum 2,000 words) is required and will be assessed.

A satisfactory standard is necessary for both theory and practical components.

Weightings of assessment components will be made known at commencement of the unit.

207 BOTANY: CONSERVATION—GLOBAL AND LOCAL ASPECTS
Drs Guest, Attiwill, Neales and Calder and others

16 lectures; Terms 1 and 2; 2 points.

Prerequisites: Nil.
SYLLABUS The Global distribution of resources. Limits to growth. Biological contributions to developing countries. Conservation of global resources. Case studies in global and local conservation issues.

ASSESSMENT One 1½-hour examination in August; also one essay (maximum 1,500 words). Weightings of assessment components will be made known at commencement of the unit.

208 BOTANY: MARINE BOTANY
Drs Kraft and Wetherbee
16 lectures; 24 hours of practical work. Terms 1 and 2; 3 points. Credit NOT given for both 203 and 208.
Prerequisites: Biology 101 or 102 and 104 (recommended).
SYLLABUS A survey of marine plants with emphasis on macroscopic seaweeds and the major groups of phytoplankton. Phycological methods, including electron microscopy and other cytological tools. Comparative anatomy and biochemistry in systematics and phylogeny.
ASSESSMENT One 2-hour examination, one essay (5,000 words maximum); one 1-hour practical test during the unit. Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL
Note: Scholarships and prizes are normally awarded to students taking 32 or more points from 300-level of which at least 20 are in Botany.

301 COMMUNITY AND ECOSYSTEM ECOLOGY
Drs Ashton and Attiwill
24 lectures; 72 hours practical work including 3 or 4 days field excursion immediately pre-term and 1 or 2 one-day field excursions during term (maximum 5 days of excursions); 8 points; terms 1 and 2.
Prerequisites: 606-201, 606-202 and 606-204.
SYLLABUS Vegetation and soils of natural vegetation of Australia with special reference to the south-east; structure, floristics and dynamics of vegetation. Correlation with habitat factors. Chemistry of forest soils, forest productivity and nutrient cycling.
ASSESSMENT One 3-hour theory examination at the completion of the course. A maximum of 8 practical reports each of no more than 4 pages assessed during the course; one major report of 2,500 words to be submitted no later than second week of term 3. A satisfactory standard is required for both theory and practical components. Weightings of assessment components will be made known at commencement of the unit.

302 BOTANY: POPULATION AND EVOLUTIONARY ECOLOGY
Drs Calder and Ladiges
16 lectures; 24 hours practical work; one excursion may be held; 4 points; term 3.
Prerequisites: 606-204, 652-201.
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SYLLABUS Plant population biology; plant growth and reproductive strategies; breeding systems; pollination biology, seed production and germination. Patterns of variation in populations and species; plasticity; polymorphisms. Natural selection and the evolution of ecotypes and clines in eucalypts and other species. Speciation.

ASSESSMENT One 2-hour theory examination on completion of the unit and a maximum of 4 practical reports totalling no more than 6,000 words assessed throughout the course.
A satisfactory standard is required for both theory and practical components.
Weightings of assessment components will be made known at commencement of the unit.

303 BOTANY: ENVIRONMENTAL PLANT PHYSIOLOGY
Dr Neales
16 lectures; 24 hours practical work, or elective alternative 3 hours tutorial plus 21 hours literature search project work (intending Honours students should do the former); 4 points; term 2.
Prerequisites: 606-202.
SYLLABUS Carbon gain (CO₂ assimilation) and water use (transpiration) by plants; their control by stomatal and environmental factors; also consideration of comparative physiology, ecological adaptation and plant responses to stress such as drought and salinity.
ASSESSMENT One 2-hour written examination; a written (300 words) and verbal (15 minutes) appraisal of an appropriate scientific paper; either a maximum 3 practical reports (each no more than 1,200 words) based on the 24 hours' practical work or one 4,000 essay based on literature search.
Weightings of assessment components will be made known at commencement of the unit.

304 SYSTEMATICS AND EVOLUTION
Drs Duigan and Ladiges
24 lectures; 36 hours practical work including one 1-day excursion; 6 points; terms 1 and 2.
Prerequisite: 606-201.
SYLLABUS The evolution of vascular plants, especially seed plants, and the evolution of the Australian flora. Emphasis will be given to the biology, evolution and classification of plants, and topics will include the fossil record, numerical taxonomy, cladistics and biogeography, using Australian examples where possible.
ASSESSMENT During the course: one 1,500-word essay and practical report(s) totalling not more than 2,000 words. One 3-hour examination paper at the end of the course. Weightings of assessment components will be made known at the commencement of the unit.

305 BOTANY: PLANT CELL BIOLOGY
Professor Clarke, Drs Anderson, Bacic and others
24 lectures; 4 points; term 1.
Prerequisites: 606-202 or 521-202.
SYLLABUS Structure and organization of the plant cell. Molecular and ultrastructural approaches to understanding the form and function of cellular components; vacuoles, the endomembrane system, microtubules and microfilaments, the plasma membrane and the cell wall. Surface slimes and secretions of plant cells. Interactions between plant cells, cell surfaces as points of contact, membrane receptors and markers of identity, lectins, current ideas on the basis of cell recognition in pollen-stigma, host-symbiont and host-pathogen interactions. Differentiation from cultured callus cells. Applications of immunological and recombinant DNA techniques to problems in plant cell biology and to manipulations of commercially important crop plants.

ASSESSMENT One 3-hour theory paper at the end of the course and assessment of one essay of 2,000 words maximum during the course. Weightings of assessment components will be made known at commencement of the unit.

306 BOTANY: PRACTICAL UNIT IN CELL BIOLOGY
Professor Knox and Dr Clarke, Dr Wetherbee

8 4-hour laboratory classes; 4 1-hour discussion periods; 2 points; term 2.
Prerequisites: 606-202 or 521-202; 606-305.

SYLLABUS Selected experiments and techniques in plant cell biology and physiology. Cytochemistry and immunocytochemistry; electron microscopy (transmission, scanning and freeze fracture); analytical techniques; fractionation of subcellular components, separation and analysis of protein and carbohydrate components. Immunological techniques in plant cell biology.

ASSESSMENT One 1½-hour written examination; a maximum of 4 practical reports each of which shall be no longer than 1,500 words assessed throughout the course.
Weightings of assessment components will be made known at commencement of the unit.

307 BOTANY: MARINE BENTHIC ALGAE
Dr Kraft

16 lectures; 24 hours practical work; 4 points; term 3.
Prerequisites: 606-203 or 606-208 (recommended).

SYLLABUS Systematics, biochemistry, cell biology, reproductive morphology, ecology and phylogeny of marine benthic algae of both local and overseas floras.

ASSESSMENT One 1½-hour theory examination and one 1½-hour practical examination. One essay of 1,500 words maximum may be required during the course.
Weightings of assessment components will be made known at commencement of the unit.

308 BOTANY: MARINE AND FRESHWATER PHYTOPLANKTON
Dr Wetherbee

16 lectures; 24 hours practical work; 4 points; term 1.
Prerequisites: 606-203 or 606-208 (recommended).
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SYLLABUS Morphology, cytology and ecology of phytoplankton classes; sampling, isolation and culture; light and electron microscope techniques used in studying phytoplankton.

ASSESSMENT One 1 1/2-hour theory examination and one 1 1/2-hour practical examination at the end of the course. Weightings of the assessment components will be made known at commencement of the unit.

309 BOTANY: MYCOLOGY AND PLANT PATHOLOGY
Drs Swart and Guest
16 lectures; 24 hours practical work; one excursion (optional); 4 points; term 2.
Prerequisites: 606-203 or equivalent reading.
SYLLABUS Distribution and spread of fungi; general aspects of plant pathology; principles of fungus physiology; aspects of fungal taxonomy and ecology.
ASSESSMENT One 2-hour examination on completion of unit; a maximum of 4 practical reports each of no more than 10 pages, including illustrations, to be assessed during the course. Weightings of the assessment components will be made known at commencement of the unit.

310 BOTANY: PROJECT IN BOTANY
Co-ordinator Dr Calder
One 36-hour research project; 2 points; term 2 or 3.
This unit is designated for students majoring in Botany to explore an interest in research in a particular subject. It can only be undertaken in terms 2 or 3 by arrangement with individual instructors prior to enrolment. Normally a project is not offered to a student as a unit where a substantial part of the student's course is already project-based.
ASSESSMENT Based on a research report (not more than 6,000 words); oral examination on the report may be required.

311 BOTANY: PLANT REPRODUCTIVE BIOLOGY
Professor Knox and Dr Lawson
16 lectures, 24 hours practical work; Term 3; 4 points.
Prerequisites: 606-201 or 606-202.
SYLLABUS Plant reproductive mechanisms and breeding systems with special emphasis on higher plants; the biology of pollen-pistil interactions and fertilization; genetic significance of higher plant reproductive systems; genetic control systems; manipulation of breeding systems in plant improvement; biotechnology of controlled mating; pollen and gametophyte selection and genetic transformation systems; wide hybridization; applications of tissue culture, cell culture and genetic engineering to plant improvement.
ASSESSMENT One 2-hour written examination at the end of the course; a written critique, of no more than 1,000 words, of a research paper. A maximum of six projects (each no more than four pages or a prepared microscope slide) will form the practical assessment. Weightings of the assessment components will be made known at commencement of the unit.
DEPARTMENTAL SUGGESTED COURSE

100 Level Chemistry 101; Physics 100 level; Mathematical Sciences 111 or 110; plus a unit from: Biology, Geology or Mathematical Sciences 120.

200 Level 15-21 points of 200 level Chemistry required, selected from 201/2/3; 220/1/2/3; 240/1/2 and 260, together with units from Mathematics (250, 275, 210, 220, 230, 285), Physics (211, 243, 223, 224, 244 and 246 recommended), Marine Science and the Biological Sciences. (See categories A, B and C.)

300 Level Chemistry major: Minimum of 24 points of 300 level Chemistry units (at least 6 points from each of Physical, Organic and Inorganic) together with another 18 points of 300 level Chemistry units (including 399).
Chemistry/Physical Science major: 24 points as above (including 304, 320, 336, 341 or 342 or 343).
Chemistry/Biological Science major: 24 points as above (including 304, 320, 336 and 344 together with units selected from Chemistry 301, 302, 323, 322, 324 and 326).

Students taking units for which the practical work or examinations involve numerical calculations are advised to provide themselves with electronic calculators of an approved type.

See also Marine Science Section

B.Sc.(HONS.) ADMISSION REQUIREMENTS
The minimum admission requirement is 24 points of 300-level Chemistry including at least 6 points from each of Physical, Organic, and Inorganic Chemistry.

100 LEVEL

101 CHEMISTRY
First Year Co-ordinator: Dr McRae
A course of 72 lectures, 20 hours of tutorials and 66 hours laboratory work throughout the year. 8 points.
A preliminary standard equivalent to V.C.E. (formerly H.S.C.) Chemistry will be assumed.

SYLLABUS
(i) Physical Chemistry
(1) Electrochemistry: conductance of weak and strong electrolytes; analytical applications; Galvanic cells and their application.
(2) Thermochemistry.
(3) Phase equilibria in one component systems. Raoult’s law and deviations. Distillation.
(4) Homogeneous kinetics: reaction order; activation energy; simple mechanisms.

(ii) Inorganic Chemistry
A survey of the range of observed properties and reactions of inorganic compounds. Models for atomic and molecular electronic structure; the
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application of these to the description of structure and interactions in ionic solids and covalent and molecular compounds. Introduction to co-ordination chemistry.

(iii) Organic Chemistry
The scope of organic chemistry. Bonding, structure and elementary stereochemistry of carbon compounds.
An outline of the chemistry of hydrocarbons and of the major groups of mono-functional compounds in terms of molecular structure and elementary electronic theory.
Students must provide themselves with a set of molecular models.
LABORATORY WORK Three hours per week throughout the year, illustrating the principles of physical, organic and inorganic chemistry together with exercises in quantitative and qualitative analysis.
The practical classes for this subject are taken in the Chemistry building.
ASSESSMENT Written assignments and tests throughout the course will be taken into account in determining the candidate's result for the year's work. Also 3 two-hour written examinations, one each in the first term, second term and end-of-year examination periods.
Practical work will be continuously assessed throughout the year on the basis of a student's performance in the laboratory and their written reports.
Weightings of assessment components will be made known at commencement of the unit.

200 LEVEL

The Chemistry School; consisting of the Departments of Physical, Organic and Inorganic Chemistry, offers the following units at the second level. To assist students who wish to choose Chemistry as a major or sub-major study, three categories of course are set out below, designed for students taking respectively a full Chemistry major, Chemistry with a biological science, and Chemistry with Mathematics or another physical science. Courses in these categories have been approved in advance for Chemistry majors and sub-majors. Any student wishing to construct a Chemistry major or sub-major course differing from those set out below must submit his proposed course for approval, to a panel of Chemistry School course advisors at the appropriate time.
It should be noted that a Chemistry major at 300 level requires significant components of physical, organic and inorganic chemistry.

Category A
For students majoring in Chemistry only. These students are recommended to enrol for a minimum of 21 points in Chemistry, made up as follows:
Physical: 203 (6 points)
Organic: 222 (6 points)
Inorganic: 240 (6 points)
Analytical: 260 (3 points)

Category B
For students majoring in a biological science, together with Chemistry. These students are recommended to enrol for a minimum of 16 points in Chemistry, made up as follows:
Category C

For students majoring in Mathematics or another physical science, together with Chemistry. These students are recommended to enrol for a minimum of 17 points in Chemistry, made up as follows:

- Physical: 201 (5 points) or 203 (6 points).
- Organic: 220 (4 points) or 223 (5 points)
- Inorganic: 241 (5 points)
- Analytical: 260 (3 points)

Practical Work

**Physical**: 36 hours of laboratory work. Practical work will be continuously assessed on the basis of student performance in the laboratory and written reports. This assessment is combined with the theory assessment in determining the candidate's score in the unit.

**Organic**: 36 hours of laboratory work designed to provide illustrative material for 200 level organic chemistry units and training in technique is combined with each of the theory units for the purpose of examination. Satisfactory completion of the practical work is necessary before any credit is granted for the units.

**Inorganic**: Satisfactory performance in the practical component of each of the units 240, 241 and 242 is required before credit for the unit as a whole can be given. It should be noted that students who choose only unit 243 may not enrol in 300 level Inorganic Chemistry.

**Analytical**: Enrolment in unit 260 (42 hours practical together with 8 lectures) is recommended for all students in categories A, B and C and for all Science faculty students enrolled for other units of Chemistry worth 13 or more points.

ASSESSMENT

Units may be examined at fixed times throughout the year, and in the examination term at the end of the year. Written assignments and tests throughout the course may be taken into account in determining the candidate's score in the unit. Weightings of assessment components will be made known at commencement of the units. In general, a minimum of 10 200-level Chemistry points must be credited before permission will be granted a student to enrol for any 300-level Chemistry units.

PREREQUISITES

- **Physical**: Any one of 201, 202 or 203 is a prerequisite for any 300-level Physical Chemistry unit.
- **Organic**: Any one of 220, 221, 222 or 223 is a prerequisite for any 300-level Organic Chemistry unit.
- **Inorganic**: Either 240 or 241 is a prerequisite for topic (i) of 300-level inorganic.

**PHYSICAL CHEMISTRY**

The following units are mutually exclusive in the sense that credit may be held for one only. Students should therefore select the unit that best suits their particular needs or interests. A pass in any one of the units 201, 202, 203 (or their equivalent) is a prerequisite for enrolment in any of the 300-level Physical Chemistry units.
201 PHYSICAL CHEMISTRY I
28 lectures; 36 hours practical work; 10 tutorials; 5 points.

Thermodynamics

Kinetics

Quantum Mechanics & Spectroscopy
Schrodinger equation: 1-dimensional potential well, rigid rotor, angular momentum, harmonic oscillator. Rotational and vibrational spectra of diatomic molecules, electronic spectra, magnetic resonance.

202 PHYSICAL CHEMISTRY II
36 lectures; 36 hours practical work; 10 tutorials; 6 points.

Syllabus as for 201, together with:

203 PHYSICAL CHEMISTRY III
36 lectures; 36 hours practical work; 10 tutorials; 6 points.

Syllabus as for 201 together with:
Phase equilibrium; phase rule; thermodynamics and representation of $p-T-x$ behaviour of 2- and 3- component systems. Diffusion and electrical conduction in solids; defects in crystals.

ORGANIC CHEMISTRY
Students may enrol in only one of 220, 221, 222 or 223.

Students must provide themselves with a set of molecular models.

Professor Cameron, Dr Feutrill and Dr Gill

220 ORGANIC CHEMISTRY
22 lectures; 36 hours practical work; 4 points.

Prerequisite: 101.

This course builds on the elementary treatment of Chemistry 101 to present a basic, working coverage of commonly encountered organic systems, their reactivity, and the factors which affect it.

ASSESSMENT One $1\frac{1}{2}$-hour examination for Term 1; One 1-hour examination for Term 2.
221 ORGANIC CHEMISTRY
30 lectures; 36 hours practical work; 5 points.
Prerequisite: 101.
A course of basic organic chemistry similar to unit 220, augmented by a more extensive treatment of organic molecules of environmental and biological importance, and their role in biological reactions.
ASSESSMENT One 1½-hour examination for Term 1; One 1½-hour paper for Term 2.

222 ORGANIC CHEMISTRY
38 lectures; 36 hours practical work; 6 points.
Prerequisite: 101.
A course of basic organic chemistry similar to unit 220, augmented by a more extensive treatment of selected subjects such as the concept of aromaticity, molecules of environmental and biological interest, and a study of industrial processes.
ASSESSMENT One 1½-hour examination for each of Terms 1 and 2; One 1-hour examination for Term 3.

223 ORGANIC CHEMISTRY
30 lectures; 36 hours practical work; 5 points.
Prerequisite: 101.
A course of basic organic chemistry similar to Unit 220, together with a study of some industrial processes and other aspects of applied organic chemistry.
ASSESSMENT One 1½-hour examination for Term 1 and one 1½-hour paper (in Term 3) on lectures in Terms 2 and 3.

INORGANIC CHEMISTRY
Topics offered in Inorganic Chemistry at 200 level are:

(i) Bonding Theories Applied to Inorganic Systems
8 lectures.
Molecular orbital and valence bond theories applied to bonding in simple polyatomic molecules. Crystal field, molecular orbital and ligand field theories of metal complexes.
ASSESSMENT One 1-hour terminal examination.

(ii) Physical Methods Applied to Inorganic Systems
8 lectures.
Magnetic susceptibilities of first row transition metal complexes. Infrared and Raman spectroscopy; n.m.r. spectroscopy of $^1H$, $^1C$, $^3F$, $^3P$ and other nuclei. Electrochemistry of transition metal compounds. X-ray crystallography.
ASSESSMENT One 1-hour terminal examination.
(iii) **Inorganic Chemistry of Transition Metals**
8 lectures.
Oxidation states and stereochemistries of complexes of first row transition metals and of palladium and platinum; application of magnetic and spectroscopic methods.
ASSESSMENT One 1-hour terminal examination.

(iv) **Inorganic Chemistry of Main Group Elements**
8 lectures.
Topics in the descriptive inorganic chemistry of the halogens and halides and of compounds of the rare gases and of elements such as B, Al, Se, Te, Pb and Hg.
ASSESSMENT One 1-hour terminal examination.

(v) **Solution Equilibria and Kinetics of Inorganic Systems**
8 lectures.
Synthesis and reactions of complexes, elementary kinetic studies, solution equilibria and stability constants, substitution and oxidation-reduction reactions.
ASSESSMENT One 1-hour terminal examination.

(vi) **Inorganic Superacid Systems**
8 lectures.
Application of spectroscopic, electrochemical and cryoscopic techniques to the study of inorganic solutes in anhydrous solvents such as H₂SO₄, HSO₃F and HF.
ASSESSMENT One 1-hour terminal examination.

(vii) **Inorganic Chemistry for Biology Students**
8 lectures.
Structures, properties, reactions and thermodynamic and kinetic aspects of inorganic species including metal complexes illustrated with examples of biological significance.
ASSESSMENT One 1-hour terminal examination.

(viii) **Inorganic Chemistry (Practical Course)**
36 hours laboratory work.
A course of synthetic procedures and instrumental techniques applied to inorganic chemical compounds and designed to illustrate many of the topics presented in the lecture units.
ASSESSMENT Continuous assessment of laboratory performance and of short written reports on results of experiments.

(ix) **Inorganic Chemistry (Practical Course)**
24 hours laboratory work.
As for topic (viii), with experiments appropriate to lecture topics in Unit 242.
ASSESSMENT As for Topic (viii).

**UNITS:**
The following four combinations of topics are offered to meet the needs of students in categories A, B and C:
Category A — unit 240; B — unit 242 or 243; C — unit 241.
240 INORGANIC CHEMISTRY
40 lectures and 36 hours laboratory work; 6 points.
Compulsory topics (i), (ii) and (viii), plus any other three of topics (iii), (iv), (v) and (vi).

241 INORGANIC CHEMISTRY
32 lectures and 36 hours laboratory work; 5 points.
Compulsory topics (i), (ii) and (viii), plus any other two of topics (iii), (iv), (v) and (vi).

242 INORGANIC CHEMISTRY
16 lectures and 24 hours laboratory work; 3 points.
Compulsory topics (i), (vii) and (ix). This unit is compulsory for those students in category B majoring in a biological science together with chemistry.

243 INORGANIC CHEMISTRY
16 lectures; 2 points.
Compulsory topics (i), (vii). This unit is for biology students not intending to proceed to 300 level inorganic chemistry.

260 ANALYTICAL CHEMISTRY
8 lectures and 42 hours laboratory work.
3 points.
LECTURES Determination of the structure of organic compounds by spectroscopic methods. Principles and applications of spectrophotometry and atomic absorption spectrometry. Accuracy and precision in analytical procedures.

PRACTICAL WORK Separation techniques, solvent extraction, ion-exchange, gas chromatography. Identification of organic compounds by classical and spectroscopic analysis. Quantitative determinations using titrations, gravimetric, and instrumental methods.

ASSESSMENT One 1-hour examination.

295 MARINE CHEMISTRY
Drs Smith and Johns
24 lectures; 2nd term; 3 points.
Prerequisites: 20 points including Chemistry 101.


ASSESSMENT One 2-hour written paper at the end of 2nd term.
The 300 level units offered are designed to allow maximum flexibility in designing the third year course. All courses must be submitted for approval to a Chemistry School course adviser at the appropriate time. Students who wish to apply for entry into the BSc Honours year in the School of Chemistry should note that the minimum requirement is 24 points of 300 level Chemistry, including at least 6 points from each of the areas of Physical, Organic and Inorganic.

The prerequisites and conditions of the Chemistry School and the Science Faculty must be observed.

Students majoring in Chemistry only must take unit 399 (5 points). They are recommended to take a minimum of 9 points (including practical work) in each of Physical, Inorganic and Organic Chemistry. Unit 320 must be included in the Organic Chemistry taken. A course totalling about 45 points is suggested.

Students taking chemistry with another science subject should take about 24 points. Organic unit 320 must be included. Inorganic 344 is offered particularly for students taking chemistry with a biological science.

Practical Work:

Physical: Two practical units are offered. Enrolment in 304 or 305 is compulsory for all students enrolled in 301 or 302.

Organic: Satisfactory performance in practical units is required before credit for theory units can be given. Two practical units 335 and 336 are offered. Students enrolled for 9 or more theory points in Organic Chemistry are required to enrol for 335. Students enrolled for from 3-8 theory points in Organic Chemistry are required to enrol for 335 or 336. Students enrolled for less than 3 points need take no practical work.

Inorganic: For units 340, 341, 342, 343 and 344, satisfactory performance in the practical component of the particular unit, i.e. in one of the topics (xi), (xii) or (xiii), is required before credit can be given for that unit as a whole.

Chemical Research Project: This 5 point unit includes about 90 hours of laboratory work, and is compulsory for all students majoring only in Chemistry.

ASSESSMENT Units may be examined at fixed times throughout the year, and in the examination term at the end of the year. Written assignments and tests throughout the course may be taken into account in determining the candidate's result.

Weightings of assessment components will be made known at commencement of the units.

PREREQUISITES Prerequisite studies have been specified for certain units and such preparation is to be generally regarded as essential.

PHYSICAL CHEMISTRY

301 is designed as a general unit, 302 and 303 are intended for students interested in the more practical and more theoretical aspects of chemical physics respectively.

Note that a pass in any one of units 201, 202, 203 is a necessary prerequisite for all 300 level Physical Chemistry units.
301 PHYSICAL CHEMISTRY

30 lectures; 5 points.

Elementary Statistical Mechanics
Fundamentals — probability, entropy, partition functions. Perfect gas — translational, rotational, vibrational partition functions, contributions to entropy, molar heat capacity, chemical potential.

Applications: Topics to be selected from:
Chemical reaction in gases; Chemical equilibrium law; Transport phenomena.


Surface Chemistry: Thermodynamics and properties of plane and curved surfaces. Nucleation. Surface tension and adsorption in multicomponent systems; surfactant solutions. The solid-gas interface, adsorption, surface area determinations.

ASSESSMENT Not more than 4 assignments, each not exceeding 8 pages, during terms 1 and 2, plus two 2-hour examinations, one at the end of term 1, one at the end of term 2.

302 SPECTROSCOPY AND ITS APPLICATIONS

24 lectures; 4 points.

Atomic Spectroscopy: Hydrogen atom (Rydberg formula), alkali metals (term symbols, multiplets, selection rules), atoms with more than one valence electron (R-S coupling), equivalent and non-equivalent electrons, Pauli principle.

Molecular Spectroscopy: Normal modes, rotational structure in infrared spectra, Raman spectroscopy, electronic spectra.

Pulsed Laser and Radiation Techniques

Reaction of Unstable and Excited Molecules and Atoms: States produced by thermal, photolytic, radiolytic and discharge excitation (ions; electronic, vibrational, rotational and translational excitation); bimolecular reactions of ions, atoms and free radicals in gases; energetics of reaction dynamics, third body effects, chemiluminescence, molecular beams; kinetic data from competing and consecutive reactions.

Decay of Electronically Excited States: Emission and excitation spectra; radiationless processes; quantum yield, lifetime, Stern-Volmer quenching kinetics; excimers and exiplexes; acid-base properties of excited states.

Applications: Topics to be selected from:
Solar energy storage; Fluorescence studies of molecular motion; Atmospheric reactions; Surface spectroscopy; Combustion processes.
303 PRINCIPLES OF PHYSICAL CHEMISTRY
18 lectures; 3 points.
ASSESSMENT Not more than two assignments, each not exceeding 8 pages plus one 2-hour examination at the end of term 3.

304 PHYSICAL CHEMISTRY PRACTICAL WORK 1
54 hours; 3 points.
A laboratory course, covering the fundamentals of physicochemical measurements and their interpretation.
Enrolment in this unit (or 305) is compulsory for all students enrolled in 4 to 9 points in Physical Chemistry.
ASSESSMENT Continuous throughout course, based on written reports.

305 PHYSICAL CHEMISTRY PRACTICAL WORK 2
90 hours; 5 points.
Syllabus as for 304, but coverage more intensive.
ASSESSMENT Continuous throughout course, based on written reports.

ORGANIC CHEMISTRY

320 SPECTROSCOPIC METHODS
Drs Kelly and Porter
2 points; 12 lectures
Prerequisites: 220, 221, 222 or 223.
A simple treatment of the analysis of infrared, nuclear magnetic resonance and mass spectra with particular emphasis on application in organic structure determination.
ASSESSMENT One 1½-hour terminal examination.
322 ORGANIC REACTION MECHANISMS

Dr Lawlor

2 points; 12 lectures

Prerequisites: 220, 221, 222 or 223.

A descriptive account of aspects of organic reaction mechanisms including an introduction to frontier orbitals and their importance in organic reactions.

ASSESSMENT One 1⅔-hour terminal examination.

323 BIOLOGICAL CHEMISTRY

Dr Gill

2 points; 12 lectures

Prerequisites: 220, 221, 222 or 223.

A mechanistic treatment of the chemistry underlying selected biological reactions exemplified by topics in biology including: enzyme action, photosynthesis, glycolysis, vitamins and hormones.

ASSESSMENT One 1⅔-hour terminal examination.

324 NATURAL ORGANIC SUBSTANCES

Professor D. W. Cameron

2 points; 12 lectures

Prerequisites: 220, 221, 222 or 223.

A brief discussion of the chemistry of selected aromatic metabolites, alkaloids, terpenoids, steroids, vitamins and antibiotics. General characteristics of certain of these classes established by biosynthetic pathways including acetate, shikimate and mevalonate.

ASSESSMENT One 1⅔-hour terminal examination.

325 REACTIVE INTERMEDIATES

Dr Q. N. Porter

2 points; 12 lectures

Prerequisites: 220, 221, 222 or 223.


ASSESSMENT One 1⅔-hour terminal examination.

326 PRINCIPLES OF ORGANIC SYNTHESIS

Dr G. I. Feutrill

2 points; 12 lectures

Prerequisites: 220, 221, 222 or 223.

Application of mechanistic principles to the understanding and planning of organic synthesis. Illustrations cover a wide field of organic syntheses.

ASSESSMENT One 1⅔-hour terminal examination.
Faculty of Science

327 ORGANIC PHOTOCHEMISTRY
Dr J. M. Lawlor
2 points; 12 lectures
Prerequisites: 220, 221, 222 or 223.
An introduction to the organic-chemical consequences of photoexcitation; specifically, a descriptive account of light-induced fragmentations, redox reactions and cycloadditions.
ASSESSMENT One 1½-hour terminal examination.

328 CHEMISTRY OF THE ENVIRONMENT
Dr R. B. Johns
2 points; 12 lectures
Prerequisites: 220, 221, 222 or 223.
A general outline of pollutants of our environment including a discussion of the concept and consequences of materials cycles. A case study of the environmental and ecological effects of DDT and other chlorinated hydrocarbons.
ASSESSMENT One 1½-hour terminal examination.

329 ORGANIC POLYMER CHEMISTRY
12 lectures; 2 points.
Prerequisites: 220, 221, 222 or 223.
Reaction mechanism of step-growth and chain-growth polymerizations.
ASSESSMENT One 1½-hour terminal examination.

335 ORGANIC PRACTICAL WORK I
Dr J. M. Lawlor
90 hours; term 1; 5 points.
Prerequisites: 220, 221, 222 or 223; 320.
The emphasis is on the techniques of organic chemistry rather than on illustration of lecture material. Good recoveries of good-quality products and good reporting are stressed. The preparative exercises include catalytic reactions, reactions under anhydrous-anaerobic conditions, fractional distillation, small-scale recrystallisations and distillations, gas-liquid chromatography and preparative column chromatography. There are also exercises in structure determination by spectroscopic and chemical means.
Satisfactory completion in this unit is compulsory for all students enrolled in 9 or more Organic theory points at the 300 level.

336 ORGANIC PRACTICAL WORK II
Dr J. M. Lawlor
54 hours; term 1; 3 points.
Prerequisites: 220, 221, 222 or 223; 320.
A less extensive version of Unit 335.
Satisfactory completion in this unit or unit 335 is compulsory for all students enrolled in 3-8 Organic theory points at the 300 level.
395 ORGANIC GECHEMISTRY OF FOSSIL FUELS
Dr R. B. Johns
12 lectures; 2 points.
Prerequisite: A completed second year course in Chemistry of at least 10 credited points.
SYLLABUS An introduction to the concepts of Organic Geochemistry: discussion of the concept of Biological Markers, the Diagenetic Path­ways to geochemical fossils and kerogen, and the relationship of Biological Markers in Fossil Fuels to the depositional environment. The chemical composition of coals and oils will be discussed in the context of a chemical understanding of the coalification process and petroleum generation.
ASSESSMENT One 1½-hour terminal examination.

INORGANIC CHEMISTRY

Topics offered in Inorganic Chemistry at 300 level and the assessment procedures for them are given below:
(i) PHYSICAL METHODS IN INORGANIC CHEMISTRY
8 lectures.
Prerequisite: 240 or 241.
Advanced ligand field theory and an introduction to the angular overlap model. Application to electronic spectra, magnetic susceptibility and magnetic interactions of transition metals. The application of nuclear magnetic resonance (of paramagnetic ions) to problems in Inorganic Chemistry. It is suggested that topic (iv) be taken as well.
(ii) CHEMISTRY OF d— AND f— TRANSITION ELEMENTS
8 lectures.
A survey of the special features of the structures and reactions of compounds of the 1st, 2nd and 3rd row transition metals. Chemistry of lanthanides and actinides with special reference to stabilities of various oxidation states in terms of involvement of d and f electrons in bonding.
(iii) INORGANIC STRUCTURAL AND CRYSTAL CHEMISTRY
8 lectures.
An essentially descriptive course with particular emphasis on (i) common features existing between crystal structure types and their continuity, (ii) the recognition of simple operations by which such types of structures can be related or transformed one to another, and (iii) alternative descriptions available for individual crystal structures. Non-stoichiometric solids.
(iv) CHEMICAL APPLICATIONS OF GROUP THEORY
8 lectures.
Use of symmetry arguments in chemistry. Definition of a mathematical group, sub-group, class. Symmetry operations and elements, classes of symmetry operations. Representations of groups, characters, orthogonality theorems, character tables. Representation theory and quantum mechanics. Applications to group orbitals, molecular vibrations, aspects of ligand field theory.
Faculty of Science

(v) ORGANO-METALLIC CHEMISTRY
8 lectures.
Synthesis, reactions and structure of organo-metallic compounds with special reference to the use of spectroscopic, magnetic and diffraction techniques (e.g. carbonyls, nitrosyls, sandwich compounds, hydride compounds, olefin compounds).

(vi) INORGANIC REACTION MECHANISMS
8 lectures.
A discussion of the characteristic reactions of metal complexes. The types of reactions covered will include nucleophilic and electrophilic substitution, stereochemical rearrangements and oxidation-reduction. The experimental methods used for mechanistic studies will also be considered.

(vii) MAIN GROUP NON-METAL CHEMISTRY
8 lectures.
A discussion of the synthesis, characteristic reactions, structures and bonding of classes of substances such as ring and cage molecules, e.g. sulphur and phosphorus nitrides, perfluoroalkyl derivatives of the elements, and silyl compounds. Information derived from various physical techniques will be presented and analysed.

(viii) CATALYSIS AND REACTIONS OF CO-ORDINATED LIGANDS
8 lectures.
Types of activation resulting from attachment to metal centres. Migration. Insertion. Oxidative addition. Reductive elimination. Catalytic cycles illustrated by a number of processes of synthetic or industrial importance.

(ix) CHEMISTRY OF ESTUARIES AND OCEANS
8 lectures.
Prerequisites: 13 or more 200-level Chemistry points plus 610-295.
The sea as a chemical system; reactions occurring in oceans and estuaries; interactions of river water and seawater.

ASSESSMENT OF TOPICS (i) to (ix). Each topic is to be assessed by one 1-hour terminal examination except that, at the commencement of topic (iv), the class, as a whole, is offered the choice between the 1-hour examination and completion of an assignment examined on the basis of a report with a maximum length of 20 pages. In the examination period after each term, examination papers are presented each of which includes 2 or 3 1-hour sections, each section relating to one of the topics presented in that term.

(x) BIO-INORGANIC CHEMISTRY
18 lectures; 3 points.
model systems. Chemistry and biological importance of sodium, potassium, calcium, magnesium, copper and molybdenum.

ASSESSMENT One 2-hour terminal examination.

(xi) INORGANIC PRACTICAL COURSE A
90 hours; 5 points.
Prerequisites: 260 and either 240 or 241 or 242.
A course of synthetic procedures and instrumental techniques designed to illustrate much of the material covered in the third year Inorganic Chemistry lecture topics.
ASSESSMENT A maximum of 8 experiments is to be completed. Each experiment is of 10-12 hours duration including the writing of a report, 5-10 pages long, depending on the experiment.

(xii) INORGANIC PRACTICAL COURSE B
54 hours; 3 points.
Prerequisites: 260 and either 240 or 241 or 242.
The practical course is a shortened version of that given for topic (xi).
ASSESSMENT A maximum of 5 experiments is to be completed. Each experiment is of 10-12 hours duration including the writing of a report, 5-10 pages long, depending on the experiment.

(xiii) INORGANIC PRACTICAL COURSE C
54 hours; 3 points.
Prerequisites: Topic (x) and 260 and either 240 or 241 or 242.
A course of synthetic and instrumental techniques designed to illustrate some of the matter covered in topic (x).

UNITS
The following five combinations of topics are offered as units 340 to 344 in Inorganic Chemistry at 300 level. A student may enrol in any one of the units 340 to 344, subject to departmental course advice and approval. Units 360 and 399, the details of which are set out below, are also offered.

340 INORGANIC CHEMISTRY 1
64 lectures and 90 hours laboratory work; 16 points.
8 topics selected from (i) to (ix), 11 points, plus topic (xi), 5 points.

341 INORGANIC CHEMISTRY 2
48 lectures and 90 hours laboratory work; 13 points.
6 topics selected from (i) to (ix), 8 points, plus topic (xi), 5 points.

342 INORGANIC CHEMISTRY 3
48 lectures and 54 hours laboratory work; 11 points.
6 topics selected from (i) to (ix), 8 points, plus topic (xii), 3 points.

343 INORGANIC CHEMISTRY 4
32 lectures and 54 hours laboratory work; 8 points.
4 topics selected from (i) to (ix), 5 points, plus topic (xii), 3 points.

344 INORGANIC CHEMISTRY 5
18 lectures and 54 hours laboratory work; 6 points.
Topic (x), 3 points and topic (xiii), 3 points.
360 ANALYTICAL CHEMISTRY
8 lectures and 30 hours laboratory work; 3 points.
Prerequisites: Not less than 13 200-level Chemistry points including 260.
SYLLABUS Principles and applications of potentiometry based on ion-selective electrodes, voltammetry (dropping mercury and solid electrodes, DC, AC and other modes) and atomic absorption spectrometry.
PRACTICAL WORK Selected analyses including the procedures listed above and applied to real materials including seawater and wine.
ASSESSMENT One 1-hour terminal examination and assessment of practical work.

399 CHEMICAL RESEARCH PROJECT
1 lecture; 90 hours laboratory work; preparation of written and oral reports: 5 points.
Prerequisite: Students must be enrolled for at least six points at the 300 level in each of Physical, Organic and Inorganic Chemistry (excluding Unit 399).
Students will carry out a brief chemical investigation under the direction of a Chemistry School staff member. Titles of the projects available will be displayed at the end of second term, and the project work will be carried out during third term. Each student will be required to prepare both a written and oral report on the investigation. The written report is the basis for the major part of the assessment.
Enrolment in this unit is compulsory for all students enrolled in 30 or more 300 level points in Chemistry.

MARINE CHEMISTRY

395 ORGANIC GEOCHEMISTRY OF FOSSIL FUELS
Dr R. B. Johns
12 lectures; 2 points.
Prerequisite: A completed second year course in Chemistry of at least 10 credited points.
SYLLABUS Refer to this unit listed earlier under Organic Chemistry.
ASSESSMENT One 1½-hour terminal examination.

396 CHEMISTRY OF ESTUARIES AND OCEANS
Dr J. D. Smith
May not be taken with 340 to 344.
8 lectures; assignments; 2 points.
Prerequisites: 13 or more 200-level Chemistry points.
SYLLABUS The sea as a chemical system; reactions occurring in oceans and estuaries; interactions of river water and seawater.
ASSESSMENT One 1-hour terminal examination. Assignments not exceeding 6 pages.
**622 COMPUTER SCIENCE**

**DEPARTMENTAL SUGGESTED COURSE**

100 Level Mathematical Sciences 110/111, 120, 130 together with another 100 level unit. e.g. Physics 100 level.

200 Level Computer Science 214, 222, 250; Mathematics 230, 250 or (210, 220), together with other units.

300 Level Computer Science 312, 313, 325, 330, 332, 341, 340, 351, 332 together with other units.

Students will be required to spend time on practical assignments in addition to lectures, practice classes and tutorials. However the total time involved for each unit should be approximately the same as that for any other science unit of similar level and point score.

Prerequisites other than those listed may sometimes be acceptable. The Department should be consulted in cases of doubt.

In particular units students may choose the assessment method. Full details will be provided by the department at the commencement of the particular unit.

**B.Sc.(HONS.) ADMISSION REQUIREMENTS**

The minimum admission requirements for Fourth Year honours in Computer Science are:

a. A third class faculty honour;
b. attainment of 300-level results at a standard prescribed by the department;
c. passes in 622-214, 222 and 250, and at least six of 622-312, 313, 325, 330, 332, 341 and 351;
d. passes in 618-250 or (618-210 and 220).

**100 LEVEL**

At the first year level, the Department of Computer Science offers components of the Mathematical Science units 617-111, 617-110, 617-120, 617-130, 617-140 and 617-150.

The recommended course for students intending to proceed to 200 Level Computer Science units is 617-111 (or 110), 120 and 130. Students who do not take 130 and who later decide to proceed to 200 level units may do so by taking the additional Computer Science unit, 622-213, in their second year in parallel with 622-214 with permission of the chairman.

The Department offers a special unit at the first year level, 622-113, which is held four weeks full-time during the summer vacation. It is taken by Diploma students, but it is also available to other students as a terminal unit.

**113 COMPUTER SCIENCE: INTRODUCTION TO COMPUTING**

**(SUMMER SCHOOL)**

24 lectures; eight 1-hour practice classes; approximately 24 hours project work; 3 points.

**SYLLABUS** Design and implementation of algorithms; syntax and semantics of high level languages; programming in Pascal; control structures and data structures; introduction to software engineering.
Faculty of Science

Computer organization: binary number systems; logical and arithmetic operations; peripheral devices; machine languages. Numerical computing: roundoff and truncation errors; solution of linear and nonlinear equations; numerical integration, random number generation.

ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

200 LEVEL

The department of Computer Science offers four units at the 200-level. To enrol for a unit at the 200-level it is necessary to have passed all the units in the sequence 617-110/111, 120 and 130. An alternative sequence for students who have passed 617-110/111 and 120 but who have not taken 617-130 is to enrol for 622-213 and 214 concurrently in 1st term. This alternative sequence is only available with the Chairman's permission.

622-214 and 622-250 are the prerequisites for most of the 300-level units. The theoretical and numerical units also require 622-222. Thus students intending to major in Computer Science are advised to take 622-214, 222 and 250. Intending Fourth Year students are required to take 622-214, 222 and 250.

213 COMPUTER SCIENCE: COMPUTER SCIENCE METHODS

24 lectures; eight 1-hour practice classes; approximately 24 hours practical work; 1st term; 4 points.
Prerequisites: 617-110/111 and 120; or equivalent.

Credit may not be obtained for 622-213 if 617-130 has been passed.

SYLLABUS Theory of algorithms. Data structures: strings; linear lists; trees; binary search trees; hash tables. Sorting and searching. System processes: assemblers; loaders; compilers; operating systems. Data processing concepts and algorithms: online/batch systems; sequential/direct access files; sequential file algorithms; database systems.

ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

214 COMPUTER SCIENCE: STRUCTURE OF COMPUTERS

32 lectures; seven 1-hour tutorials; approximately 48 hours' project work; 1st term; 6 points.
Prerequisites: 617-110/111, -120 and -130.

SYLLABUS Assembly language programming, procedure calling implementation, high-level language implementation, combinational and sequential logic, busses, serial transmission, memory, central processor organization, input/output, memory management, hardware language support features.

ASSESSMENT One 3-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

58
222 COMPUTER SCIENCE: MATHEMATICS OF COMPUTER SCIENCE

32 lectures; twelve 1-hour tutorials; approximately 45 hours' project work; 2nd & 3rd terms; 6 points.
Prerequisites: 617-110/111, -120 and -130.
SYLLABUS Discrete mathematics: complexity of programs, finite automata and formal languages, unsolvability, introduction to Logic Programming. Numerical methods: Finite differences; polynomial approximation; solution of linear equations; solution of nonlinear equations; numerical integration.
ASSESSMENT One 3-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

250 COMPUTER SCIENCE: COMPUTER SYSTEMS

32 lectures; twelve 1-hour tutorials; approximately 45 hours' project work; 2nd & 3rd terms; 6 points.
Prerequisites: 622-214.
SYLLABUS Structure of computer system software; assemblers; macroprocessors; high level languages; compilers: linkers and loaders; interpreters; concurrent processes; file store management; file organization and design; software aspects of memory management.
ASSESSMENT One 3-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL

Students are free to take any combination, consistent with the prerequisite structure. However, they are advised to include units from each of the four streams (hardware, software, theoretical, numerical) to provide some breadth to their course.

Students with a mathematical bias should ensure that they take a proportion of 3rd year Mathematics units. Similarly, students interested in the hardware aspects of computers should include units from Electrical Engineering such as 431-382. Students interested in pursuing a career in commercial data processing should consider taking 622-352 and units offered by the faculty of Economics and Commerce.

It is recommended that students majoring in Computer Science take the units 312, 313, 325, 330, 332, 340, 341 and 351.

303 COMPUTER SCIENCE: ARTIFICIAL INTELLIGENCE

16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 3rd term; 4 points.
Prerequisites: 622-312 (after 1987, 622-222).
SYLLABUS Searching, problem solving, logic and deduction, knowledge representation, learning, programming languages for artificial intelligence.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit.
Faculty of Science

Weightings of assessment components will be made known at commencement of the unit.

312 COMPUTER SCIENCE: DATA STRUCTURES AND ALGORITHMS
16 lectures; seven 1-hour practice classes; approximately 24 hours’ project work; 1st term; 4 points.
Prerequisites: 622-250.

SYLLABUS A selection from the following topics. Linear lists, stacks, queues, trees and hash tables; abstract data types; applicative programming techniques; analysis of algorithms; height-balanced and B-trees; dynamic storage management algorithms; dynamic hashing; partial match retrieval algorithms.

ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

313 COMPUTER SCIENCE: COMPUTER DESIGN
16 lectures; seven 1-hour practice classes; approximately 24 hours’ project work; 2nd term; 4 points.
Prerequisites: 622-214.

SYLLABUS Hardware description languages; component technology; design methodologies; comparative study of computer designs; peripherals and their interfacing; communications.

ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

324 COMPUTER SCIENCE: NUMERICAL ANALYSIS
16 lectures; seven 1-hour practice classes; approximately 24 hours’ project work; 1st term; 4 points.
Prerequisites: 622-222 and 618-250 or (618-210 and -220).

SYLLABUS Spline approximation, Fourier analysis, Chebyshev approximation, rational approximation, Gaussian quadrature; solution of initial value problems in ordinary differential equations.

ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

325 COMPUTER SCIENCE: MATHEMATICAL SOFTWARE
16 lectures; seven 1-hour practice classes; approximately 24 hours’ project work; 2nd term; 4 points.
Prerequisites: 622-222, 341 and 618-250 or (618-210 and -220).

SYLLABUS Matrix inversion; solution of polynomial equation; spline approximation; adaptive quadrature; fast Fourier transform; non-linear minimization.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

330 COMPUTER SCIENCE: THEORY OF COMPUTATION
16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 1st term; 4 points.
Prerequisites: 622-222, 250.
SYLLABUS A selection from the following topics. Automata and formal languages: finite state, pushdown, Turing and register machines, regular and context free languages; recursive and partial recursive sets and functions; complexity of computation: P and NP problems; correctness of programs.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

332 COMPUTER SCIENCE: OPERATING SYSTEMS
16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 2nd term; 4 points.
Prerequisites: 622-250.
SYLLABUS Design issues in operating systems; concurrent processes; memory management; file systems; distributed operating systems.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

335 COMPUTER SCIENCE: TOPICS IN THEORETICAL COMPUTER SCIENCE
16 lectures; seven 1-hour tutorials; approximately 24 hours' project work; 3rd term; 4 points.
Prerequisites: 622-330.
SYLLABUS A selection from topics such as: complexity of computation; synthesis and verification of programs; derivation of correct programs; programming language semantics; concurrent computation; database theory.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

340 COMPUTER SCIENCE: COMPUTER SCIENCE PROJECT
Approximately 118 hours' project work; 1st, 2nd & 3rd terms; 6 points.
Prerequisites: 622-341 (may be taken concurrently). Appropriate co-requisite units may also be required.
SYLLABUS A substantial project drawn from such areas as microprocessors, software, graphics or networks.
Faculty of Science

ASSESSMENT Each student will be required to prepare a written report on the project within the overall time limit of 118 hours, for presentation at the end of 3rd term. Students will be assessed on the basis of their project work.
Weightings of assessment components will be made known at commencement of the unit.

341 COMPUTER SCIENCE: SOFTWARE ENGINEERING
16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 1st term; 4 points.
Prerequisites: 622-250.
SYLLABUS Study of the problems connected with the development of large-scale programs. Topics include design strategies, systems specification, project estimating, costing and planning, progress monitoring and project control; development team structure; programming and documentation; testing and debugging; validation and certification; evaluation and measurement; maintenance and modification.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

343 COMPUTER SCIENCE: COMPUTERS AND SOCIETY
16 lectures; approximately 30 hours' project work; 2nd & 3rd terms; 4 points.
Prerequisites: 622-214.
SYLLABUS Computer uses in industry, education, medicine, law, economics and public administration; social implications of computers; professional aspects, computer facilities management.
ASSESSMENT This unit will be assessed by written project work not exceeding 10,000 words in all. A satisfactory performance on each project is required for a pass in the unit. Weightings of assessment components will be made known at commencement of the unit.

351 COMPUTER SCIENCE: DATABASE SYSTEMS
16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 3rd term; 4 points.
Prerequisites: 622-250.
SYLLABUS Database system architecture; CODASYL proposals; relational database systems; normalization; query languages; deductive database systems; security and integrity.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

352 COMPUTER SCIENCE SYSTEMS ANALYSIS AND DESIGN
16 lectures; seven 1-hour practice classes; approximately 24 hours project work; 2nd term; 4 points.
Prerequisites: 622-341.
SYLLABUS Structured analysis techniques, data flow analysis, data normalization, human-computer interfaces, data processing tools and languages.

ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

353 COMPUTER SCIENCE: NETWORKS AND COMMUNICATIONS
16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 3rd term; 4 points.
Prerequisites: 622-250.
SYLLABUS Communication hardware; network topology; the physical layer; the data link layer; the network layer; the transport and session layers; the presentation layer; the application layer.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

361 COMPUTER SCIENCE: PROGRAMMING LANGUAGES AND COMPILERS
16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 2nd term; 4 points.
Prerequisites: 622-312.
SYLLABUS Programming language features; compiler tasks and structure; intermediate representations of programs; global tables; run-time structures; lexical analysis; parsing; semantic analysis; code generation; optimizations.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

380 COMPUTER SCIENCE: GRAPHICS
16 lectures; seven 1-hour practice classes; approximately 24 hours' project work; 3rd term; 4 points.
Prerequisites: 622-250.
SYLLABUS Graphics hardware; specification of structures; picture generation; raster algorithms; image processing.
ASSESSMENT One 2-hour terminal examination and assigned project work. Project work must be completed satisfactorily to pass the unit. Weightings of assessment components will be made known at commencement of the unit.

390 COMPUTER SCIENCE: DIRECTED STUDY
16 lectures; approximately 30 hours' project work; 4 points.
Prerequisites: This unit may only be taken with the consent of the chairman.
Faculty of Science

SYLLABUS A course of directed study in Computer Science covering material which is not otherwise available to the student. The study will be directed by a member of the department and may entail project work in addition to lecture material.

ASSESSMENT Assessment by project work and/or terminal examination not exceeding 2 hours.

Weightings of assessment components will be made known at commencement of the unit.

431 ELECTRICAL ENGINEERING

Students who are interested in taking Electrical Engineering must consult the Chairman of the department.

382 DIGITAL CIRCUITS

18 hours' lectures, 5 hours' tutorials; 9 hours' laboratory work; terms 1, 2 and 3; 4 points.

Prerequisites: Some knowledge of microprocessor organization and programming is assumed. Special provision may be made for students without this background.

SYLLABUS Characteristics and limitations of logic families, functional study of monostables, astables, Schmitt trigger, A/D and D/A converters, counters and shift registers, design of sequential circuits, memory elements.

ASSESSMENT One 1½-hour terminal examination in November (70%); test during course (10%); laboratory work (12%); practice class submissions (8%).

400 ENGINEERING

100 LEVEL

102 INTRODUCTION TO ENGINEERING B

SYLLABUS (approximately 64 hours of lectures and 74 hours of tutorial and practical classes). 7 points.

Topics included are:

(1) General lectures, e.g.; study methods, use of libraries.
(2) Communication, written and oral—types of written communication; oral presentation of material; graphical communication.
(3) Descriptive Geometry, Engineering Drawing and Sketching—representational methods; points, lines, planes, surfaces; orthographic and axonometric projections, intersections and developments. Drawing techniques, dimensioning, assembly drawings.
(4) The Statics of Engineering Systems—forces, equilibrium, planar trusses, friction, beams, bending moments and shear forces. Stress and strain, material behaviour, section properties, torsion and bending.
DRAWING OFFICE WORK
Three hours per week throughout most of the year.

ASSESSMENT
The drawing office work and assignments on topic (2) will be assessed during the year.
One 3-hours' paper on topic (4), one 1 1/2-hour paper on topic (5) and one 1 1/2-hour paper on topic (3) will be taken during the year.
The final assessment will be for pass and honours and will be based on the performance in the drawing office, in the assignments and in the three examination papers.
Students will be informed at the commencement of the year of the relative weight to be given to the various portions of the examination and of the minimum required level in each component.

COMBINED COURSE IN SCIENCE/ENGINEERING (ELECTRICAL)

COMPUTER SCIENCE STREAM

YEAR 1
400-102 Introduction to Engineering B
622-100 Computer Science 1
618-005 Engineering Mathematics 1
640-120 Physics (Advanced)

YEAR 2
431-201 Electrical Engineering 1
618-025 Engineering Mathematics 2
618-026 Engineering Mathematics 2A

Science
622-214 Structure of Computers
622-250 Computer Systems
and either
640-026 Physics 2 (Engineering Co.)
or
640-223 Quantum Mechanics
or
640-223. Quantum Mechanics and
640-227 Optics

YEAR 3
431-301 Electrical Engineering 2
618-036 Engineering Mathematics 3A
619-003 Statistics and Stochastic Processes

Science
622-222 Mathematics of Computer Science
and
618-285 Computational Mathematics A (Optional)

YEAR 4
40 points of 300-level Science units
Faculty of Science

YEAR 5
431-401 Electrical Engineering 3
431-412 Discussion Sessions 2
   (Electrical Engineering)
together with either:
317-203 Business Administration 3
and one of:
317-201 Business Administration 1
317-202 Business Administration 2
or
618-045 Engineering Mathematics 4

MATHMATICS STREAM

YEAR 1
400-102 Introduction to Engineering B
617-111 Mathematical Science 1A
617-120 Mathematical Science 1C
640-120 Physics (Advanced)

Engineering

Science

YEAR 2
431-201 Electrical
   Engineering 1
618-026 Engineering
   Mathematics 2A
   either:
   (618-210 Real and Complex Analysis
   (618-230 Vector Analysis and Mathe-
   trical Method
or:
618-250 Mathematics 2
in addition:
640-222 Optics and Relativity
640-223 Quantum Mechanics
640-226 Thermal Physics

YEAR 3
431-301 Electrical
   Engineering 2
618-036 Engineering
   Mathematics 3A
619-003 Statistics and
   Stochastic Processes
plus
618-285 Computational Mathematics A
approx. 7 points of approved electives
(e.g., 640-299 Physics Laboratory, or
618-260 Linear Programming and
Optimization

YEAR 4
40 points of 300-level Science units

YEAR 5
431-401 Electrical Engineering 3
431-412 Discussions Sessions 2
   (Electrical Engineering)
together with either:
317-203 Business Administration 3
and one of:
316-308 Economics C8
Genetics

317-201 Business Administration 1
317-202 Business Administration 2
or
622-220 Computer Science 2E

**PHYSICS STREAM**

**YEAR 1**

400-102 Introduction to Engineering B
617-111 Mathematical Science 1A
617-120 Mathematical Science 1C
640-120 Physics (Advanced)

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<td>640-222 Optics and Relativity</td>
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<td>618-025 Engineering Mathematics 2</td>
<td>640-223 Quantum Mechanics</td>
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<td>618-026 Engineering Mathematics 2A</td>
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<td>436-223 Engineering Materials (Electrical)</td>
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<td>618-285 Computational Mathematics A</td>
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<tr>
<td>618-036 Engineering Mathematics 3A</td>
<td>640-224 Classical Mechanics</td>
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<td>619-003 Statistics and Stochastic Processes</td>
<td>640-226 Thermal Physics</td>
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**YEAR 3**

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**YEAR 4**

40 points of 300-level Science units with 640-299 Physics Laboratory

**YEAR 5**

431-401 Electrical Engineering 3
431-412 Discussion Sessions 2 (Electrical Engineering) 
together with either:
316-308 Economics C8
317-201 Business Administration 1
317-202 Business Administration 2
or
618-045 Engineering Mathematics 4
or
622-220 Computer Science 2E

**652 GENETICS**

**DEPARTMENTAL SUGGESTED COURSE**

100 Level Biology 101 or 102, 103 and 104 or 102 with either 103 or 104, together with units from Chemistry (recommended), Physics, Mathematical Sciences, Psychology or History and Philosophy of Science.
Faculty of Science

200 Level Genetics 201 and 202 together with units from Anatomy, Biochemistry (recommended), Botany, Chemistry, H.P.S., Mathematics, Microbiology, Physiology, Psychology, Statistics, Zoology.

Students interested in constructing a course with an emphasis on Biotechnology must include Genetics 201 and 202 and include appropriate 300 level units (see Guide to Science Courses).

300 Level Students who wish to proceed to Honours in Genetics should take a minimum of 15 points including at least one of the courses with a practical component (301, 304).

Suggested subject combinations are:
(a) Population and Evolution stream: Genetics 301, 305, 306 plus one or more of 302, 303 and 304, together with Botany (especially 301, 302 and 304) and/or Zoology (especially 301, 303, 304), and/or units from Mathematics, Statistics.
(b) Molecular stream: Genetics 302, 303 and 304 plus one or more of 301, 305 and 306 together with Biochemistry (especially 302, 303 and 323); and/or Microbiology (especially 309, 310, 307, 308, 305, 303, 304); and/or cellular based units in Botany and/or Zoology.
(c) Complete Genetics stream: Genetics 301, 302, 303, 304, 305, 306 together with units from other Science faculty courses.

B.Sc.(HONS.) ADMISSION REQUIREMENTS
Students should take a minimum of 15 points at 300-level including at least one of the units with a practical component, 301, 304.

201 GENERAL GENETICS (LECTURES)
Dr Kelly, Professor Hynes, Dr Batterham

48 lectures (2 per week, terms 1, 2 and 3); 9 tutorials (3 per term); 6 points.

The unit will cover the fundamental principles of genetics at the molecular, organism and population levels.

Prerequisites: 600-101 or 600-102, 103 or 600-102, 104.


ASSESSMENT Written examinations will be held at the end of each term; in term 1, 1 hour; in terms 2 and 3, 1½ hours. Tutorial problems will contribute to the assessment. Weightings of assessment components will be made known at commencement of the unit.

202 GENERAL GENETICS (PRACTICAL WORK)
Dr Kelly, Professor Hynes, Dr Batterham

72 hours practical work; terms 1, 2 and 3; 3 points.
Students must call at the department's office before Thursday 3 March, to be assigned to a laboratory group. Laboratory coats must be obtained. Students taking 202 must be taking or have completed General Genetics 201. Three hours per week of experimental work and problems involving techniques and experimental designs used in genetic, cytogenetic and molecular analysis of micro-organisms and higher organisms. Tutorials and discussions will be held within the practical classes.

ASSESSMENT One 1-hour written examination at the end of each of terms 1, 2 and 3; experimental reports and tutorial problem answers will contribute to the assessment. Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL

PREREQUISITE for courses Genetics 201 and 202 except for units 305 and 306 where only 201 is required. The requirement of 202 for other units may be waived by the Chairman. Six units are offered. Genetics 302, 303, 305 and 306 are lecture only units. Genetics 304 is a laboratory orientated course and requires a current enrolment or previous pass in both Genetics 302 and 303. Concurrent units are timetabled so that a student can enrol in both units. Students taking units with a practical class component must call at the department's office to be assigned to a laboratory group before the commencement of the unit. Students who wish to proceed to B.Sc. (Honours) in the department of Genetics are advised to take at least 15 points of Genetics. This should include at least one course with a practical class component (301 or 304). In some cases this latter requirement may be waived particularly if students have successfully completed Biochemistry 323 or microbiology 310.

301 POPULATION AND ECOLOGICAL GENETICS

Dr McKenzie and Dr Martin

16 lectures; 32 hours of practical classes; 4 hours of tutorials; one field excursion; 1st term; 5 points.

Prerequisite: 201 and 202.

SYLLABUS This unit is designed to demonstrate the interaction between the genetical and ecological properties of populations of animals and plants. Topics will include: genetic models of populations; the maintenance of genetic polymorphisms; modes of selection; gene flow and population differentiation.

ASSESSMENT One 2-hours' written paper; up to 4 practical reports including an excursion report, average length 750 words, problems/assignments.

Weightings of assessment components will be made known at commencement of the unit.

302 MOLECULAR GENETICS

Dr Lee and Professor Hynes

30 lectures; 1st term; 5 points.

Prerequisite: 201 and 202.
Faculty of Science

SYLLABUS The unit aims at a basic coverage of the principles of molecular genetic analysis. DNA transactions — replication, repair, mutagenesis, recombination in prokaryotes and eukaryotes. Prokaryote gene structure, action and regulation. Plasmid and phage genetics. Recombinant DNA methodology.

ASSESSMENT One 3-hours’ terminal examination; up to six problems/assignments.
Weightings of assessment components will be made known at commencement of the unit.

303 MOLECULAR AND CELLULAR GENETICS
Dr Cobbett, Dr Kelly and Dr Camakaris
30 lectures; 2nd term; 5 points.
Prerequisite: 201 and 202. Enrolment in or previous completion of 652-302 Molecular Genetics and/or Biochemistry 521-303 and/or Microbiology 526-309.


ASSESSMENT One 3-hours’ terminal examination; up to six problems/assignments.
Weightings of assessment components will be made known at commencement of the unit.

304 MOLECULAR AND CELLULAR GENETICS (PRACTICAL)
6 lectures and 72 hours of practical classes; 2nd and 3rd terms; 5 points.
Prerequisite: 201, 202 and current enrolment in 302 and 303.

SYLLABUS The unit aims to introduce students to modern techniques used in Genetic Analysis. Lectures, demonstrations and experiments illustrating these techniques will be performed and students will undertake one or more specialized practical projects. Areas covered include phage and bacterial genetics, recombinant DNA techniques, developmental genetics, molecular cytogenetics and mammalian cell biology.

ASSESSMENT Practical reports; problem assignments; project report; oral presentations of experimental data.
Weightings of assessment components will be made known at commencement of the unit.

305 HUMAN GENETICS
Dr Camakaris and Dr Martin
30 lectures; 2nd and 3rd term; 5 points.
Prerequisite: 201.

SYLLABUS The unit investigates various aspects of genetics as they relate to human populations. Mutation in humans and its molecular basis. The genetic basis of metabolic diseases and congenital malformations. Detection and screening of genetic diseases. Genetic counselling; immunogenetics. Human cytogenetics. Biological variation and

ASSESSMENT One 2-hours' terminal examination; one essay of 1,500 words maximum length.
Weightings of assessment components will be made known at commencement of the unit.

306 GENETICAL EVOLUTION OF PLANTS AND ANIMALS
Dr Martin and Dr Lee
30 lectures; 3rd term; 5 points.
Prerequisite: 201.
SYLLABUS A study of the role of genetics in the evolution of plants and animals from the molecular through to the chromosomal level. The common and special features of evolution in plants and animals, including man, will be investigated. Some consideration will be given to the role of directed evolution for the breeding of plants and animals for economic purposes and to the possible future evolution of man.

ASSESSMENT One 2-hours' open-book terminal examination; one essay of 2,500 words maximum length.
Weightings of assessment components will be made known at commencement of the unit.

121 GEOGRAPHY (SCIENCE COURSE)

SUGGESTED DEPARTMENTAL COURSE
100 Level Geography 101 and 104; one or more of Meteorology 101, 102, 103, Geology 101, Biology 101; 100 level courses in Mathematical Sciences.
200 Level Geography 211 and 213; units selected from 200-level courses in Geology, Meteorology, Marine Science or Botany.
300 Level Geography 311 and 318; units selected from 300-level courses in Geography, Geology, Meteorology, Marine Science or Botany.

Note: In addition to the units listed in this handbook, the department offers the following which may, with the permission of the faculty of Science, be taken as non-Science units within the B.Sc. course (full details are set out in the Faculty of Arts Handbook): 121-102 A Geography of Australia 121-212 Economic Geography 121-312 Regional and Urban Development 121-313 Urban Economic Studies 121-315 Historical Geography 121-316 Geography of Development 121-317 Social Geography
PREREQUISITES
1. In first year Geography, a previous study of Geography is not presumed.
2. A first-year Geography unit is normally a prerequisite for all second-year Geography units; however, exceptions to this rule will be made for students who have taken appropriate units in other departments.
Faculty of Science

3. Equally, a second-year Geography unit is normally a prerequisite for all third-year Geography units; however, appropriate units in other departments will be accepted as prerequisites.

4. Some Geography units have specific prerequisites; these are listed in the details of the relevant units. Prerequisites may be waived by permission of the Chairman of the department of Geography.

B.Sc. (HONS.) ADMISSION REQUIREMENTS

Admission to fourth year honours is normally open to students who have (i) completed Geography 101; (ii) completed at least 19 points of 200-level Geography and 23 points of 300-level Geography including 318, and (iii) achieved a Faculty honours score of 65% or greater in their 300-level results. Admission may be granted to students who have taken fewer Geography points, provided they have completed relevant units in other departments.

100 LEVEL

This consists of 101 A Geography of Famine and 104 Introductory Physical Geography. Students wishing to major in Geography must enrol in 101 and 104. No first year unit has a prerequisite.

101 A GEOGRAPHY OF FAMINE

Co-ordinator: Mr G. J. Missen
72 lectures; 6 points.
SYLLABUS Famine (including hunger and malnutrition) is the single most important issue facing the world today. This unit examines the incidence of famines and their causes: climatic changes, ecological destruction, population growth and other social changes. Various social theories are assessed as explanations of famine and the maldistribution of food.

ASSESSMENT Three one-hour tests (30%); two essays (no more than 2,000 words each) (70%).

104 INTRODUCTORY PHYSICAL GEOGRAPHY

Dr B. L. Finlayson
24 lectures; 24 hours of practical work; one half-day excursion; 3rd term; 3 points.
SYLLABUS People and climate; the hydrological cycle; river systems; the effects of people's activities on water resources; floods and droughts; elements of biogeography.

ASSESSMENT One 1½-hour examination (50%); one 1,500-word essay (50%).

200 LEVEL

Students wishing to major in Geography should take 211 and 213. Students not majoring in Geography who wish to enrol in individual units may have the prerequisites waived if they have taken relevant units in other departments.

211 PHYSICAL GEOGRAPHY

Drs. E. C. F. Bird, B. L. Finlayson and Professor J. R. V. Prescott
58 lectures; 66 hours of practical work (up to 40% of which will be field work); 3 terms; 10 points.
Prerequisites: 101 and 104.
SYLLABUS Map projections, history of cartography, techniques of map making. Surveying: levelling, use of theodolite, plane tabling, tacheometry, contouring, areal and volumetric calculations. Introduction to photogrammetry.
The physical basis of climate; large-scale climatic controls; energy balances and transports; the general circulation of the terrestrial atmosphere and of the atmospheres of other planets; meso- and micro-scale climatic controls; approaches to climatic classification; climatic concepts in geography.
Impacts of people’s activities on vegetation; introductions and invasions; vegetation and landform stability; conservation of species, communities and habitats; nature reserves; landscape management in Victoria.
ASSESSMENT One 1-hour theory paper (10%); one 2-hour practical examination (10%) in the department of Surveying; a cartography project (13%) in the department of Geography, at the end of first term. One 1-hour examination in the department of Meteorology (20%); a written project of up to 2,000 words (13%). examined at the end of second term.

213 GEOGRAPHIC INFORMATION SYSTEMS

Professor M. J. Webber
40 lectures; 72 hours of practical work; one excursion (4 days in 1st term non-teaching period); 3 terms; 9 points.
Prerequisite: Geography 101 or 104.
SYLLABUS An introduction to the concepts and methods of collecting, analysing and mapping geographic data. The nature of geographic data and their collection: sources, sampling, measurement systems and data structures. Implications of these for quantitative analysis. Regional delineation. Human pattern recognition from aerial photographs and space imagery. Basic statistical methods of analysing geographic data; clustering methods for regional delineation. The computer-based production of statistical maps: problems associated with digitising and editing cartographic data; derivation of population densities and other indices from raw census data and classification. Practical exercises give the students hands-on experience in applying concepts and methods; the excursion introduces data collection and mapping of selected physical geographic features in the field.
ASSESSMENT One 2-hour examination at the end of the year (50%); reports on practical classes (25%); an excursion report (up to 3,000 words) (25%). Students must obtain at least 50% of the aggregate marks given for project work, as well as to pass each written examination.

300 LEVEL

Students wishing to major in Geography should enrol in 311 and 318. Those who wish to pursue an honours degree in Geography must also take these two units. Geography 314 is also offered as a Science unit.
Prerequisites: as noted. These may be waived for students not majoring in Geography if they have taken relevant units from other departments.
311 GEOMORPHOLOGY
Drs E. C. F. Bird, B. L. Finlayson and E. B. Joyce
72 hours of lectures; 72 hours of practical classes; excursions of up to 10 days; 3 terms; 18 points.
Prerequisites: Geography 211 or Geology 101.
SYLLABUS
(i) Coastal geomorphology: The nature and evolution of coastal landforms in relation to physiographic and ecological processes; patterns and rates of coastline changes; the Victorian coastline.
(ii) Fluvial geomorphology: Runoff processes and the flood hydrograph; sediment and solute transport in rivers; the development of river channels and associated fluvial landforms; Australian rivers.
(iii) Surficial geology: Weathering, tectonics, vulcanism and morphotectonics; long term geomorphology; landform evolution.
(iv) Quaternary geology: Quaternary environments, especially in arid and semi-arid Australia; dating techniques; young sedimentary deposits; evolution of the Murray Basin and Simpson Desert-Lake Eyre Basin.
ASSESSMENT Three 1-hour tests on practical work; field reports (up to 3,000 words) per term; one 3-hour final examination at the end of the year. Students are required to obtain at least 50% of the aggregate mark for field reports and practical tests as well as to pass the final examination.
Weightings of assessment components will be made known at commencement of the unit.

314 MARITIME AND SEABED RESOURCES
Professor J. R. V. Prescott
24 lectures and 36 hours of practical work; first half year; 6 points.
Prerequisite: One 200-level Geography unit.
SYLLABUS The physical geography of oceans and continental shelves with reference to the nature and distribution of mineral, biological and energy resources. They will be considered in terms of the proposed and existing claims to Exclusive Economic Zones and Continental Shelves around the coasts of the world. Problems associated with the division of coastal resources between adjacent and opposite states. Political and technical problems of exploiting maritime and seabed resources in national areas and in zones of the deep seabed beyond national jurisdiction.
ASSESSMENT One 1½-hour examination at the end of the unit (70%); one essay (2,000 words) (30%). Satisfactory completion of practical exercises is required.

318 RESEARCH METHODS IN GEOGRAPHY
Professor M. J. Webber
24 lectures; 24 hours of seminars or practical work; 3 terms; 5 points.
Prerequisites: two 200-level Geography units.
SYLLABUS Geography as a science; philosophical issues in geographical research; sources and analyses of data; presentation of research results.
ASSESSMENT Presentation of short seminar papers and practical exercises (30%); one essay (up to 3,000 words) (40%); one research proposal (30%).
626 GEOLOGY

See also 600 Marine Science.

DEPARTMENTAL SUGGESTED COURSE: GEOLOGY MAJOR

100 Level Geology 101 with units selected from the following: Biology 101; Chemistry 101 (strongly recommended); Geography 104; Mathematical Sciences 110, 111, 120; Meteorology 103; Physics 120, 140 or 160.

200 Level Geology 201 to 203 and 209, with units selected from the following: Botany 201, 208; Chemistry 201, 220, 241, 260, 295; Geography 211, 213; Marine Science 202, 203, 204; Mathematics 250; Physics 211, 212; Zoology 201, 202, 204, 205.

300 Level Geology 301 to 305 and 309 and one of 311-313 or units selected from Geology (Geophysics) series. Students wishing to do Geography 311 should take Geology 302, 303, 304 and 309.

DEPARTMENTAL SUGGESTED COURSE: GEOPHYSICS MAJOR

Geophysics may be combined with Geology, Physics, Mathematics, or Computer Science and Mathematics.

Geology/Geophysics

100 Level Geology 101; Mathematical Sciences 110; Chemistry 101; Physics 100 level.

200 Level Geology 201 to 209; Mathematics 250, 275.

300 Level Geology 303, 304, 309 and 301 or 302; Geophysics 361, 362, 371, 372.

Physics/Geophysics

100 Level Geology 101; Mathematical Sciences 111, 120; Physics 120 or 140.

200 Level Physics 212, 241, 244 to 247, 249 and selections; Mathematics 250.

300 Level Geophysics 332, 361, 362, 371, 372; Physics 300 units as selected.

Mathematics/Geophysics

100 Level Geology 101; Mathematical Sciences 111, 120; Physics 120 or 140.


300 Level Geophysics 332, 361, 362, 371, 372; Mathematics 330 and 350 or two units from Mathematics 310-340; units from Mathematics 381-384 as selected.

Computer Science/Geophysics

100 Level Geology 101; Mathematical Sciences 111, 120; Physics 120 or 140.

200 Level Computer Science 214, 222, 250; Mathematics 250; Physics 212.

300 Level Geophysics 332, 361, 362, 371, 372; Computer Science units as selected.

B.Sc.(HONS.) ADMISSION REQUIREMENTS

Geology

Admission to Fourth Year Honours is normally open to students who have obtained 21 points or more in 300-level Geology units.
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Geophysics
Admission to Fourth Year Honours is normally open to students who have obtained a minimum of 15 points from approved 300-level Geophysics units. Greater weight will be given to results in Geophysics units in considering applications.
Admission may also be granted to students from disciplines other than Geology with the approval of the Chairman. In such cases, Geology 111 will usually be a prerequisite although this or Geology 101 may be approved to be taken concurrently.

100 LEVEL
This consists of the units 101 Geology and 111 The Dynamic Earth. Neither of these units has any prerequisites. Students cannot gain credit for more than 9 points of 100-level Geology (i.e. they cannot enrol in both units). Students wishing to major in Geology must enrol in 101 but those enrolling in 111 may transfer to 101 at the end of first term. Tutorials will be given and will be announced at the beginning of each term. Field excursions will normally be held on Saturdays or Sundays.

101 GEOLOGY
Co-ordinator: Dr R. W. Le Maitre
72 lectures; 72 hours practical work; 6 days field work; 9 points.
SYLLABUS The origin and evolution of the solar system. The earth as a dynamic planet; major geological processes (plate tectonics, evolution of ocean basins, mountain building). Surface processes including weathering; sediment transport and depositional environments; the formation of sedimentary basins; the development of the landscape. The nature of crystalline substances; the relationship between crystalline structure, chemical composition and physical properties of common minerals. The nature and products of igneous and metamorphic activity, including mineralization. The history of the Earth as elucidated by geological principles. The evolution of life as found in the geological record. Principles of palaeontology, stratigraphy and geological history.
ASSESSMENT One 2-hour theory paper at the end of each term and a 1-hour practical examination during each term. Short tests may also be held during the practical sessions. A reading topic will be assessed in the examination. Weightings of components of assessment will be made known at the commencement of the unit.

111 THE DYNAMIC EARTH
Co-ordinator: Dr R. W. Le Maitre
24 lectures; 24 hours practical work; 2 days field work; 3 points; 1st term.
SYLLABUS The origin and evolution of the solar system. The earth as a dynamic planet; major geological processes (plate tectonics, evolution of ocean basins, mountain building). Surface processes including weathering; sediment transport and depositional environments; the formation of sedimentary basins; the development of the landscape.
ASSESSMENT One 2-hour theory paper at the end of first term and a 1-hour practical examination during the term. Short tests may also be held during the practical sessions. A reading topic will be assessed in the term examination. Weightings of components of assessment will be made known at the commencement of the unit.
Students wishing to major in Geology are required to enrol in units 201-203 inclusive and 209.

Prerequisites: For students majoring in Geology, 101. Students not majoring in Geology who wish to enrol in individual units, may ask to have the prerequisites waived; each case will be considered on its merits.

FIELD WORK The prescribed field excursions for unit 209 held at weekends or during term vacations, and a field mapping exercise held during term vacation. Written reports on field work are required.

ASSESSMENT Theory examinations are held in the University examination period immediately following the completion of the unit. Practical examinations will either be held at the same time, or at the students’ convenience.

201 MINERALOGY AND PETROLOGY
Co-ordinator: Dr A. Cundari
28 lectures; 45 hours’ practical work; 5 points; 1st term.
Prerequisite: Geology 101.
SYLLABUS Optical mineralogy applied to the identification of common rock-forming minerals. The description and interpretation of common igneous and metamorphic rocks.
ASSESSMENT One 3-hour theory examination. Assessment of practical work.
Weightings of assessment components will be made known at commencement of the unit.

202 SEDIMENTOLOGY AND STRUCTURAL GEOLOGY
Co-ordinator: Dr C. J. L. Wilson
28 lectures; 45 hours’ practical work; 5 points; 2nd term.
Prerequisite: Geology 101.
SYLLABUS Genesis of sediments, their depositional structures and petrography. Introduction to environmental analysis. Mechanical aspects of rock deformation including theories of stress and strain, behaviour of materials. Descriptive treatment of strain, folds and cleavage.
ASSESSMENT One 3-hour theory examination. Assessment of practical work.
Weightings of assessment components will be made known at commencement of the unit.

203 PALAEONTOLOGY AND STRATIGRAPHY
Co-ordinator: Dr O. P. Singleton
28 lectures; 45 hours practical work; 5 points; 3rd term.
Prerequisite: Geology 101.
SYLLABUS Principles of palaeontology, including its application to evolution, ecology and biostratigraphy. Systematic palaeontology of selected geologically important groups of invertebrate animals and plants. Principles of stratigraphy, including the bases for correlation and age determination of rocks. Aspects of the geological, including tectonic, history of the Earth, illustrated by specific examples.
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ASSESSMENT One 3-hour theory examination. Assessment of practical work.
Weightings of assessment components will be made known at commencement of the unit.

209 FIELD GEOLOGY
Co-ordinator: Mr M. A. H. Marsden
14 days field work; 3 points.
Prerequisites: 201, 202, 203.
SYLLABUS 7-days field exercise and 6 days of additional excursions. Students should consult the departmental notice board for dates, manner of paying excursion accommodation and food charges, which will be fixed as early as possible in first term.
ASSESSMENT By written reports and assessment of field exercises. Weightings of assessment components will be made known at commencement of the unit.

640-212 PHYSICS: CONTINUUM MECHANICS AND GEOPHYSICS
Unit offered jointly by department of Geology and school of Physics. See Physics section for details.

300 LEVEL
Students majoring in Geology will normally be required to take units 301-304 inclusive and 309 plus one of units 311, 312 or 313. In some units the ratio between lectures, practicals and field work may be varied from that specified. 
Prerequisites: For students majoring in Geology, 201-203 and 209 Geology. Students not majoring in Geology who wish to enrol in a few individual units may ask to have the prerequisites waived. Each case will be considered on its merits.
Students are strongly recommended to gain additional experience during the preceding long vacation by obtaining a temporary position with a company or geological survey. The department of Geology will assist in this regard.
ASSESSMENT Theory examinations are held in the University examination period immediately following the completion of the unit. Practical examinations will either be held at the same time or at the students' convenience.

301 PETROLOGY AND GEOCHEMISTRY
Co-ordinator: Dr R. W. Le Maitre
36 hours lectures, 36 hours practical work; 8 points; 1st term and first half of 2nd term.
Prerequisites: Geology 201-203.
SYLLABUS Introduction to major and trace element geochemistry, mineral equilibria, phase diagrams, isotope geochemistry illustrated by selected igneous, metamorphic and sedimentary processes.
ASSESSMENT One 3-hour theory examination plus one 3-hour practical examination or its equivalent in the assessment of class practical work.
in the form of reports totalling no more than 3,000 words. Weightings of assessment components will be made known at the commencement of the unit.

302 GEODYNAMICS
Co-ordinator: Dr R. Powell
36 hours lectures, 36 hours practical work; 8 points; second half of 2nd term and 3rd term.
Prerequisites: Geology 210-203.
SYLLABUS Structure and composition of the Earth’s crust and upper mantle; thermal and stress-strain relationship. Plate tectonics; analysis of structural components of the crust; interpretation of regional stress and strain. Pre-Cambrian tectonics.
ASSESSMENT One 3-hour theory examination plus one 3-hour practical examination or its equivalent in the assessment of class practical work in the form of reports totalling no more than 3,000 words. Weightings of assessment components will be made known at the commencement of the unit.

303 ECONOMIC GEOLOGY A—METALLIFEROUS DEPOSITS
Co-ordinator: Dr R. R. Keays
23 hours lectures, 45 hours practical work; 6 points; 1st term and first half of second term.
Prerequisites: Geology 201-203.
SYLLABUS Geological setting and genesis of major metalliferous deposits with special reference to Australia; introduction to mineragraphy and ore mineral textures. Applications of Geophysics in the location of natural resources.
ASSESSMENT One 3-hour theory examination plus one 3-hour practical examination or its equivalent in the assessment of class practical work in the form of reports totalling no more than 3,000 words. Weightings of assessment components will be made known at the commencement of the unit.

304 ECONOMIC GEOLOGY B—FUELS
Co-ordinator: Mr M. A. H. Marsden
24 hours lectures, 42 hours practical work; 6 points; second half of 2nd term and 3rd term.
Prerequisites: Geology 201-203.
SYLLABUS Geology of petroleum and coal deposits. Composition, origin, migration and entrapment of petroleum; petroleum occurrence and tectonics; wireline well logs and their applications. Applications of geochemistry to the location of natural resources. Geological applications of remote sensing techniques.
ASSESSMENT One 3-hour theory examination plus one 3-hour practical examination or its equivalent in the assessment of class practical work in the form of reports totalling no more than 3,000 words. Weightings of assessment components will be made known at the commencement of the unit.
309 FIELD GEOLOGY
Co-ordinator: Mr M. A. H. Marsden
Prerequisites: 201-209.
6 points.
One 8 day field mapping exercise, one 8 day excursion and 7 additional
days throughout the year. Students should consult the departmental
notice board for dates, manner of paying excursion accommodation and
food charges, which will be fixed as early as possible in first term.
ASSESSMENT By written reports and assessment of field exercises.
Weightings of assessment components will be made known at com­
mencement of the unit.

311 ADVANCED MINERALOGY, PETROLOGY AND STRUCTURAL
GEOLOGY
Co-ordinator: Dr A. Cundari
24 hours lectures, 42 hours practical work; 6 points; second half of
2nd term and 3rd term.
Prerequisites: Geology 201-203.
SYLLABUS Advanced topics in mineralogy, igneous petrology, magma
genesis, metamorphic mineral equilibria and deformation.
ASSESSMENT One 3-hour theory examination plus one 3-hour practical
examination or its equivalent in the assessment of class practical work
in the form of reports totalling no more than 3,000 words. Weightings
of assessment components will be made known at the commencement
of the unit.

312 ADVANCED SEDIMENTOLOGY, PALAEONTOLOGY AND
STRATIGRAPHY
Co-ordinator: Dr O. P. Singleton
26 hours lectures, 36 hours practical work; 6 points; 1st term and first
half of 2nd term.
Prerequisites: Geology 201-203.
SYLLABUS Advanced topics in sedimentation, facies analysis, petrology
of sediments, palaeontology and principles of stratigraphy. Integrated
case studies of sedimentary rock systems.
ASSESSMENT One 3-hour theory examination plus one 3-hour practical
examination or its equivalent in the assessment of class practical work
in the form of reports totalling no more than 3,000 words. Weightings
of assessment components will be made known at the commencement
of the unit.

313 SURFICIAL AND QUATERNARY GEOLOGY
This unit may not be taken by students enrolling in 121-311 Geomor­
phology. Students wishing to take a more extensive course in geomor­
phology should consider taking 121-311 Geomorphology (see suggested
courses at the beginning of the Geology handbook entry).
Co-ordinator: Mr E. B. Joyce
24 hours lectures, 24 hours practical work, 4 days of excursions; 6
points; 3rd term.
Prerequisites: Geology 201-203.

SYLLABUS Surficial Geology: Weathering, tectonics, volcanism and morpho­
tectonics; long term geomorphology; landform evolution.
Quarternary Geology: Quarternary environments, especially in arid and semi-arid Australia; dating techniques; young sedimentary deposits; evolution of the Murray Basin and Simpson Desert-Lake Eyre regions.

ASSESSMENT One 3-hour theory examination plus one 3-hour practical examination or its equivalent in the assessment of class practical work in the form of reports totalling no more than 3,000 words. Weightings of assessment components will be made known at the commencement of the unit.

GEOPHYSICS
Students who intend to proceed to B.Sc. (Honours) in Geophysics should take a minimum of 15 points from units 332 to 372 inclusive. Students who do not already have credit for Geology 101 or 111 must enrol for either concurrently with their Geophysics units.

332 INTRODUCTION TO GEOPHYSICAL EXPLORATION
Dr L. Thomas
12 lectures; 2 points.
This unit may not be taken by students enrolling in 303.
SYLLABUS Introduction to gravity, magnetic, seismic, electrical and radiometric techniques, illustrated by case histories.
ASSESSMENT 1½-hours theory examination.

344 GEODESY
Dr L. Thomas
12 lectures; 2 points.
Prerequisites: Geology 101 or 111; Physics 120, 140 or 160; Mathematics 230 or 250.
SYLLABUS Physical geodesy; the earth's shape and gravity field, and the relation between these; precession, nutation and tidal motions.
ASSESSMENT 1½-hours theory examination.

361 PRACTICAL GEOPHYSICS A
Dr L. Thomas
72 hours practical; 2½-days field work; 5 points
SYLLABUS Use of Geophysical instruments, especially in gravity, magnetic and electrical work. Manual interpretation of data.
ASSESSMENT One 3-hour examination in Geophysical Computing. Laboratory and field work are assessed, and are taken into account in determining each candidate's result. Weightings of the assessment components will be made known at commencement of the unit.

362 PRACTICAL GEOPHYSICS B
Dr L. Thomas
72 hours practical; 2½-days field work; 5 points
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SYLLABUS Use of geophysical instruments, especially in seismic work. Modelling and use of computer methods of interpretation.

ASSESSMENT As for 361.

371 GEOPHYSICAL EXPLORATION A
Dr. L. Thomas
24 lectures; 4 points.
Prerequisites: Geology 101 or 111, Physics 120, 140 or 160, Mathematics 230 or 250.
SYLLABUS Potential field theory applied to gravity, magnetic, electrical and electromagnetic exploration methods. Interpretation methods developed from this theory.
ASSESSMENT One 2-hour theory examination.

372 GEOPHYSICAL EXPLORATION B
Dr. G. Beresford-Smith
24 lectures; 4 points.
Prerequisites: Geology 101 or 111, Physics 120, 140 or 160, Mathematics 230 or 250.
SYLLABUS Theory of seismic wave propagation applied to resource exploration. Specialized techniques of data acquisition and processing. Structural and non-structural interpretation.
ASSESSMENT One 2-hour theory examination.

136 HISTORY AND PHILOSOPHY OF SCIENCE

DEPARTMENTAL SUGGESTED COURSE
100 Level H.P.S. 101 and 103, Physics 100 level together with 100 level units selected from Biology, Chemistry, Geology, Mathematical Sciences.
200 Level H.P.S. 202 or 203 plus one or more of H.P.S. 222, 223, 224, 225, 226 or 227; together with units from other science disciplines.
300 Level H.P.S. 345, together with other complementary 300 level science units, preferably selected to form a second major.

In addition to the units described below, the following History and Philosophy of Science units may be taken as a non-Science component of the B.Sc. degree. Details are set out in the Faculty of Arts Handbook. Enrolment requires approval by the Faculty of Science.
136-021 Theories of Culture
136-221 Equality and Inequality: An Introduction to the History of Social Theory
136-304 Culture, Structure and Person

100 LEVEL
101 HISTORY OF ASTRONOMY
Dr. K. Hutchison
Not more than 45 hours of lectures, films and discussion classes in the first half of the year; 4 points.
SYLLABUS The course will focus on changing conceptions of the universe in sixteenth and seventeenth century Europe. It examines: ancient Greek notions of the universe as finite with a central spherical earth; the transmission of these notions to renaissance Europe; their abandonment; arguments for and against a sun-centred solar system; the transition to an infinite universe.

ASSESSMENT One 3-hour examination at the end of the year. Written work consisting of two essays and class assignments not exceeding 4,000 words in total. Students may earn exemption from the examination by satisfactory performance in the written work and in a class test at or near the end of first term. Students will be advised of the weighting and deadlines for assessment components at the beginning of the course.

103 UPHEAVALS IN SCIENTIFIC THOUGHT
Dr H. E. Le Grand
2 lectures, 1 tutorial per week; 2nd half of year; 4 points.

SYLLABUS What is the nature of scientific change, particularly revolutionary change? This question will be addressed from both socio-historical and philosophical perspectives. Specific cases to be studied include "revolutions" in the physical and the earth sciences spanning the Eighteenth and Twentieth Centuries. No previous study of the sciences involved is presumed.

ASSESSMENT One 3-hours' examination at the end of the year. Students may earn exemption from the examination by satisfactory performance on prescribed written work (consisting of two essays and class assignments not exceeding 4,500 words in total). Students will be advised of the weightings and deadlines for assessment components at the beginning of the unit.

200 LEVEL
202 SCIENCE, REASON AND POWER
Dr H. Krips
25 lectures; weekly tutorials; 1st half year; 6 points.

SYLLABUS Is science a rational enterprise, or is it just one element in a system of power relations constituting society? Foucault's answer to this question is considered, as well as the more traditional views of Popper, Lakatos and Kuhn.

ASSESSMENT Written work of at most two essays of 2,000 words each due on specific dates. Students will be notified of the weightings of assessment components at the beginning of the unit.

203 SCIENCE, LIFE AND MIND
Dr F. J. Clendinnen
25 lectures; weekly tutorials; 2nd half year; 6 points.

SYLLABUS An examination of philosophical problems relating to Biological and Human Sciences.

ASSESSMENT Not to exceed one 3-hour examination. Exemption from part or whole of the examination may be gained on the basis of written
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work not exceeding 4,000 words in total, due on specified dates. Weightings of assessment components will be made known at commencement of the unit.

222 ISSUES IN MODERN LIFE SCIENCES

Dr J. Sapp
2 lectures, 1 tutorial per week; first half of year; 6 points.

SYLLABUS A critical socio-historical examination of important developments and controversies in the modern life sciences. Topics to be addressed may include amongst others the growth of molecular biology, biological models in social and economic thought, biology and the human sciences, life as a mechanical system, biomedical technology and ethics.

ASSESSMENT Specific written work (essays or tutorial work) not exceeding 4,000 words in total; one end-of-year examination (up to 3 hours). Exemption from the examination may be earned by obtaining satisfactory results in the essays and in a class test at or near the end of the unit. Students will be advised of the weightings and deadlines of assessment components at the beginning of the unit.

223 DARWINISM

Dr J. Sapp
Lectures and seminars of no more than 3 hours per week; second half of year; 6 points.

SYLLABUS An historical study of the development of evolutionary theory from the emergence of Darwinism in the nineteenth century to the "evolutionary synthesis" of the twentieth century. The unit will focus on the social and intellectual contexts of evolutionary debates and include a detailed analysis of controversies surrounding social Darwinism, eugenics, and sociobiology.

ASSESSMENT One 3-hour examination at the end of the year. Students may earn exemption from this examination by reaching a satisfactory standard in the essays and class assignments. This written work, not exceeding 4,000 words, and due on specified dates, will be required and will be taken into account in the final result. Weightings of assessment components will be made known at the commencement of the unit.

224 THE SCIENTIFIC REVOLUTION

Professor R. W. Home
Not more than 39 hours lectures/tutorials; 2nd half of year; 6 points.

SYLLABUS The emergence of modern science during the 17th and early 18th centuries. Medieval and renaissance conceptions of the world. The attacks on these conceptions in the 16th and early 17th centuries: experimentalism, scepticism, the reformation, centralised government. The new ‘Mechanical Philosophy’: Descartes. The retreat from mechanism: Newton. The controversies generated by Newton’s science. Theological and social overtones of the competing philosophies.

ASSESSMENT Written work consisting of two essays and class assignments not exceeding 4,000 words in total and due on specified dates,
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together with an examination not exceeding one 3-hour paper at the end of the year. Exemption from the examination may be earned by obtaining satisfactory results in the written work and in a class test at or near the end of the unit. Weightings of assessment components will be made known at the commencement of the unit.

225 SOCIAL HISTORY OF MEDICINE
Dr R. P. Gillespie
36 hours of lectures/seminars; 2nd half of year; 6 points.
SYLLABUS An historical introduction to shifts in medical thought and practice, from traditional medicine to scientific medicine. Particular attention will be given to the cultural context of concepts of health and illness, the growth of medical professions and institutions, and social and political influences on medical research and medical care.
ASSESSMENT Written work not exceeding 4,000 words in total, and one examination paper of not more than 3 hours at the end of the year. Exemption from the examination may be earned by obtaining satisfactory results in the written work and in a class test at or near the end of the unit. Weightings of components of assessment will be notified to students at the commencement of the course.

226 SCIENCE, TECHNOLOGY AND SOCIETY
Dr R. P. Gillespie
36 hours of lectures/tutorials; 1st half of year; 6 points.
SYLLABUS The course focuses on the organisation of scientific research and development and on the relationships between science, technology, industry and the state. A discussion of the social construction and political uses of science and technology will be illustrated through historical and contemporary case studies on military research and the arms race, the organisation of work, and environmental and occupational health.
ASSESSMENT Written work not to exceed 4,000 words, and one examination paper of not more than 3 hours’ duration. Students may earn exemption from the examination by reaching a satisfactory standard in the required essays and class assignments. Students will be advised of the weightings and deadlines of assessment components at the beginning of the unit.

227 HISTORY OF AUSTRALIAN SCIENCE
Professor R. W. Home
2 lectures, 1 tutorial weekly; 1st half of the year; 6 points.
SYLLABUS A study of selected themes in the history of Australian science since the first European contacts — the place of science in European imperial expansion; “colonial” vs. “metropolitan” science; the nature and growth of Australian scientific institutions; science and government in Australian history; the question of professionalization; “pure” vs. “applied” research; the education and training of scientists; the changing public image of science.
ASSESSMENT Essays not exceeding 4,000 words in total and due on specified dates; one examination not exceeding 3 hours at the end
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of the year. Exemption from the examination may be earned by obtaining satisfactory results in the essays and in a class test. Weightings of assessment components will be made known at the commencement of the unit.

300 LEVEL

Students undertaking substantial third-year studies in History and Philosophy of Science will normally do a mixture of 200-level and 300-level units. (The 200-level units are designed to be taken in either second or third year.) Such students should enrol for the umbrella unit 345 in order to ensure that their work receives appropriate weighting in the awarding of Faculty Honours. See entry for this unit.

301 PHILOSOPHY OF MATHEMATICS

Dr A. Hazen

Twelve lecture-seminars, 1½ to 2 hours each, during first and second terms: 6 points.

Students taking this unit should have some acquaintance with modern formal logic. Introduction to Formal Logic 161-013 provides a suitable background, alternatively some preliminary reading should be undertaken. (A study guide will be available from the HPS Office.)

SYLLABUS A study of the classical twentieth-century formulations, and more recent literature, on the metaphysics and epistemology of mathematics. Logicism (and its heir, set-theoretic realism) and intuitionism (with its contention that only constructive methods are valid) will be examined, and notions of structure and abstraction explored.

ASSESSMENT Not to exceed one 3-hour examination. Exemption from part or whole of the examination may be granted on the basis of written work not exceeding 4,000 words and due on specified dates. Weightings of assessment components will be made known at the commencement of the unit.

303 PHILOSOPHY OF SCIENCE

Dr F. J. Clendinnen

36 hours of lectures/tutorials; 1st half of year: 6 points.

Prerequisites: Some background in Philosophy. The normal requirement will be: Philosophy of Inquiry 161-002 (current enrolment and satisfactory progress will be acceptable) or Philosophy of Science 136-202 or 136-203.

SYLLABUS A study of more advanced problems in the Philosophy of Science, emphasising explanation and causation.

ASSESSMENT A maximum of two essays, of no more than 5,000 words in total, due on specified dates. Weightings of assessment components will be made known at the commencement of the unit.

320 APPROACHES TO HISTORY OF SCIENCE

One 2-hour lecture-seminar per fortnight throughout the academic year, or equivalent: 6 points.

Prerequisite: At least two second-year HPS units, including one of 136-221, 136-222, 136-223, 136-224, 136-225, 136-226, 136-227.
SYLLABUS A critical appraisal of traditional and contemporary approaches to writing the history of science. The role of intellectual and social factors in the development of science. The nature of historical explanation.

The course is intended both to introduce students to a number of broad methodological issues in the history of science, and to give them an opportunity further to pursue, in the light of these discussions, various themes arising out of one of the units 136-221, 136-222, 136-223, 136-224, 136-225, 136-226, and 136-227 that they have done or are doing concurrently. Students will work under the supervision of the member of staff responsible for the particular pre- or co-requisite unit they have chosen.

Because of the limited availability of staff, it may not be possible in any one year to provide supervision corresponding to all the units that meet the prerequisite requirement.

ASSESSMENT Assessment will be based on written work, due on specified dates, and not exceeding 6,000 words in all. Weightings of assessment components will be made known at the commencement of the unit.

322 REVOLUTIONS IN MODERN BIOLOGY
Dr J. Sapp
2 lectures and 1 tutorial per week; first half of year; 6 points.
Prerequisite: 600-101 or 102 with one 200-level Zoology, Botany or Genetics unit.
Note: This unit is intended for students majoring in biological science. Credit cannot be gained for both this unit and 136-222.

SYLLABUS The object of the course is to introduce students to some issues of central interest to biologists and historians of biology in an attempt to gain an improved understanding of the nature and character of modern biological theories, experiments and reasoning and to understand the diverse historical influences that have helped to shape various biological concepts. In particular, the course will be centred on exploring some major modern controversies concerning genetics, development and evolution.

ASSESSMENT Two essays not exceeding 4,000 words in total and due on specified dates together with an examination at the end of the year not exceeding one three-hour paper. Exemption from the examination may be earned by obtaining satisfactory results in the essays and in a class test at or near the end of the unit. Weightings of assessment components will be made known at the commencement of the unit.

333 HISTORY OF TECHNOLOGY
Dr P. Milner
A course of about 25 lectures and 35 hours of field work, seminars and directed research, throughout the year; 6 points.

SYLLABUS Studies in the history of technology, selected from the following related topics:

1. Ancient technology: The mathematics and technology of Neolithic stone rings, surveying and building dams, irrigation canals. Wind-power in middle Asia. Naturally occurring metals, the Bronze Age, the discovery of iron, the development of tools and weaponry.
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2. Technology in classical times: Early mechanisms and machine elements. Greek catapults, automata. Large scale civil engineering in Roman times.

3. Technology in medieval times: Fortifications, mortars and cannon, the manufacture of armour. Wind and water power in Western Europe. The cathedral builders. The clock and other mechanisms. Records of mining and metallurgical practices.


7. Early 20th century technology: Professional institutions and the growing role of research in science and technology. The transport revolution, the motor car, jet engines, aircraft, nuclear power.


ASSESSMENT The assessment will be based on performance throughout the year in field work, assignments and seminars.

345 HISTORY AND PHILOSOPHY OF SCIENCE (SCIENCE)

This will be composed of three units; one of which must be H.P.S. 301, 303, 320 or 390. The remaining units must be chosen from among these and the units 202, 203, 222, 223, 224, 225, 226, 227 and 322. See the details of these units for syllabuses, etc.

Candidates should enrol for 345 only and advise the department of their selection of units.

ASSESSMENT The component units will each be assessed separately within the department as set out under the details of that unit; but only a composite result for 345 as a whole will be recorded.

390 DIRECTED STUDY

Students wishing to enrol in this unit must apply for permission through a member of the department who is willing to supervise the course of study.

The number of classes per week will not exceed 3 hours for half the year. 6 points.

Prerequisite: at least 12 points of 200-level H.P.S. units.
SYLLABUS A course of directed study in the history or philosophy of science which is not covered in other units available. The study will be directed by a member of the department and must be approved by the chairman. The course of study may include part of some appropriate unit offered in the arts or science faculty. Written work, due by specified dates, not exceeding four thousand words will be required.

ASSESSMENT Not to exceed one 3-hour examination at the end of the year. The written work may be taken into account and an exemption from the examination paper may be granted on the basis of such written work. Weightings of assessment components will be made known at the commencement of the unit.

600 MARINE SCIENCE
200 LEVEL

AN INTRODUCTION TO MARINE SCIENCE
Four separate units (600-201, 600-202, 600-203, 600-204) together form an integrated introduction to Marine Sciences. To gain most benefit, students are encouraged to take all four units, which have been designed to cover aspects of physical, geological, chemical and biological marine science. In addition to providing students with an introduction to marine work in their particular discipline, this course provides the only opportunity for students to broaden their experience in different but closely related disciplines. The units are open to students who have accumulated 20 points towards a degree.

Enquiries about marine sciences in general should be directed to the Student Adviser (Science). Enquiries about individual units should be made to the lecturers concerned.

201 MARINE GEOSCIENCE
Co-ordinator: Mr M. A. H. Marsden (Department of Geology)
16 lectures; first term; 2 points.
Not available to students enrolled in 200-level or 300-level Geology.
Prerequisites: Students are expected to have passed 20 points.
SYLLABUS The physical characteristics of oceans and bays. Sedimentation and volcanic processes and their relationship to the morphology and structure of the ocean basins, continental shelves and slopes and coastal zones.
ASSESSMENT One 2-hour written examination at the end of first term.

202 MARINE CHEMISTRY
Dr R. B. Johns and Dr J. D. Smith
24 lectures; 2nd term; 3 points.
Prerequisites: Students are expected to have passed 20 points. Completion of this unit excludes credit for 610-295.
SYLLABUS The sea as a chemical system. The properties and composition of seawater and the factors which control them. Nutrient cycles in the ocean and their relation to primary production. Mechanisms of
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deposition of organic materials, and chemical pathways of their transformation in sediments to fossil fuel deposits.

ASSESSMENT One 2-hour written examination at the end of second term.

204 INTRODUCTION TO PHYSICAL OCEANOGRAPHY
15 lectures, 8 practice classes; 2 points.

Prerequisite: At least 20 points, including any first year Mathematical Sciences unit.


ASSESSMENT Practical work/written assignments consisting of not more than 5 problem sheets (not more than 10 pages in total) and an essay (1,500 words) will contribute to not more than 50 per cent of the total assessment. A substantial portion of the practical work/written assignments will be carried out during the prescribed practice classes. One 2-hour written examination will be held at the end of the unit. Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL

Students who wish to continue studies in Marine Science are recommended to take a selection from the following units. All of these units have been grouped according to a major discipline area, although students are encouraged to take as wide a selection as possible. For further guidance students should consult a course adviser in one of the departments involved.

MARINE GEOSCIENCE
121 GEOGRAPHY : 304
626 GEOLOGY : 305, 306, 344
441 MINING : 270

MARINE CHEMISTRY
610 CHEMISTRY : 328, 360, 395, 396

MARINE BIOLOGY
606 BOTANY : 208, 307, 308
654 ZOOLOGY : 201, 303

PHYSICAL OCEANOGRAPHY
631 METEOROLOGY : 301, 323
617 MATHEMATICAL SCIENCES

100 LEVEL

The School of Mathematical Sciences offers a range of mathematical sciences units at the 100-level which incorporate topics from two or more of the disciplines of Mathematics, Statistics and Computer Science. Combinations of several of these units form prerequisites for 200-level units in the Departments of Mathematics, Statistics and Computer Science. In particular, 110 (or 111) + 120 lead to 200-level units in Mathematics and Statistics and 110 (or 111) + 120 + 130 lead to 200-level units in Computer Science. In some cases, variations in these requirements are permitted by the departments concerned and, before making their choice, students should check the prerequisites and possibilities for the 200 and 300 level units in the departments of their choice. If in doubt they should consult with the Course Advisers in the relevant departments.

Students taking units which include some statistics are required to provide themselves with electronic calculators of an approved type. Students will be required to spend time on practical assignments in addition to lectures, practice classes and tutorials. The courses and choices may be summarized as follows:

110, 111 and 120 are designed for students who intend to major in one or more of Computer Science, Mathematics, Statistics, Physics and Chemistry. 110 and 120 provide a basic course in Mathematics, Statistics and Computer Science. 111 and 120 provide a similar course with more advanced Mathematics.

110 is a first course in Mathematics and Computer Science for students who regard Mathematics as a minor or even a major though not necessarily dominant component of their degrees. Together with 120 this unit is an appropriate Mathematical Sciences course for all branches of science requiring a substantial amount of mathematics, such as Physics, Computer Science, Statistics, Physical Chemistry, Meteorology, etc.

Expected background: a grade of D or better in V.C.E. (formerly H.S.C.), Mathematics A and Mathematics B.

111 is a basic course in Mathematics and Computer Science. Compared with 110 this course covers more mathematics and does so more deeply; it covers the same Computer Science material. Together with 120 it is essential for students who intend to take an honours degree in Mathematics and it is strongly recommended for students who contemplate an honours degree in Physics, Statistics or Computer Science. Together with 120 it is a normal combination for students wishing to major in Mathematics or to combine Mathematics with other subject areas, such as Physics, Computer Science, Statistics, Chemistry, Psychology, Biology, Economics, etc.

Expected background: a grade of B or better in V.C.E. Mathematics A and Mathematics B.

120 is a basic unit in Mathematics, Statistics and Computer Science. Together with 110 or 111 it is a prerequisite for later units in applications of Mathematics. Together with 110 or 111, it is also a prerequisite for 200-level Statistics and Computer Science units.
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Expected background: A grade of D or better in H.S.C. Mathematics A and Mathematics B. Physics at H.S.C. level would be advantageous but not essential.

130 is a further unit in Mathematics, Statistics and Computer Science which, together with 110 (or 111) and 120, is a prerequisite for 200-level Computer Science units. Students who do not take 130 and wish to proceed to 200-level Computer Science units may take the additional Computer Science unit 622-213 in their second year (with the Chairman's permission). 130 also provides the necessary background to the 300-level mathematics unit in optimization and it is advantageous but not essential for 200-level statistics units.

Expected background: A grade of D or better in H.S.C. Mathematics A and Mathematics B.

140 (Biological Sciences) is a unit in Mathematics, Statistics and Computer Science which is designed for students who have "D"-grade V.C.E. Mathematics A. It is orientated towards the biological sciences and is designed to meet the needs of those subjects. This unit leads on to 619-220 Statistical Methods and 619-230 Operations Research. It does not qualify as a prerequisite for any other 200-level unit in Mathematics, Statistics or Computer Science.

150 (Social Sciences) is similar to 140, except that it is concerned with applications of mathematics in the social sciences. This unit leads on to 619-220 Statistical Methods and 619-230 Operations Research. It does not qualify as a prerequisite for any other 200-level unit in Mathematics, Statistics or Computer Science.

111 MATHEMATICAL SCIENCES 1A

104 lectures, 42 tutorials/practice classes, 24 hours of laboratory work. Mathematics and Computer Science (10 points).

Conditions: Students may not gain credit for 111 and any one of 110, 140 or 150.

Design and implementations of algorithms; syntax and semantics of high level languages; control structures and data structures; introduction to software engineering and computer organization.

Projects: computer system familiarization; design and implementation of small programs in Pascal.

ASSESSMENT Up to three written examinations with a total of not more than 6 hours duration. Project work must be completed as required and assignments up to a total of 100 pages may be set. Projects and assignments will be assessed as part of the overall result. Weightings of assessment components will be made known at commencement of the unit.

110 MATHEMATICAL SCIENCES 1B
88 lectures, 26 tutorials/practice classes, 16 hours of laboratory work. Mathematics and Computer Science (8 points).
Conditions: Students may not gain credit for 110 and any one of 111, 140 or 150.
SYLLABUS Mathematical Induction; countability. Complex numbers. Introduction to group theory: cyclic and permutation groups, subgroups, cosets, Lagrange's theorem; isomorphism, groups of small orders. Boolean algebra and propositional logic. Vectors: vector algebra, applications to lines and planes, determinants. Matrix algebra: eigenvalues and eigenvectors and their applications to conics and quadric surfaces; representation of linear transformations by matrices. Sequences. Series of positive terms: comparison test. Calculus of functions of one real variable: differentiation, integration (including substitution, integration by parts, and systematic integration), applications: trigonometric functions, and their inverses. Exponential and logarithmic functions. Functions of two real variables; partial derivative, chain rule, double integrals. Design and implementation of algorithms; syntax and semantics of high level languages; control structures and data structures; introduction to software engineering and computer organization.
Projects: computer system familiarization; design and implementation of small programs in Pascal.
ASSESSMENT Up to three written examinations with a total of not more than 6 hours duration. Project work must be completed as required and assignments up to a total of 100 pages may be set. Projects and assignments will be assessed as part of the overall result. Weightings of assessment components will be made known at commencement of the unit.

120 MATHEMATICAL SCIENCES 1C
80 lectures; 42 tutorials/practice classes; 24 hours laboratory work. Mathematics, Statistics and Computer Science (8 points).
Co- (or pre-) requisite: 110 or 111.
Conditions: Students may not gain credit for 120 and either 140, 150 or 240.
Faculty of Science


Computer organization: binary number systems; logical and arithmetic operations; peripheral devices; machine languages. Numerical computing: roundoff and truncation errors; error analysis of trapezoidal and Simpson's rules; solution of nonlinear equations: bisection, Newton-Raphson and secant methods, convergence rates; complexity of Gaussian and Gauss-Jordan elimination; least squares curve fitting; random number generation. Fortran programming.

Projects: Design and implementation of Pascal and Fortran programs.

ASSESSMENT Up to three written examinations with a total of not more than 6 hours duration. Project work must be completed as required and assignments up to a total of 100 pages may be set. Projects and assignments will be assessed as part of the overall result. Weightings of assessment components will be made known at commencement of the unit.

130 MATHEMATICAL SCIENCES 1D

80 lectures, 38 tutorials/practice classes, 24 hours of laboratory work. Mathematics, Statistics and Computer Science (8 points).

Conditions: Students may not gain credit for 130 and either 140 or 150. Co (or pre) requisites: 110 (or 111) and 120.

SYLLABUS Mathematical logic: first-order languages, axioms, rules of inference, proofs and theories. Structures for languages and models of theories. Tautologies, basic facts about quantifiers, and the construction of examples. The completeness and compactness theorems and some applications. Introduction to second order and many-sorted languages.

Basic probability theory.

Simulation of probability models. Basic techniques of data analysis and inference, with particular emphasis on graphical methods. Model testing, including $\chi^2$-goodness-of-fit tests. Correlation and regression. Simple linear models. Presentation of results and conclusions. An introduction to statistical package programs.

Theory of algorithms: computability, complexity, correctness. Data structures: arrays; linear lists: stacks, queues, sequential and linked representations, pointers, insertion and deletion algorithms; trees: iterative
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and recursive traversal algorithms, binary search trees; hash tables: hash functions, double hashing, separate chaining. System software: assemblers; linkers and loaders; compilers: lexical analysis, parsing, code generation; operating systems; file systems. Data processing concepts and algorithms: online/batch systems; sequential/direct access files: sequential file algorithms: merging, sorting, updating; database systems. Logic programming concepts: list processing; logic as a data base query language; simple PROLOG programs.

Projects: Design and implementation of one or more large programs.

ASSESSMENT Up to three written examinations with a total of not more than 6 hours duration. Project work must be completed as required and assignments up to a total of 100 pages may be set. Projects and assignments will be assessed as part of the overall result. Weightings of assessment components will be made known at commencement of the unit. The computer science component must be completed satisfactorily to pass the unit.

140 MATHEMATICAL SCIENCES 1E (BIOLOGICAL SCIENCES)

82 lectures, 35 tutorials/practice classes, 24 hours of laboratory work. Mathematics, Statistics and Computer Science (8 points).

Conditions: Students may not gain credit for 140 and any of 110, 111, 120, 130 or 150.


Basic techniques of data analysis and inference, with particular emphasis on graphical methods. Model testing, including \( \chi^2 \)-goodness-of-fit tests. Correlation and regression. Simple linear models. Presentation of results and conclusions. An introduction to statistical package programs.

Design and implementation of algorithms; programming in a high level language; syntax and semantics of high level languages; control structures and data structures; introduction to software engineering and social implications.

Projects will include system familiarization and the design and implementation of a number of programs in a high level language.

ASSESSMENT Written examinations with a total of not more than 6 hours duration. Project work must be completed as required and assignments up to a total of 100 pages may be set. Projects and assignments will be assessed as part of the overall result. Weightings of assessment components will be made known at commencement of the unit.
Faculty of Science

150 MATHEMATICAL SCIENCES 1F (SOCIAL SCIENCES)
82 lectures, 35 tutorials/practice classes, 24 hours of laboratory work. Mathematics, Statistics and Computer Science (8 points).

Conditions: Students may not gain credit for 150 and any of 110, 111, 120, 130 or 140.


Design and implementation of algorithms; programming in a high level language; syntax and semantics of high level languages; control structures and data structures; introduction to software engineering and social implications.

Projects will include system familiarization and the design and implementation of a number of programs in a high level language.

ASSESSMENT Written examinations with a total of not more than 6 hours duration. Project work must be completed as required and assignments up to a total of 100 pages may be set. Projects and assignments will be assessed as part of the overall result. Weightings of assessment components will be made known at commencement of the unit.

200 LEVEL
The unit 240 is designed primarily for those students who are taking majors in the Biological and Social Sciences, who have taken 617-140 or 617-150 and who have a need of further mathematics which is relevant to their main courses of study. It will also be of interest to students who have taken 617-140 or 617-150 and who wish to study some further topics in Mathematical Sciences for their own sake. The unit is a terminal course and does not qualify as a prerequisite for any 300-level unit in Mathematical Sciences, Computer Science, Mathematics or Statistics.

240 MODELS IN MATHEMATICAL SCIENCES
Not offered in 1988.
42 lectures, 21 tutorials/practice classes; 3 terms. Mathematics and Statistics: 6 points.

Prerequisite: 617-110 or 617-140 or 617-150.
Condition: Students may not gain credit for both 617-240 and either 617-120 or 618-275.

ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examinations. Weightings of the assessment components will be made known at commencement of the unit.

300 LEVEL

370 COMBINATORIAL ALGORITHMS

Not offered in 1988.

24 lectures (3 per week), eight 1-hour practice classes; 4 points.

Prerequisites: 617-130 and any 200-level Mathematics unit.

SYLLABUS Counting, graphs, complexity of algorithms, backtrack algorithms, graph algorithms, NP complete problems.

ASSESSMENT One 2-hour written examination. Project work must be completed as required and assignments up to a total of 30 pages may be set. Projects and assignments will be assessed as part of the overall results. Weightings of the assessment components will be made known at commencement of the unit.

OPERATIONS RESEARCH

The School of Mathematical Sciences and the Departments of Mathematics, Statistics, and Computer Science, offer a number of units in the general area of operations research. These include:

- 618-260 Linear Programming and Optimization
- 619-230 Operations Research
- 618-360 Operations Research
- 619-317 Time Series Analysis
- 619-321 Stochastic Processes
- 619-361 Operations Research, Modelling, Analysis and Simulation
- 622-324 Numerical Analysis
- 622-325 Mathematical Software.

These units, when taken with standard units in mathematical sciences, mathematics, statistics and computer science, give a broad training in operations research.

Typical suggested courses—

100-level: 617-110 (or 111), 617-120, 617-130, together with another unit in physical sciences or economics.

200-level: A selection of units from the following:
- 618-250 (or 618-210, 220, 230), 618-260 (Mathematics),
- 619-210 (or 220), 619-230 (Statistics),
- 622-214, 220, 250 (Computer Science).

300-level: A selection of units from the following:
- 618-360 (Mathematics),
Faculty of Science

619-317, 321, 361 (Statistics),
622-324, 325, 341 (Computer Science),

Together with other units from Mathematics, Statistics, Computer Science or Economics.

Students interested in operations research are advised to consult the departments concerned or the chairman of the school of mathematical sciences.

MATHEMATICAL SCIENCES AND ECONOMICS

Up to three units in economics may (with faculty permission) be combined with units in Mathematical Sciences, Mathematics, Computer Science and Statistics.

Typical suggested courses:

100 Level 617-110 (or 617-111), 617-120, 617-130, Economics A or 1A.

200 Level 618-250 (or 618-210, 220) (Mathematics),
619-210 (Statistics),
622-214, 220 (Computer Science),
Economics B.

300 Level 618-360 (Mathematics),
Economics C. (This unit would need to be taken as supernumerary to degree requirements.)

A selection of units from 300-level Statistics and Computer Science.

618 MATHEMATICS

DEPARTMENTAL SUGGESTED COURSE

The four suggested courses which follow are designed for:

(a) Honours studies in Mathematics
(b) Teaching at primary or secondary level
(c) Industrial, commercial or social applications
(d) Physical sciences applications.

100 Level (a) 617-111, 617-120, 617-130 together with Physics, or another physical science.
(b) 617-110 or 617-111, 617-120, 617-130, and units from History and Philosophy of Science.
(c) 617-110 or 617-111, 617-120, 617-130.
(d) 617-110 or 617-111, 617-120 together with either 617-130, Physics, Meteorology or another physical science.

(b) Mathematics 250 (or 210, 220) and 230 together with units from Statistics, Computer Science, Physics, History and Philosophy of Science, or Mathematics 240, 260, 285, 295.
(c) Mathematics 250 (or 210, 220) and 230. Statistics 230, together with units from Computer Science, Statistics or Mathematics 240, 260, 285, 295.
(d) Mathematics 250 (or 210, 220) and 230 together with units from Statistics, Computer Science, Physics, Meteorology or Mathematics 240, 260, 285, 295.
Mathematics

300 Level (a) At least 27 points selected from Mathematics 310, 320, 330, 340, plus a selection of other 300-level Mathematics units, together with units from Statistics, Computer Science, or Physics.

(b) Mathematics 330 and 350 (or at least three of 310, 320, 330 and 340), plus Mathematics 360, together with units from Statistics, Computer Science, Physics, History and Philosophy of Science, or Mathematics 381, 382, 383, 384, 385, 386.

(c) Mathematics 330 and 350 (or at least three of 310, 320, 330 and 340), plus Mathematics 360, together with units from Statistics, Computer Science and Economics.

(d) Mathematics 330 and 350 (or at least three of 310, 320, 330 and 340), together with other 300-level Mathematics units, and units from Computer Science, Physics or Meteorology.

B.Sc.(HONS.) ADMISSION REQUIREMENTS

Students wishing to take Fourth Year Mathematics honours must obtain at least 27 points in 300-level Mathematics units and should normally include at least three units from 310, 320, 330, 340 and 360. Students are strongly advised to consult the department of Mathematics Course Advisers.

100 LEVEL

At the first year level Mathematics courses are offered jointly with the Department of Computer Science, and the Department of Statistics under the auspices of the School of Mathematical Sciences. Full details of syllabus, prerequisites and assessment may be found under the listing for the School of Mathematical Sciences.

There are a range of units available. Combinations of several of these units form prerequisites for 200-level units in the Department of Mathematics. In particular 617-110 or 617-111 is a prerequisite for any 200-level Mathematics unit, and 617-120 is a prerequisite for any 200-level unit on the applications of mathematics.

Note: Students who do not take 617-120 in 1988 will not be able to take the catch-up unit 618-225 in 1989.

200 LEVEL

Course units in Mathematics are listed below, and students may take any combination subject to the prerequisites and conditions prescribed. There are five groups of units.

A. Analysis and Algebra. These consist of the units 210, 220 and 250. There are two streams.

The units 210 and 220 are designed for students who have taken 617-111. Together with unit 618-230, they constitute the principal course offered to students who wish to take a substantial amount of mathematics in their second year. Students who intend to proceed to an honours degree should take these units.

The unit 250 is designed for students who have taken 617-110. It is mutually exclusive with either of the units 210, 220. Unit 250 is a
prerequisite for the third year unit 350 which, together with certain other third year units, may permit entry into fourth year.

B. Applications: These consist of the units 230 and 240. They are designed for students who have taken 617-111 or 617-110, and 617-120. Students who have not taken 617-120 must take unit 275 as a corequisite.

C. Optimization: This consists of unit 260, Linear Programming and Optimization, which is a prerequisite for the third year unit 360, Operations Research.

D. Computational Mathematics: This consists of unit 285 and is designed as a companion unit to the units 210, 220, 230, 240 and 250. It is primarily a project course on the use of numerical methods in solving mathematical problems. All students intending to take a significant amount of 300 level mathematics are recommended to take this unit.

E. Additional Course: This consists of the unit 295, Number Theory, the prerequisite for which is 617-111 or 617-110.

Notes:

(i) Enrolment in any unit without the stated prerequisites must be approved by the Department of Mathematics Course Advisers.

(ii) Students who have not taken 617-120 must take 275 as a co-requisite for 230.

(iii) Students taking 618-230 are strongly advised to take 618-210 and 220 or 618-250 concurrently.

210 REAL AND COMPLEX ANALYSIS
48 lectures (2 per week); 24 practice classes; 7 points.
Prerequisites: 617-110 or 617-111.
Condition: Students may not gain credit for both 210 and 250.
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

220 GROUP THEORY AND LINEAR ALGEBRA
48 lectures (2 per week); 24 practice classes; 7 points.
Prerequisites: 617-110 or 617-111.
Condition: Students may not gain credit for both 220 and 250.
SYLLABUS Vector spaces, linear transformations; eigenvalues, invariant subspaces, matrix representations; inner product spaces, norms, self-adjoint and normal operators, spectral theory. Groups, rings, modules. Representation theory for finite groups.
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.
230 VECTOR ANALYSIS AND MATHEMATICAL METHODS
48 lectures (2 per week); 24 practice classes; 7 points.
Prerequisites: 617-110 or 617-111, 617-120 or 618-275 as a corequisite.
Condition: Students may not gain credit for both 230 and 250 (done prior to 1988).
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

240 INTRODUCTION TO MATHEMATICAL PHYSICS
24 lectures (3 per week in Term 3); 16 one-hour practice classes; 4 points.
Prerequisites: 617-110 or 617-111, and for 1988 only, 617-120 or 275 as a corequisite.
SYLLABUS Euler-Lagrange equations; applications to shortest path problem, minimal surfaces of revolution, brachistochrone problem, hanging chain.
Fermat's principle, geodesics. Integral constraints, Lagrange multipliers and applications. End point variations and natural boundary conditions; applications. Variational methods in classical mechanics. One dimensional continua, continuity equation, characteristics, kinematic waves, shocks. Applications, including traffic flow, conduction and diffusion in one dimension.
ASSESSMENT Written assignments (in total not more than 25 pages) and not more than 2 hours of written examinations. Weightings of assessment components will be made known at commencement of the unit.

250 ANALYSIS AND ALGEBRA
48 lectures (2 per week throughout the year); 24 one-hour practice classes; 7 points.
Prerequisites: 617-110 or 617-111.
Condition: Students taking 618-250 may not gain credit for 618-210 or 618-220.
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ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

260 LINEAR PROGRAMMING AND OPTIMIZATION
24 lectures; 16 practice classes; 4 points.
Prerequisites: 617-110 or 111; and 618-250 (or 220) as a corequisite.
Condition: Students who have successfully completed 618-281 may gain credit for 618-260 in which case credit for 618-281 would be withdrawn.
ASSESSMENT Written assignments (in total not more than 25 pages) and not more than 2 hours of written examinations. Weightings of assessment components will be made known at commencement of the unit.

275 DIFFERENTIAL EQUATIONS
16 lectures; 8 practice classes; 2 points.
Prerequisites: 617-110 or 617-111.
Condition: Students may not gain credit for both 275 and either of 617-120 or 617-240.
ASSESSMENT Written assignments (in total not more than 15 pages) and not more than 2 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

285 COMPUTATIONAL MATHEMATICS A
8 lectures; 16 practice classes; 60 hours project work; 4 points.
Prerequisites: 617-110 or 617-111, and 617-120 or 618-275 as a corequisite.
SYLLABUS The aim of this course is to introduce students to the use of numerical methods in solving mathematical problems, with the emphasis on the development of mathematical models and the implementation of numerical techniques in obtaining solutions. Various topics are developed by project work. The topics are selected so that the numerical methods used will include the numerical solution of linear equations, function approximation, numerical integration and the numerical solution of ordinary differential equations. The numerical methods used will be a selection from the topics listed below in the syllabus details. The theoretical treatment of these topics will be brief, with the emphasis on implementation.
Linear equations: matrix norm, scaling, pivoting, stability, iterative methods, tri-diagonal systems. Function approximation; minimax, least
Mathematics

squares, orthogonal polynomials, cubic splines. Finite differences; inter­
polation, differentiation, integration. Ordinary differential equations;
initial value problems, boundary value problems, numerical integration,
asymptotic error formulas, Runge-Kutta procedures.

ASSESSMENT Project work (60 hours) completed as required, and one
written examination of 1½ hours will each contribute to the total
assessment. Weightings of assessment components will be made known
at commencement of the unit.

295 NUMBER THEORY

16 lectures; 8 practice classes; 2 points.
Prerequisites: 617-110 or 617-111.
Condition: Students who gained credit for 618-283 prior to 1987 may
not gain credit for 618-295.
SYLLABUS Factorisation, primes, greatest common divisors, con­
gruences, multiplicative functions, primitive roots, quadratic residues,
quadratic reciprocity, continued fractions, Pell's equation, Gaussian
integers, quadratic forms.
ASSESSMENT Written assignments (in total not more than 15 pages)
and not more than 2 hours of written examination.
Weightings of assessment components will be made known at com­
mencement of unit.

300 LEVEL

Course units in Mathematics are listed below, and students may take
any combination, subject to the prerequisites and conditions stated.
There are four groups of units:
A. Analysis and Algebra: These consist of units 310, 320, and 350.
The units 310, 320 are designed for students who have taken the
units 210, 220. These units are necessary for students who intend
proceeding to an Honours degree and wish to study fourth year units
in the areas of Analysis, Algebra, Geometry, and Topology. The unit
350 is mutually exclusive with 310, 320 and is designed for students
who have taken 250.
B. Applications: These consist of units 330, 340 and are designed for
students who have taken either 250 (done prior to 1988), or 210 and
230. These units give the necessary background for students who wish to
study fourth year units in the areas of Applications of Mathematics, as
part of an Honours degree.
C. Operations Research: This consists of unit 360. Prerequisites are
618-250 (or 618-210, 220) and 618-260. This unit offers an introduction
to the application of mathematics to problems arising in industry and
commerce. For complementary courses in this area, refer to the Opera­
tions Research listing under the School of Mathematical Sciences.
D. Additional Courses: These consist of units 381, 382, 383, 384, 385,
386. In any one year normally only five of these will be offered. For
details of which units are available and specific details of the courses,
students should consult the Department of Mathematics Course Advice
Book, or the Department Course Advisers. These units are supple­
metary to the units in A, B and C and designed to broaden the scope
of the mathematics course for students majoring in mathematics.
Notes:
(1) Students proposing to take Honours degrees should take careful note of the requirements for entry into the various Honours schools as set out in Chapters 5 and 9 of this Handbook. In particular, students wishing to take Fourth Year Mathematics Honours should obtain at least 27 points in 300-level Mathematics units, and should normally include at least three units from 310, 320, 330, 340, 360. These students are strongly advised to consult the Department of Mathematics Course Advisers. Suitably good results in 330 and 350 may also serve as a prerequisite for Fourth Year.

(2) Students who have taken 250 (prior to 1988) and wish to complete their degree at this level, majoring in mathematics, are strongly recommended to take both the units 330 and 350. Students are encouraged to combine these units with the operations unit 360 and a selection of the units 340, 381, 382, 383, 384, 385, 386.

(3) Enrolment in any unit without stated prerequisites must be approved by the Department of Mathematics Course Advisers.

(4) It is recommended that the students who have not already done so should take one of the units 260, 285.

310 ANALYSIS

48 lectures (2 per week); 18 practice classes; 9 points.
Prerequisites: 210, 220.
Condition: Students may not gain credit for both 310 and 350.
SYLLABUS Metric and topology; completeness; contraction mapping; compactness; connectedness. Measure spaces, measurable functions, Lebesgue integral and its properties; dominated convergence, Fubini's theorem, applications; absolute continuity. Banach and Hilbert spaces; bounded linear operators and functionals; Hahn-Banach theorem; uniform boundedness; applications.
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

320 ALGEBRA AND TOPOLOGY

48 lectures (2 per week); 18 practice classes; 9 points.
Prerequisites: 220, 230 and concurrent enrolment in 310.
Condition: Students may not gain credit for both 320 and 350.
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.
330 MATHEMATICAL METHODS
48 lectures (2 per week); 18 practice classes; 9 points.
Prerequisites: 250 (or 210 and 230).
Condition: Students who gained credit for 618-340 or 618-352 prior to 1987 may not gain credit for 618-330.
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination.
Weightings of assessment components will be made known at commencement of the unit.

340 MATHEMATICAL PHYSICS
48 lectures (2 per week); 18 practice classes; 9 points.
Prerequisites: 250 (or 210 and 230).
SYLLABUS Classical mechanics (Variational principles, Lagrangian and Hamiltonian dynamics, Hamilton-Jacobi theory, integrable and chaotic systems). Foundations of statistical mechanics (Gibbs ensembles, thermodynamic limit, phase transitions, scaling theory and renormalization group. Spin systems and exactly solvable models. Applications.) Continuum mechanics (Kinematics, stress and strain tensors, Navier-Stokes equations for a viscous fluid, vorticity, slow flow and boundary layers. Navier's equations for a linear elastic material, elastostatics of beams, waves.)
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination.
Weightings of assessment components will be made known at commencement of the unit.

350 ANALYSIS AND ALGEBRA
48 lectures (2 per week); 18 practice classes; 9 points.
Prerequisites: 250 (or 210 and 220).
Condition: Students who gained credit for 618-351 prior to 1987 may not gain credit for 618-350.
SYLLABUS Elementary topology, metric spaces, normed spaces, introduction to functional analysis; Hilbert space and eigenvalue problems; Lebesque measure in \( \mathbb{R}^n \), Lebesgue integral. Normal groups, quotient groups, homomorphism of groups, Abelian groups. Matrix groups and symmetries, matrix representations, irreducible representations, character tables.
ASSESSMENT Written assignments (in total not more than 30 pages) and not more than 3 hours of written examination.
Weightings of the assessment components will be made known at commencement of the unit.

360 OPERATIONS RESEARCH
48 lectures (2 per week); 18 practice classes; 9 points.
Prerequisites: 250 (or 210, 220), 260.
Faculty of Science

SYLLABUS Advanced topics in linear programming; integer programming. Operations research models and techniques for management problems, including dynamic programming, critical path, decision tree models, network models, inventory, stability analysis, scheduling models. Case studies; use of computer packages. Optimization algorithms; separable programming; hill climbing methods.

ASSESSMENT Written assignments (in total not more than 50 pages) and not more than 3 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

381 ALGEBRA

24 lectures (3 per week); 8 practice classes; 4 points.
Prerequisites: 250 (or at least two of 210, 220, 230).

SYLLABUS A selection of topics in algebra, e.g. combinatorics, mathematical logic, Galois theory, algebraic number theory, Lie algebras, ring theory, group theory, homological algebra.

ASSESSMENT Written assignments (in total not more than 40 pages) and not more than 2 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

382 GEOMETRY

24 lectures (3 per week); 8 practice classes; 4 points.
Prerequisites: 250 (or at least two of 210, 220, 230).

SYLLABUS A selection of topics in geometry, e.g. differential geometry, differential topology, minimal surfaces, geometric topology, algebraic topology, algebraic geometry.

ASSESSMENT Written assignments (in total not more than 40 pages) and not more than 2 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.

383 MATHEMATICAL MODELLING

24 lectures (3 per week); 8 practice classes; 4 points.
Prerequisites: 250 (or at least two of 210, 220, 230).

SYLLABUS The theory and practice of mathematical modelling, applied to areas such as economics, social sciences, ecology and population dynamics, traffic flow and mechanics. The mathematical methods used may include such topics as graph theory, combinatorial techniques, Markov chains, n-person games, Monte-Carlo methods and the application of differential and difference equations, involving both analytical and numerical solutions.

ASSESSMENT Written assignments (in total not more than 40 pages) and not more than 2 hours of written examination. Weightings of assessment components will be made known at commencement of the unit.
384 DEVELOPMENTS IN MATHEMATICS
24 lectures (3 per week); 8 practice classes; 4 points.
Prerequisites: 250 (or at least two of 210, 220, 230).
SYLLABUS One or more topics based on recent developments in the theory and application of mathematics.
ASSESSMENT Written assignments (in total not more than 40 pages) and not more than 2 hours of written examination.
Weightings of assessment components will be made known at commencement of the unit.

385 COMPUTATIONAL MATHEMATICS B
12 lectures; 54 hours project work; 5 points.
Prerequisites: 250 or 230, 285.
SYLLABUS Mathematical modelling and the numerical solution of partial differential equations and integral equations. A selection of topics from: simulation studies, finite difference methods, fast Fourier transform methods, finite element methods, filtering techniques and parallel algorithms.
ASSESSMENT Project work (54 hours) completed as required and a written examination of 1½ hours will each contribute to the total assessment.
Weightings of the assessment components will be made known at commencement of the unit.

386 DIFFERENTIAL EQUATIONS
24 lectures (3 per week); 8 practice classes; 4 points.
Prerequisites: 250 (or 210, 230).
Condition: Students who gained credit for 618-330 prior to 1987 may not gain credit for 618-386.
ASSESSMENT Written assignments (in total not more than 40 pages) and not more than 2 hours of written examination.
Weightings of assessment components will be made known at commencement of the unit.

631 METEOROLOGY
DEPARTMENTAL SUGGESTED COURSE
Meteorology may be commenced in either 1st, 2nd or 3rd year.
100 Level Meteorology 101 or 102 or 103; together with units from Chemistry, Geology, Mathematical Sciences, Physics.
200 Level Meteorology 201 (for students beginning Meteorology), 202, 203, 204, 205, 206 together with Computer Science, Mathematics, Physics.
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300 Level Meteorology 201 (for students beginning Meteorology); and any units selected from 202-206. At least 9 300 level Meteorology units, and units from other Science disciplines.

The units described below can provide up to half of the 100 points needed for a B.Sc. degree with Meteorology as a major subject; the remaining points would normally be drawn from Mathematics, Physics, the Geophysical Sciences and Computer Science. Unit 201 Outline of Meteorology is designed and compulsory for second year and more senior students who have not taken at least the first year unit 101 (Meteorology 1) or 102 (Introductory Meteorology). All students are encouraged to study current synoptic charts and satellite cloud imagery provided daily by the Commonwealth Bureau of Meteorology, and reviewed in a half-hour weather discussion weekly.

Advanced lecture courses on special topics in Meteorology, Oceanography and Glaciology are given as part of the B.Sc. (Hons.) course (see 631-400 Meteorology in Chapter 9); details of these lectures, which are open to graduate students of other schools, can be obtained from the Meteorology Department.

B.Sc.(Hons.) ADMISSION REQUIREMENTS

Students with adequate background in Science including such subjects as Mathematics, Physics or Computer Science can take Meteorology at fourth year honours level even if Meteorology undergraduate units have not been completed. For such students it will be necessary to undertake some Meteorology undergraduate units at an advanced level as part of their Fourth Year studies.

100 LEVEL

Students who desire a full introduction to meteorology, but who are unsure of continuing in 2nd and/or 3rd year, should take unit 101 or 102. Unit 101 carries 8 points in comparison with the 6 points of 102 because of the practical work content. Thus unit 101 is a more fully rounded introduction to meteorology. Both these units are adequate prerequisites for all other units except 631-201 Outline of Meteorology, which is an alternative. Credit for only one of units 101, 102, 201 can be applied toward a degree. Students who wish only a brief overview of the main weather and climate elements should take unit 103. This unit examines in some detail the interaction of people and climate. All first-year units are of a non-mathematical nature and concentrate on the concepts of meteorology.

100 LEVEL ASSESSMENT

Students are assessed in 631-101, 631-102 by three, compulsory, 30-minute multiple-choice examinations (one in each term) and in 631-103 by one such examination in first term. The rest of the assessment in the units will be by further examinations, and/or essays. Each student may choose the form and mixture of the assessment. For example, they may elect to be assessed by examinations (one per term of 60 minutes) or by essays (two per term; 3 to 5 pages of writing). Problem sheets not exceeding 10 pages will contribute to the final assessment. For 631-101, the final grade is an arithmetic average of the performance in the four components of the course: the work of terms 1, 2 and 3, and the laboratory work.
Weightings of assessment components will be made known at the commencement of the unit.

101 METEOROLOGY: METEOROLOGY 1

3 hours of lectures per week plus ½-hour of weather chart discussion, plus 3 hours of laboratory work which although supervised is taken at times to suit the individual student who will work on the projects in our computing and/or synoptic laboratory; 8 points.

SYLLABUS

Term I: The earth in space; the troposphere; solar and terrestrial radiation; mean sea level distributions; meteorological parameters; thermal pressure features; the general circulation; local and global energy budgets; the weather and climate variables; climate modelling; past climates; causes of ice ages; the impact of weather and climate (social, historical, biological); interaction between man and climate.

Term II: Pressure systems and height. Large scale weather systems; air masses; fronts; jet streams; cyclones and anticyclones; associated weather; relevance to the Australian region. Local weather systems: clouds (formation and dissipation); precipitation; the thunderstorm; other severe storms.

Term III: Equations of motion; meteorological forces; wind models; thermal wind and stability; properties of the wind field — vorticity and divergence. Conservation of vorticity; numerical forecasting. The aeronautical diagram; empirical forecast rules; local forecasting.

ASSESSMENT See under “100 level assessment”.

102 METEOROLOGY: INTRODUCTORY METEOROLOGY

3 hours of lectures per week for the full year; 6 points.

SYLLABUS

Term I: The earth in space; the troposphere; solar and terrestrial radiation; mean sea level distributions; meteorological parameters; thermal pressure features; the general circulation; local and global energy budgets; energy transfer processes; the weather and climate variables; controls and feedback processes; climate modelling; past climates; warm and ice age meteorology; causes of ice ages; the impact of weather and climate (social, historical, biological); interaction between man and climate.

Term II: Gas laws; pressure systems and height. Large scale weather systems; air masses; fronts; jet streams; cyclones and anticyclones; associated weather; relevance to the Australian region. Local weather systems: clouds (formation and dissipation); precipitation; the thunderstorms; other severe storms.

Term III: Equations of motion; meteorological forces; wind models; thermal wind and stability; properties of the wind field — vorticity and divergence. Conservation of vorticity; numerical forecasting. The aeronautical diagram; empirical forecast rules; local forecasting.

ASSESSMENT See under “100 level assessment”.

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103 METEOROLOGY: WEATHER, CLIMATE AND PEOPLE

3 hours of lectures per week; 1st term; 2 points.

SYLLABUS The earth in space; the troposphere; solar and terrestrial radiation; mean sea level distributions; meteorological parameters; thermal pressure features; the general circulation; local and global energy budgets; energy transfer processes; the weather and climate variables; controls and feedback processes; climate modelling, past climates; warm and ice age meteorology; causes of ice ages; the impact of weather and climate (social, historical, biological); interaction between man and climate.

ASSESSMENT See under "100 level assessment".

200 LEVEL

ASSESSMENT FOR ALL 200-LEVEL METEOROLOGY UNITS: All units carry two points. In each unit, assessment is made on the basis of one 1½-hour terminal examination, or a project and/or an essay. Weightings of assessment components will be made known at the commencement of the unit. Prescribed reading and tutorials may be substituted for lectures in units with very few students.

Students commencing the study of Meteorology at second year level must enrol for 201; this is not necessary for students who have done Meteorology in first year (unless their only first year Meteorology unit was 103).

No textbook adequately covers the material presented in the 200 level units. Since texts are too expensive to require a different one for each unit, no text is prescribed. Preliminary reading and reference texts are available in the Meteorology department library.

201 METEOROLOGY: OUTLINE OF METEOROLOGY

16 lectures; independent reading of selected references as a project equivalent to 6 hours practical work; 2 points.

An introductory course, designed for students who have not done first year Meteorology, but who are considering majoring in the subject. The course content is similar to that of first year unit 102, but the topics are given a more rigorous mathematical treatment.

202 METEOROLOGY: METEOROLOGICAL MEASUREMENTS

8 lectures; 24 hours supervised practical work including a field excursion and evaluation of results; 2 points.

Physical principles of measurement of basic meteorological parameters; radiation, temperature, humidity, pressure and wind.

203 METEOROLOGY: THERMODYNAMICS OF THE ATMOSPHERE

14 lectures; 6 hours supervised practical work; 2 points.

State variables; statics; convection; dry and moist adiabatic processes; thermodynamic diagrams; potential, internal, and available energies.

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204 METEOROLOGY: PLANETARY CLIMATOLOGY
10 lectures; 18 hours supervised practical work; 2 points.
The physical basis of climate; large-scale climatic controls; energy balances and transports; the general circulation of the terrestrial atmosphere, and of the atmospheres of other planets; meso- and micro-scale climatic controls.

205 METEOROLOGY: COMPUTER METEOROLOGY
4 lectures; 36 hours supervised practical work; 2 points.
Prerequisite: 631-103 or 201, and 617-110 or 111. Prerequisites may be waived by the chairman.
Basics of programming; applications to meteorology; practical exercises.

206 METEOROLOGY: THE URBAN ENVIRONMENT
8 lectures; 24 hours supervised practical work, including a field excursion; 2 points.
The effects of cities on the local atmospheric environment; modification of the radiation balance; anthropogenic heat and moisture; temperature inversions; the urban heat island; local winds; transport and dispersion of atmospheric pollutants.
See also 600-204 Introduction to Physical Oceanography under Marine Science.

300 LEVEL
Unit 301 carries four points; units 302, 303 and 309 carry three points; all other 300-level units carry two points. Assessments are made on the basis of one 1½-hour terminal examination, and/or an essay test on prescribed reading beyond the material presented in lectures. Weightings of assessment components will be made known at the commencement of the unit. In units with very few students, prescribed reading and tutorials may be substituted for lectures.
Students commencing the study of Meteorology at third year level are required to enrol for unit 201.
No text covers the entire year; to avoid unnecessary expense on the student's part, no textbooks are prescribed. Preliminary reading and reference texts are available in the Meteorology department library.

301 METEOROLOGY: DYNAMICS
16 lectures and 24 hours supervised practical work; 4 points.
Equations of frictionless motion in the rotating atmosphere; special co-ordinates and solutions; divergence, circulation, vorticity; scale analysis of equations of motion, and derivation of the geostrophic, thermal wind and vorticity equations; vertical velocity, and the omega equation; perturbation theory; Rossby theory; instabilities in barotropic and baroclinic flow.

302 METEOROLOGY: MICROMETEOROLOGY
8 lectures; 30 hours supervised practical work (including extended field trip); 3 points.
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Meteorological processes near the surface; transfer by conduction and by turbulence; evaporation and evapotranspiration; the heat balances of terrestrial surfaces and layers.

303 METEOROLOGY: SOLAR RADIATION
8 lectures; 30 hours supervised practical work (including an 8-9 hour observational project and its evaluation); 3 points.

304 METEOROLOGY: TURBULENCE
8 lectures; twelve hours supervised practical work; 2 points.
Introduction to turbulence; Reynolds averaging of the equations of motion; Richardson number; stability (temperature and moisture); the constant flux layer; similarity theory; free convection; spectra and co-spectra; dissipation; Kolmogorov theory; planetary boundary and Ekman layers; mixing. Length theory; diffusion.

305 METEOROLOGY: NUMERICAL WEATHER PREDICTION
8 lectures; twelve hours supervised practical work; 2 points.
301 Meteorology is a prerequisite.
General dynamic and numerical concepts; filtering, initialisation, energy consistency. The hierarchy of prediction models used in forecasts and in general circulation experiments.

306 METEOROLOGY: TERRESTRIAL RADIATION
Eight lectures, twelve hours supervised practical work; 2 points.
303 Meteorology is a prerequisite.

307 METEOROLOGY: SYNOPTIC METEOROLOGY
Eight lectures, twelve hours supervised practical work; 2 points.
301 Meteorology is a prerequisite.
The problem of meteorological analysis; types of analysis; the use of surface-based and satellite-based data in analysis; large-scale features of the upper and lower troposphere; severe weather systems.

308 METEOROLOGY: CLOUD PHYSICS
Eight lectures, twelve hours supervised practical work; 2 points.
Classification and dynamics of clouds; growth of cloud droplets and ice crystals; precipitation mechanisms.

309 METEOROLOGY: GENERAL GLACIOLOGY
8 lectures, 30 hours supervised practical work (including field trip); 3 points.
The ice crystal; snowfall and the geographical distribution of snowcover and the snowline; metamorphism of snow to ice; glacier mass balances; the flow law of ice, glacier movement and the distribution of velocity within a glacier; glacier energy balances and micrometeorology; glaciological methods.

320 METEOROLOGY: PRACTICE OF NUMERICAL WEATHER FORECASTING
2 lectures; 30 hours' supervised practical work; 2 points.
305 is a prerequisite.
Computer study of the simple equivalent barotropic model: forecasts and backcasts for ± 48 hours: analysis of varying the vorticity advection; boundary effects; Incorporation of diabatic heating and vertical motions: other models.

321 METEOROLOGY: REMOTE SENSING
8 lectures; 12 hours of supervised practical work (including two or three 3-hour field trips); 2 points.
202 Meteorology is a prerequisite.
Physical principles of acoustic, optical, and radio remote sensing of the troposphere.

322 SATELLITE METEOROLOGY
Eight lectures, twelve hours practical work. Two points.
Geostationary and polar-orbiting satellites; meteorological applications of satellites; the design and operation of infra-red and microwave sensors; analogue and digital satellite data.

323 DESCRIPTIVE PHYSICAL OCEANOGRAPHY
10 lectures; 6 hours' practical work; 2 points.
Prerequisites: Introduction to Physical Oceanography (600-204) or 631-201 or with permission of the Chairman of Department.
SYLLABUS The physical characteristics of the world oceans: dynamics, thermodynamics. Atmosphere-ocean interaction—heat, mass and salt exchange and balances. Water masses, currents, physical and chemical tracers, mixing, redistribution of chemical and biological constituents. Winds, waves and currents, tides, ocean processes for coastal engineering. Experimental techniques in oceanography research — temperature, salinity, conductivity, density, acoustics, currents, tides, laboratory instruments and deep sea equipment.

324 METEOROLOGY: ADVANCED METEOROLOGICAL MEASUREMENTS
8 lectures; 12 hours of supervised practical work; 2 points.
202 Meteorology is a prerequisite.
Observational methods for meteorological research; recent advances in sensor technology; signal processing, telemetry, data loggers and recorders.
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325 METEOROLOGY: METEOROLOGICAL DATA ANALYSIS
8 lectures; 12 hours of supervised practical work; 2 points.
301 Meteorology is a prerequisite.
Various methods of meteorological analysis, including successive correction, “optimum”, multivariate and normal mode schemes. Dynamic analysis. Spectral analysis, and empirical orthogonal functions. Smoothing and filtering of data.

526 MICROBIOLOGY

DEPARTMENTAL SUGGESTED COURSE
100 Level Biology 101, or 102/103 or 102/104; Chemistry 101; Mathematical Sciences 100 level; Physics 100 level.
200 Level Microbiology 201, 202; Biochemistry 201, 202; together with: Chemistry Category B course or Histology 201, Physiology 201 or 202 or 203; or Genetics 201, 202; or a selection from Organic Chemistry 200 level; Botany 202, 203 or 208; Pharmacology 201; Zoology 203.
Students interested in constructing a course with an emphasis on Biotechnology must include Microbiology 201 and 202 and appropriate 300-level units. See Guide to Science Courses.
300 Level At least 22 points of 300 level Microbiology (including at least 6 points of practical); together with 300 level Biochemistry units; other units may be selected from Botany, Chemistry, Genetics, Pathology, Zoology.
Students wishing to major in Immunology are required to take Microbiology 305 and 306 plus at least 13 points from Microbiology 312, 313, 314 and Pathology 306, 308, 309.
In special cases oral examinations may be given for any of the Microbiology units.
Prerequisites may be waived by the chairman of the department.

B.Sc.(HONS.) ADMISSION REQUIREMENTS
Students wishing to proceed to Fourth Year honours in Microbiology are advised to take at least 22 points of 300-level Microbiology, including at least 6 points of 300-level practical units.

200 LEVEL

201 MICROBIOLOGY: GENERAL MICROBIOLOGY (LECTURES)
Dr I. H. Holmes, Dr R. G. Wilkinson
48 lectures; 1st, 2nd and 3rd terms; 6 points.
Prerequisites: Biology 101, or Biology 102 and 103, or Biology 102 and 104.
Students wishing to major in Microbiology are required to take Microbiology 201 and 202 and are advised to take Biochemistry 201 and 202.
SYLLABUS A general introductory course dealing with the properties of micro-organisms (bacteria, viruses, and fungi), their behaviour in their natural environment and in the laboratory, their importance in the patho-
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genesis of disease in animals, plants and insects, their role in degradative and synthetic cycles of compounds in nature, and their importance as tools for research into fundamental processes of life.

ASSESSMENT A total of 3-hours written examination which may include a test at the end of 2nd term. Weightings of assessment components will be made known at commencement of unit.

202 MICROBIOLOGY: GENERAL MICROBIOLOGY (PRACTICAL WORK)
Dr R. G. Wilkinson, Dr I. H. Holmes
72 hours practical work; 1st, 2nd and 3rd terms; 3 points.
Students taking 202 must also take or have completed Microbiology 201. Three hours per week experimental work to introduce students to microbiological techniques and their applications in recognizing different types of micro-organisms and studying their basic properties.

ASSESSMENT Continuous assessment based on laboratory performance (which may include practical tests), written reports on results of experiments and written tests. Weightings of assessment components will be made known at commencement of the unit.

203 MICROBIOLOGY (OPTOMETRY)
Dr D. M. Graham
A course of 24 lectures with associated demonstrations. 3 points.


ASSESSMENT One 2-hour written examination.

300 LEVEL
Students who wish to proceed to B.Sc. (Honours) in the department of Microbiology are advised to take not less than 22 points of 300-level Microbiology to include at least 6 points of 300-level practical units.

301 MICROBIOLOGY: PATHOGENESIS AND EPIDEMIOLOGY
Dr J. R. L. Forsyth, Dr R. M. Robins-Browne
24 lectures; 4 points.
Prerequisites: Microbiology 201 and 202.

SYLLABUS The mechanisms of disease production by micro-organisms in man and the principles governing the spread of infectious diseases in the community.

ASSESSMENT One 2-hour written paper. Essay work may be prescribed and the marks therefrom included in the assessment. Weightings of assessment components will be made known at commencement of the unit.
302 MICROBIOLOGY: PRACTICAL MICROBIOLOGY

Mrs E. Reade

12 lectures; 72 hours practical work including tutorials; 6 points.
Prerequisites: Microbiology 201 and 202.

The aim of the course is to train students in the practical application of bacteriology to the isolation and identification of bacteria in a number of situations where these organisms are exerting major biological effects. Examples will be drawn from medical, industrial and food microbiology. Students will be involved in project work and will be expected to demonstrate competence in both theory and practice. Those students who wish to obtain a position in a microbiology laboratory are advised to take this unit.

ASSESSMENT Assessment of laboratory performance plus one 3-hour examination.
Weightings of assessment components will be made known at commencement of the unit.

303 MICROBIOLOGY: VIROLOGY (LECTURES)

Professor D. O. White, Dr I. H. Holmes

24 lectures; 4 points.
Prerequisites: Biochemistry 201, Microbiology 201 and 202.

A comprehensive study of the principles governing the behaviour of viruses in nature and in man. The course has two contrasting themes: the role of viruses in human disease and the contribution of viruses to the progress of molecular biology.

ASSESSMENT One 3-hour written paper.

304 MICROBIOLOGY: VIROLOGY (PRACTICAL WORK)

Dr D. M. Graham

36 hours practical work; 2 points.
Prerequisites: Students taking 304 must be enrolled for or have taken Microbiology 303.
Students will choose one of several projects involving current techniques of medical and/or molecular virology. They will be expected to contribute to the planning, as well as to the execution and interpretation of the experiments.

ASSESSMENT Assessment of performance during laboratory work and a written and/or oral report.
Weightings of assessment components will be made known at commencement of the unit.

305 MICROBIOLOGY—PRINCIPLES OF IMMUNOLOGY

Dr W. Boyle, Dr C. Cheers

24 lectures; 4 points; 1st term.
Prerequisites: At least 12 points theory, 4 points practical 200 level units, from Biochemistry, Genetics, Histology, Microbiology or Physiology.
This course will provide an introductory survey of Immunology, with emphasis on the cellular and molecular basis of immune mechanisms and the application of immunological methods to clinical problems.

ASSESSMENT One 3-hour written paper.

306 MICROBIOLOGY—IMMUNOLOGICAL TECHNIQUES

PRACTICAL

Dr C. Cheers
36 hours' practical work; 2 points; 2nd term.
Prerequisites: 526-305.

The aim of this course is to acquaint students with a range of immunological techniques, and their application and interpretation in clinical immunology and research.

ASSESSMENT Continuous assessment based on laboratory work. One 2-hour written paper. Each to account for 50% of assessment.

307 MICROBIOLOGY: INDUSTRIAL MICROBIOLOGY

(LECTURES)

Dr M. Dyall-Smith
24 lectures; 4 points.
Prerequisites: Microbiology 201, 311, Biochemistry 201.

Kinetics of growth of micro-organisms, with particular reference to the environmental factors that influence the yield of biomass and product; the implications of this knowledge for the design of fermenters and the management of fermentations. The application of fundamental biochemical and genetic knowledge to the accumulation of fermentation products (antibiotics, amino acids, polysaccharides) on an industrial scale and for the production of vaccines by recombinant methods. The role of micro-organisms in the treatment of waste water.

ASSESSMENT One 3-hour written paper.

308 MICROBIOLOGY: INDUSTRIAL MICROBIOLOGY

(PRACTICAL WORK)

Dr M. Dyall-Smith
36 hours practical work; 2 points.
Prerequisites: Microbiology 201, 202 and 311, Biochemistry 201 and 202.

Students taking 308 must also be enrolled for or have taken Microbiology 307.

Practical exercises which are illustrative of the principles involved in controlling the growth of microbial cells.

ASSESSMENT Assessment will be based on performance during projects and on the written report. Weightings of assessment components will be made known at commencement of the unit.
309 MICROBIOLOGY: MICROBIAL GENETICS (LECTURES)
Professor A. J. Pittard, Dr R. G. Wilkinson
24 lectures; 4 points.
Prerequisites: Biochemistry 201, Microbiology 201.
SYLLABUS A study of some of the key research papers which form the basis for our understanding of the regulation of gene expression in Escherichia coli and some of its bacteriophages. To help understand the way in which new concepts have been developed in molecular genetics, emphasis will be placed on sequential studies carried out with particular systems.
ASSESSMENT One 3-hour written examination; one essay (up to 1,500 words).
Weightings of assessment components will be made known at commencement of the unit.

310 MICROBIOLOGY: MICROBIAL GENETICS (PRACTICAL WORK)
Professor A. J. Pittard, Dr R. G. Wilkinson
36 hours practical work; 2 points.
Prerequisites: Biochemistry 201 and 202, Microbiology 201 and 202.
Students taking 310 must also be enrolled for or have taken Microbiology 309.
In this course, students will work in pairs or small groups on individual projects taken from a wide area of microbial genetics. Students will be expected to take part in the design of experiments and to play an active and critical role in evaluating results and proposing further investigations.
ASSESSMENT Assessment of performance during laboratory work and on written and/or oral reports.
Weightings of assessment components will be made known at commencement of the unit.

311 MICROBIOLOGY: MICROBIAL PHYSIOLOGY (LECTURES)
Dr B. Hodgson
12 lectures; 2 points.
Prerequisite: Biochemistry 201, Microbiology 201.
SYLLABUS A basic introduction to microbial physiology, including topics such as cell surfaces — structures, functions, interactions and synthesis; membrane properties; transport processes; energy conservation and utilisation; functions and control of metabolic pathways.
ASSESSMENT One 2-hour written paper.

312 MICROBIOLOGY—CELLULAR IMMUNOLOGY AND INFECTION
Dr C. Cheers
18 lectures; 3 points; 2nd term.
Prerequisites: 526-305.
The immune response to infectious disease tells us much about the fundamentals of immunology. Control of cellular interactions, cell recognition and communication, the evolutionary importance of the major histocompatibility complex, genetic influences on immunity and bio-engineering approaches to prophylaxis will be discussed. The beneficial and damaging effects on the host will be considered.

ASSESSMENT One 2-hours' written paper.

313 MICROBIOLOGY—MOLECULAR ASPECTS OF IMMUNOLOGY

Dr W. Boyle
18 lectures; 3 points; 3rd term.
Prerequisite: 526-305.
An advanced course which covers recent molecular definition of a number of aspects of the immune response including immunochemical and immunogenetic studies of antigens, biochemical aspects of antigen processing and the nature of MHC-restricted-antigen complexes, and the production and regulation of T cell receptors and interleukins.

ASSESSMENT One 2-hour written examination.

314 MICROBIOLOGY—IMMUNOLOGY PROJECTS PRACTICAL COURSE A

Dr W. Boyle
36 hours; 2 points; 3rd term.
Prerequisites: 526-306 and 526-312 or 526-313.
This course offers a series of projects in cellular immunology, immunochemistry and immunity to infection. Each student will select one project which will present an experimental problem. The student will design an experimental protocol to answer the problem and pursue the necessary experimental investigations throughout the 36-hour practical period.

ASSESSMENT By continuous assessment of experimental work performed and by evaluation of a written report, of not more than 3,000 words, describing the investigation, its results and significance. Weightings of assessment components will be made known at commencement of the unit.

531 PATHOLOGY

DEPARTMENTAL SUGGESTED COURSE

100 Level Biology 101 or 102 and 103; Chemistry 101; together with other 100 level Science units.

200 Level Histology 201; Biochemistry 201; Physiology 202; together with units selected from Biochemistry 202; Microbiology 201, 202; Pharmacology 201; Chemistry.

300 Level Students wishing to proceed to a B.Sc. (Hons.) course in the Pathology Department should take Pathology units equivalent to at least 18 points. This should include Pathology 301, together with units selected from Pathology 302, 303, 304,
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306, 308, 309, 310, 311. A combined course with either Cellular and Developmental Biology, Microbiology/Immunology, Biochemistry, Physiology or Pharmacology is recommended.

B.Sc.(HONS.) ADMISSION REQUIREMENTS

See "300 Level".

301 GENERAL PATHOLOGY

3 hours per week lectures; 2 hours per week tutorials; 2 hours per week practical histopathology; 1st term; 6 points.
Prerequisites: Any two of Histology 201, Biochemistry 201 or Physiology 201.

SYLLABUS The course will illustrate the scientific basis of the study of physical diseases, their causes and the responses of tissues and organs in these diseases. Major topics will include: cell responses to injury and necrosis; acute and chronic inflammation, repair and regeneration; vascular disease, haemostasis, thrombosis and embolism, infarction and oedema; abnormalities of growth including neoplasia; disorders of metabolism, calcification and immunological responses.

ASSESSMENT One 2-hour written paper and one 1-hour practical examination in the specified examination period at end of term 1. Weightings of assessment components will be made known at commencement of the unit.

302 REACTIONS TO INJURY

3 hours per week lectures; 2 hours per week tutorials; 2 hours per week practical histopathology; throughout term 2; 6 points.
Prerequisite: 531-301.

SYLLABUS Basic knowledge about the reactions of the human body to injury are given as part of 301 General Pathology. Unit 302 will comprise a more detailed consideration of the processes of acute and chronic inflammation, repair, regeneration, infections, cell injury and cell death and the special pathology of injury as it affects the central nervous system, the kidney and bones and joints.

ASSESSMENT One 2-hour written paper and one 1-hour practical examination in the specified examination period at end of term 2. Weightings of assessment components will be made known at commencement of the unit.

303 REACTIONS TO INJURY: PRACTICAL

5 hours per week practical experimental pathology; throughout term 2; 2 points.
Prerequisites: 531-301, 531-302 (usually taken concurrently).

SYLLABUS A programme of experiments will be carried out which relate to the topics of Reactions to Injury 302, namely acute and chronic inflammation, repair, regeneration, infections, cell injury and cell death and the special pathology of injury as it affects the central nervous system, the kidney and bones and joints.

ASSESSMENT Will be based on written reports about the practical classes written during or soon after the classes.
Weightings of assessment components will be made known at commencement of the unit.

304 CELL PROLIFERATION AND NEOPLASIA
3 hours per week lectures; 2 hours per week tutorials; 2 hours per week practical histopathology; 6 hours per week practical experimental pathology; 1st half term 3; 4 points.

Prerequisite: 531-301.

SYLLABUS Unit 531-304 will present aspects of the current knowledge of the process of neoplasia and of the pathology of neoplasms, thereby extending from the basic principles outlined in 531-301; plus cytopathology and the basis of chemotherapy of neoplasms.

ASSESSMENT One 1-hour written paper and one 1-hour practical examination in the specified examination period at end of term 3. Reports written during or soon after the experimental classes of work done in the classes will also be required.
Weightings of assessment components will be made known at commencement of the unit.

305 HAEMATOLOGICAL ASPECTS OF PATHOLOGY
Not available in 1988.

3 hours per week lectures; 2 hours per week tutorials; 6 hours per week practical haematology; 2nd half term 3; 4 points.

Prerequisite: 531-301.

SYLLABUS Unit 531-305 will include aspects of normal blood and bone marrow; disorders of red cells, anaemias; disorders of white cells, leukaemias, lymphomas, myelomas; study of blood group antigens and their significance in pathology; bleeding disorders; and coagulopathies.

ASSESSMENT One 1-hour written paper and one 1-hour practical examination in the specified examination period at end of term 3. Reports written during or soon after the experimental classes of work done in the classes will also be required.
Weightings of assessment components will be made known at commencement of the unit.

306 TRANSPLANTATION AND IMMUNOGENETICS
18 hours' lectures; term 2; 3 points.

SYLLABUS This course will cover immunogenetic principles of use in biology with selected examples including the use of inbred mouse strains, H-2, non-H-2, H-Y, Ly and other murine systems; HLA and blood groups of man; immunoglobulin gene structure and expression and the appropriate examples of gene cloning in eukaryotes. In addition, the course will cover all aspects of transplantation including the history, development of models in experimental systems both in vitro and in vivo and the relevance of these to organ transplantation in man.

ASSESSMENT One 2-hour written paper in the specified examination period at end of term 2.

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307 GENERAL PATHOLOGY (OPTOMETRY)
5 points.
3 hours per week lectures; 1 hour per week tutorial; 1 hour per week histopathology; 1st term.
SYLLABUS An outline of general pathology with reference to degenerative processes including necrosis and atrophy; circulatory disturbances; infarction, thrombosis, embolism, hyperaemia, oedema; inflammation; disorders of growth; aplasia, hypoplasia, hyperplasia and hypertrophy, neoplasia, metaplasia; tissue regeneration and repair.
ASSESSMENT One 1½-hour written paper comprising theoretical work in the specified examination period at the end of term 1, and one 30-minutes practical examination during the final practical period of the term. Weightings of assessment components will be made known at commencement of the unit.

308 IMMUNOPATHOLOGY
18 hours' lectures; term 3; 3 points.
SYLLABUS This course is designed to demonstrate immunopathological processes of disease and will include immune mechanisms of tissue damage, immune deficiency diseases, auto-immune disease, immunohaematology and appropriate experimental systems. In addition, tumour immunology will be covered.
ASSESSMENT One 2-hour written paper in the specified examination period at the end of term 3.

309 IMMUNOLOGY LABORATORY PROJECT PRACTICAL COURSE B
36 hours' practical laboratory work; 3rd term; 2 points.
Prerequisites: 526-306 (Immunological Techniques) and 531-306 or 531-308.
SYLLABUS This course will offer projects in Immunogenetics, Transplantation and Immunopathology. Students will proceed to study mainly one project, and will design, prepare, conduct and report on the project in detail. In addition, several demonstrations and visits to Clinical Immunology Units may be arranged.
ASSESSMENT Continuous assessment of the student's plan of the experiment and the way this is carried out; assessment of the written report (of not more than 3,000 words); and assessment of the oral presentation (approximately 15 minutes). Weightings of assessment components will be made known at commencement of the unit.

310 HISTOPATHOLOGICAL TECHNIQUES
1 hour per week lectures; 2 hours per week practical work; 1st term; 2 points.
Prerequisite: 531-301 (normally taken concurrently).
SYLLABUS A combined lecture/practical course designed to introduce the basic techniques of histopathology, including: tissue preparation for light microscopy; fixation; processing; microtomy; staining procedures; histochemistry; cryotomy.
ASSESSMENT One 2-hour written paper in the specified examination period at end of term 1. Reports written during or soon after the experimental classes of work done in classes will also be required. Weightings of assessment components will be made known at commencement of the unit.

311 TECHNIQUES FOR ELECTRON MICROSCOPY
1 hour per week lectures; 2 hours per week practical work; 2nd term; 2 points.
Prerequisites: 531-301, 531-310 (or 516-301).
SYLLABUS A combined lecture/practical course designed to introduce the basic techniques of electron microscopy including tissue preparation: fixation; embedding; ultramicrotomy; staining procedures; electron microscopy.
ASSESSMENT One 2-hour written paper in the specified examination period at the end of term 2. Reports written during or soon after the experimental classes of work done in the classes will also be required. Weightings of assessment components will be made known at commencement of the unit.

534 PHARMACOLOGY

DEPARTMENTAL SUGGESTED COURSE
100 Level Biology 101, or 102 and 103; Chemistry 101; Physics 100 level; together with one of the following: Mathematical Sciences, Psychology.
200 Level Biochemistry 201; Pharmacology 201; Physiology 201, 202 or 203; together with one of the following combinations of units:
(a) Biochemistry 202; Histology 201; Chemistry 221.
(b) Biochemistry 202; Chemistry Category B course.
(c) Biochemistry 202; Histology 201; Microbiology 201, 202.
300 Level Either (1) Pharmacology 301, 302, 304 and 305, or for those wishing to specialize in Toxicology, 301, 302, 303 and 307, together with units of a second study; or (2) all 300 level Pharmacology units together with units selected from Biochemistry, Chemistry, Pathology, and Physiology.

B.Sc.(HONS.) ADMISSION REQUIREMENTS
The requirements for admission to B.Sc. (Hons.) in Pharmacology are a sufficiently good undergraduate record and the following 300 level units.
(1) Pharmacology 301 (5 points), 302 (7 points), 304 (6 points) and 305 (4 points), (a total of 22 points), or for those wishing to specialize in Toxicology, Units 301 (5 points), 302 (7 points), 303 (3 points) and 307 (5 points), (a total of 20 points). Either of these options
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may be taken, together with units of a second study in the biological sciences or:
(2) all 300 level Pharmacology units (a total of 30 points) together with units selected from Biochemistry, Pathology, Physiology or:
(3) candidates may be accepted with fewer points in Pharmacology than specified in (1) or (2) under special circumstances as determined by the Chairman.

200 LEVEL

201 PHARMACOLOGY

32 lectures; 2nd and 3rd terms; 4 points.
Prerequisites: Chemistry 101 and Biology 100 level.

SYLLABUS The course will cover the general principles of pharmacology and mechanisms of drug action. It will provide an introduction to the following topics: the physiological basis of drug action; the nature of receptors and the kinetics of drug action; the absorption, distribution and elimination of drugs in the body; the physiology and pharmacology of junctional transmission in the peripheral autonomic and somatic neuroeffector systems; the pharmacology of a number of important groups of drugs used in therapy; drug development; selective toxicity; the pharmacology of toxins and venoms; the pharmacology of environmental contaminants; pharmacological aspects of nutrition, drug abuse and mechanisms of drug dependence.

ASSESSMENT One 2-hour written examination in term 4. An essay (20% of final mark) submitted in first week of October. An oral examination may also be held for students who do not achieve a pass in the written examination.

300 LEVEL

Students intending to proceed to B.Sc. (Hons.) in General Pharmacology should take at least Units 301, 302, 304 and 305.
Students wishing to proceed to a B.Sc. (Hons.) specializing in Toxicology should take at least units 301, 302, 303 and 307.

301 MOLECULAR PHARMACOLOGY

12 lectures; 48 hours of practical work/tutorials; 1st term; 5 points.
Prerequisites: In general, Pharmacology 201, Physiology 201 and Biochemistry 201, but consideration may be given for exemption in special cases.

SYLLABUS The course will cover the following topics: classification and sources of drugs; mechanisms of drug action; drug-receptor kinetics; dynamics of drug action; characterization of drug receptors and the principles of selective toxicity. The practical work will illustrate the lecture material.

ASSESSMENT One 1½-hour written examination at the end of 1st term. An oral examination will also be held. Practical work and reports must be satisfactorily completed and will be taken into account. Weightings of assessment components will be made known at commencement of the unit.
**302 AUTOPHARMACOLOGY**

20 lectures; 60 hours of practical work/tutorials; 1st term; 7 points.
Prerequisite: Pharmacology 301.

SYLLABUS The lecture course will be concerned with the nature, identification, assay, biosynthesis and metabolism of neurohumoral transmitter substances and of autacoids such as histamine, prostaglandins, kinins, serotonin, angiotensin and substance P. The pharmacology of drugs mimicking or modifying the action of these substances will be covered. The practical course will consist of experiments and demonstrations designed to illustrate the lecture course.

ASSESSMENT One 2-hour written examination at end of term 1. An essay (2,000 words) submitted on completion of the unit. An oral examination will also be held. Practical work and reports must be satisfactorily completed and will be taken into account. Weightings of assessment components will be made known at commencement of the unit.

**303 PHARMACOKINETICS**

9 lectures; 32 hours of practical work/tutorials; 2nd term; 3 points.
Prerequisites: In general, Pharmacology 201, Physiology 201 and Biochemistry 201 but exemptions may be given in special cases.

SYLLABUS The course will cover the following topics: administration, absorption, distribution, excretion and metabolism of drugs; pharmacogenetics; mechanisms of drug action; quantitative aspects of pharmacokinetics. The practical course will consist of experiments designed to illustrate the lecture course.

ASSESSMENT One 1-hour written examination at the end of term 2. An oral examination will also be held. Practical work and reports must be satisfactorily completed and will be taken into account. Weightings of assessment components will be made known at commencement of the unit.

**304 PHARMACOLOGY OF THERAPEUTIC SUBSTANCES 1**

15 lectures; 60 hours of practical work/tutorials; 2nd term; 6 points.
Prerequisites: Pharmacology 301 and 302.

SYLLABUS The lecture course will be concerned with the pharmacology of drugs affecting electrolyte and water balance, drugs affecting the cardiovascular, respiratory and gastrointestinal system, drugs affecting the eye and anti-inflammatory drugs. The practical course will consist of experiments and demonstrations designed to illustrate the lecture course.

ASSESSMENT One 2-hour written examination at the end of term 2. An essay (2,000 words) to be submitted on completion of the unit. An oral examination will also be held. Practical work and reports must be satisfactorily completed and will be taken into account. Weightings of assessment components will be made known at commencement of the unit.
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305 PHARMACOLOGY OF THERAPEUTIC SUBSTANCES 2
12 lectures; 42 hours of practicals/tutorials; 3rd term; 4 points.
Prerequisites: Pharmacology 301 and 302.
SYLLABUS The lecture course will deal with the following topics: drugs affecting the central nervous system; psychotropic drugs; centrally acting drugs used to treat disorders of motor function; sedatives and hypnotics; analgesics; drug abuse and mechanisms of drug dependence. The practical course will consist of experiments and demonstrations designed to illustrate the lecture course.
ASSESSMENT One 1½-hour written examination during term 4. An essay (2,000 words) to be submitted on completion of the unit. An oral examination will also be held. Practical work and reports must be satisfactorily completed and will be taken into account. Weightings of assessment components will be made known at commencement of the unit.

306 OCULAR PHARMACOLOGY
Third Year—Optometry Course
Not more than 18 lectures; two 3-hour practical sessions; 4 tutorials; 3rd term; 3 points.
SYLLABUS The course will be oriented towards the actions, side effects and toxic reactions of drugs which act on the eye. It will cover the pharmacology of endogenous and exogenous substances of clinical and scientific importance in relationship to the functions and diseases of the eye. In particular, the course will cover such groups of drugs as Mydriatics and Cycloplegics; Miotics and Cyclospastics; Local Anaesthetics; Antibacterials, Anti-viral agents; Stains, Preservatives; Thickening agents; Collyria and Lubricants. The subject matter, in general, will comprise the following:
(a) the autonomic innervation of the eye and drugs acting on intracellular muscles; their mechanisms of action; interaction; untoward effects;
(b) other drugs commonly used in ocular conditions, including local anaesthetics; antihistamines; anti-inflammatory drugs and the chemotherapy of ocular infection;
(c) drug hypersensitivity with special reference to the eye;
(d) drugs which may cause or exacerbate glaucomatous states, and drugs used to treat glaucoma;
(e) lacrimators; CW agents, domestic and industrial chemicals;
(f) drug absorption and penetration through the cornea; vehicles for drugs applied topically to the eye;
(g) drug regulations; classification and naming of drugs;
(h) doses and preparations of drugs and diagnostic aids which may be used or encountered by optometrists; ocular first aid involving drugs.
The practical course will consist of experiments and demonstrations to illustrate components of the lecture course.
ASSESSMENT One 2-hour written paper in term 4. An oral examination may be held for students who do not pass the written examination. Weightings of assessment components will be made known at commencement of the unit.
Physics

307 TOXICOLOGY

12 lectures; approx. 48 hours' practicals/tutorials; 3rd term; 5 points.

Prerequisites: Either Pharmacology 304 or 305. Pharmacology 303 highly recommended.

SYLLABUS The course will introduce toxicology and will be concerned with the application of toxicological and pharmacological principles to the development of drugs and other consumer chemicals. The course includes the following topics: introduction to toxicology; experimental design; preclinical and clinical testing of drugs; toxicity testing of drugs and other chemicals; mechanisms of drug toxicity; aspects of environmental toxicology.

The practical course will consist of experiments designed to illustrate important aspects of toxicology.

The practical course will consist of experiments and demonstrations designed to illustrate the lecture course.

ASSESSMENT One 1½-hours’ written examination in term 4. An essay (2,000 words) to be submitted on completion of the unit. An oral examination will also be held. Practical work and reports must be satisfactorily completed and will be taken into account.

Weightings of assessment components will be made known at commencement of the unit.

640 PHYSICS

DEPARTMENTAL SUGGESTED COURSE

100 Level Physics 120 or 140; Mathematical Sciences 111 and 120 or 110 and 120; together with units from Chemistry 101; Mathematical Sciences 130; Geology 101; Biology.

200 Level Physics (241, 222, 223, 224, 225, 226, 299) or (241, 242, 243, 244, 245, 246, 299); and Mathematics (210, 220, 230) or 250.

300 Level At least 27 points of Physics units selected according to the table preceding the 300 level entry; together with, either approximately 15 points of other physics units; or units selected from other science disciplines (e.g. Mathematics, Geophysics, Meteorology).

Many units given by the school of Physics are offered at two levels, standard and advanced. In general, the treatment of the subject matter in the advanced level units will be deeper than that at the standard level, and may involve more sophisticated mathematics.

Admission to advanced level units in the first year is restricted to students with a strong Victorian Certificate of Education (formerly H.S.C.) background in physics and mathematics, and preference may be given to students intending to major in physics. Admission to advanced level units in the second and third year is restricted to students with a strong background in the prerequisites for those units and in Physics and Mathematics as a whole and subject to approval by the School of Physics.

Notwithstanding anything stated above, the chairman of the school of Physics may at his discretion waive any prerequisites for Physics units in individual cases.
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B.Sc.(HONS.) ADMISSION REQUIREMENTS

Candidates wishing to enter Fourth Year honours in Physics are normally expected to have passed in at least 27 points of 300-level Physics, including 320 or 340 as well as satisfying normal faculty requirements.

100 LEVEL

The School of Physics offers three courses in physics in the first year, each consisting of a lecture unit in each of the three terms, together with a laboratory course throughout the year. All courses assume a knowledge of VCE Physics and at least elementary calculus. Note that the VCE subject, Physical Science, contains considerably less physics than the subject VCE Physics. Students, particularly those with a weak background in physics, are encouraged to read the book “Matter, Earth and Sky” by G. Gamow (Prentice-Hall) before the beginning of term.

Students wishing to major in physics (i.e. undertake 27 or more points of physics at third year level) should take a continuing physics course in first year (i.e. the 120 or 140 course).

Students with adequate preparation do not disadvantage themselves by taking advanced courses.

120 Physics (Advanced)

Students embarking on any career with good results in VCE Physics and Mathematics should enter for this intellectually vigorous course in physics.

140 Physics (Standard)

This course forms a background in Physics which suits students wishing to major in any physical, technological, or biological discipline.

160 Physics (Terminal)

This course gives a broader and more descriptive coverage of physics than does the 140 or 120 course. It is designed as a terminal course for students who do not have a solid background in physics and mathematics. Students, with sufficiently good results in 160 Physics and mathematics, may be allowed to proceed to higher level physics courses, with permission.

120 PHYSICS (ADVANCED COURSE)

H. H. Bolotin, A. G. Klein, D. G. Sargood

72 lectures; weekly tutorials; 72 hours laboratory; 8 points.

SYLLABUS

As for 140 Physics but with a deeper and somewhat more mathematical treatment.

LABORATORY WORK The experiments are arranged in the following groups, each requiring four or five three-hour sessions to complete:

Introductory Electricity, DC experiments, Electronics, Optics, Nuclear Radiation.

ASSESSMENT One 2-hour written examination at the end of each term’s work. Laboratory work is assessed continually during the year. Each of the three written papers and the laboratory work counts for 25% of the final mark.
Physics

140 PHYSICS (STANDARD COURSE)
E. G. Muirhead, G. C. Joshi, K. A. Amos
72 lectures; weekly tutorials; 72 hours laboratory; 8 points.

SYLLABUS
The course will cover most of the topics listed below, and will be illustrated by applications to physical and biological sciences. Vector notation and differential and integral calculus will be used whenever appropriate.


Physical introduction to Special Relativity.


Electromagnetism: Electrostatics: Coulomb’s law, electric field and lines of force, Gauss’s law, electric potential, capacitance, dielectric materials, energy density of the electric field. Direct current circuits: current and current density, electromotive force, Ohm’s law, resistance, Kirchoff’s rules. Magnetism: magnetic induction and flux, Biot-Savart and Ampere’s circuital laws, magnetic materials, energy density of the magnetic field. Electromagnetic induction: Faraday’s and Lenz’s laws, inductance, eddy currents. Alternating current circuits: reactance and impedance. Maxwell’s equations in integral form; displacement current. Electromagnetic waves in vacuum. The only field vectors introduced are E and B.


LABORATORY WORK The experiments are arranged in the following groups, each requiring four or five three-hour sessions to complete:
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Introductory Electricity, DC experiments, Electronics, Optics, Nuclear Radiation.

ASSESSMENT One 2-hour written examination at the end of each term's work. Laboratory work is assessed continually during the year. Each of the three written papers and the laboratory work counts for 25% of the final mark.

160 PHYSICS (TERMINAL COURSE)
72 lectures; weekly tutorials; 72 hours laboratory; 8 points.

SYLLABUS
Mechanics, Properties of Matter and Waves: This section presents Newtonian mechanics and two of its important applications in physics: the mechanical properties of matter and mechanical waves, with special reference to sound waves. It begins with the kinematics and dynamics of particle motion, based on the concept of mass, force, momentum and energy, and then goes on to apply these ideas to a study of some of the mechanical properties of matter — elasticity, fluid statics and dynamics, and surface properties; emphasis will be laid on the microscopic (atomic-scale) mechanisms that underlie these properties. It concludes with an account of sound, seismic and other mechanical waves, including the important ideas of wave propagation, superposition, interference, standing waves, frequency response and resonance, all of which have analogues in other areas of physics.

Thermal Physics: This section presents basic ideas on heat and temperature that underlie extensive areas of physics, chemistry, biology and the earth sciences. It includes an introduction to the first and second laws of thermodynamics and the concepts of entropy and free energy, and also the practically important topic of heat transfer. The subject will be presented from both the macroscopic (large-scale) and microscopic (molecular-scale) viewpoints, and the relations between them will be emphasized.

Electromagnetism: In this section an account is given of stationary and moving charges and the forces between them — electrostatics, electric circuits, magnetostatics, and electro-magnetic induction — and discusses many practical applications of these ideas, including instrumentation, transducers, alternating currents, and electronics. Finally, there is a qualitative account of the nature and origin of electromagnetic waves.

Optics: This section covers both "geometrical" optics, including lenses, mirrors, and optical instruments, and "physical" optics — dealing with phenomena such as polarization, interference and diffraction that arise from the physical nature of electromagnetic radiation.

Atomic and Nuclear Physics: The atomic and nuclear physics section has two main themes — quantum ideas and the basic structure of atoms and nuclei, and the many applications of atomic and nuclear physics to science and technology as a whole, including X-rays, lasers, radioactivity and radioisotopes, interaction of radiation with matter, radiation detectors and nuclear energy.

LABORATORY WORK The experiments are arranged in the following groups, each requiring four or five three-hour sessions to complete.
Physics

Introductory Electricity, DC experiments, Electronics, Optics, Nuclear Radiation.

ASSESSMENT One 2-hour written examination at the end of each term's work. Laboratory work is assessed continually during the year. Each of the three written papers and the laboratory work counts for 25% of the final mark.

170 PHYSICS: ASTRONOMY
Mr R. H. Wilkinson

Three lectures per week; 3 terms; reading assignments; written work. Practical work; telescope observations and/or laboratory work, 3 hours/week; 2 overnight excursions; 8 points.
The course is suitable for non-scientists, not being specifically designed for physicists. There are no prerequisites.

SYLLABUS
The collection of astronomical data: Visual, photographic, electronic, other instruments.
The Solar System: Diurnal and annual motions — rotation of the Earth. Distinction between Sun, Moon, planets, and the "fixed stars". The solar system — evidence for this; description, sizes, distances and other data. Origin of the system. Possibility of life elsewhere in the system.
Topics of current interest in astronomy are included at relevant points in the course, e.g. planetary astronomy, pulsars, neutron stars, black-holes, quasars, N-galaxies, BL Lac objects, non-thermal radio sources.

ASSESSMENT One 2-hour written examination at the end of each term's work. Work during the year will be taken into account. The practical work will be continually assessed during the year. Each of the 3 written papers and the practical work counts for 25% of the final mark.

200 LEVEL

211 PHYSICS: ENERGY AND ENVIRONMENT
J. L. Rouse

24 lectures: tutorials; 1st term; 3 points.

SYLLABUS Energy and power — principles, demands and outlook. Thermodynamics — transformation of energy and its costs, thermal pollution. Electrical energy from fossil fuels, hydroelectric generation — principles and problems. Costs, capacity, storage, reserves, efficiency,
environmental effects. Electrical energy from nuclear reactors — principles and problems. Fossil fuels as energy sources. Transportation — oil and alternative energy sources, noise and air pollution. Energy in the future — breeder reactors, fusion power, solar power, geothermal power, tidal power, etc. Promise and problems.

ASSESSMENT 2-hour terminal examination plus an essay of 2,000 to 3,000 words to be submitted on or before the date of the examination. The examination and the essay carry equal weight.

212 PHYSICS: CONTINUUM MECHANICS AND GEOPHYSICS
L. Thomas (Geology), E. G. Muirhead (Physics)
24 lectures; tutorials; 3rd term; 3 points.
Prerequisites: No formal ones but it will be assumed that students have studied physics and mathematics at least to first year level, and it is preferred that they be taking Mathematics 230 or 250 concurrently.
SYLLABUS Introduction — the scope of continuum mechanics and its application to "solid-earth" geophysics.
Elastic properties of solids and elastic waves, with applications to seismology and the study of the earth's interior via seismic waves, free oscillations, etc.; earthquakes.
Water waves, tsunamis; tides in the ocean and solid earth.
Heat transfer by conduction, convection, and radiation, and the internal heat of the earth.
The earth's magnetic field, and an introduction to theories of its origin. Introduction to physical ideas associated with plate tectonics and continental drift.
ASSESSMENT One 3-hour terminal examination.

222 PHYSICS: OPTICS AND RELATIVITY (ADVANCED)
S. N. Tovey, G. I. Opat
24 lectures; tutorials; 1st term, 3 points, 3-hour terminal examination.
Prerequisites: as for 242 Physics.
SYLLABUS A deeper treatment of the syllabus for 242 Physics.

223 PHYSICS: QUANTUM MECHANICS (ADVANCED)
B. M. Spicer
24 lectures; tutorials; 3rd term; 3 points; 2-hour terminal examination.
Prerequisites: as for 243 Physics.
SYLLABUS A deeper treatment of the syllabus for 243 Physics.

224 PHYSICS: CLASSICAL MECHANICS (ADVANCED)
J. W. G. Wignall
24 lectures; tutorials; 2nd term; 3 points; 2-hour terminal examination.
Prerequisites: As for 244 Physics.
A deeper treatment of the syllabus for 244 Physics.
225 PHYSICS: ELECTROMAGNETISM (ADVANCED)
H. H. Bolotin
16 lectures; tutorials; 2nd term; 2 points; 2-hour terminal examination. Prerequisites and books as for 245 Physics. A deeper treatment of the syllabus of 245 Physics. A stronger mathematics background is assumed.

226 PHYSICS: THERMAL PHYSICS (ADVANCED)
B. H. J. McKellar
16 lectures; tutorials; 3rd term; 2 points. Prerequisites: As for 246 Physics. SYLLABUS A deeper treatment of the syllabus for 246 Physics. ASSESSMENT One 2-hour terminal examination.

227 PHYSICS: OPTICS (ADVANCED)
S. N. Tovey
16 lectures; tutorials; 1st term; 2 points; 2-hour terminal examination. Prerequisites and books as for 247 Physics. A deeper treatment of the 247 Physics syllabus.

241 PHYSICS: A.C. CIRCUITS AND ELECTRONICS
G. J. F. Legge
16 lectures; 48 hours' laboratory; tutorials; 1st term; 4 points. Prerequisites: 120 or 140 Physics; 110 or 111 Mathematical Sciences, and 120 Mathematical Sciences or 275 Mathematics. SYLLABUS DC circuits: Kirchhoff's Laws, sources of emf and current, network analysis and circuit theorems. AC circuits: Inductance, capacitance, the transformer, sinusoidal waveforms, RMS and peak values, power, complex representation of AC quantities, impedance and admittance, series LCR circuit, Q factor, resonance. Network analysis and circuit theorems, filters, decibel. Electronics: Semiconductors, the pn junction, field-effect transistors, bipolar transistors, characteristics and equivalent circuits, amplifiers, feedback, oscillators. ASSESSMENT One 2-hours' terminal examination. Practical work examined weekly. Lecture work and laboratory work counted equally.

242 PHYSICS: OPTICS AND RELATIVITY
G. J. Wood, B. H. J. McKellar
24 lectures; tutorials; 1st term; 3 points. Prerequisites: 120 or 140 Physics; 110 or 111 Mathematical Sciences. SYLLABUS Optics: Syllabus, books as for 247 Physics. Relativity: Theoretical and experimental problems of 19th century physics. Einstein's postulates. Frames of references, Lorentz trans-
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formations, space-time diagrams. Relativistic kinematics, optics, mechanics and applications.

ASSESSMENT One 3-hour terminal examination.

243 PHYSICS: QUANTUM MECHANICS
G. C. Joshi
24 lectures; tutorials; 3rd term; 3 points.
Prerequisites: 120 or 140 Physics; 110 or 111 Mathematical Sciences, and 120 Mathematical Sciences or 275 Mathematics.
It will be assumed that students are also taking 230 or 250 Mathematics.

ASSESSMENT One 2-hour terminal examination.

244 PHYSICS: CLASSICAL MECHANICS
K. A. Nugent
24 lectures; tutorials; 2nd term; 3 points.
Prerequisites: 120 or 140 Physics; 110 or 111 Mathematical Sciences, and 120 Mathematical Sciences or 275 Mathematics.
SYLLABUS Classical Mechanics, as formulated by Lagrange and Hamilton, is presented in such a way that the transition to modern physics, including Quantum Theory, can be made with the least difficulty. Mathematical rigour is not neglected but the emphasis of the course is directed towards physical understanding.

ASSESSMENT 2-hour terminal examination.

245 PHYSICS: ELECTROMAGNETISM
E. G. Muirhead
16 lectures; tutorials; 2nd term; 2 points.
Prerequisites: 120 or 140 Physics; 110 or 111 Mathematical Sciences, and 120 Mathematical Sciences or 275 Mathematics.
It will be assumed that students are also taking 230 or 250 Mathematics.
SYLLABUS Maxwell's equations in integral and differential forms. Electric scalar and magnetic vector potentials. Dielectric and magnetic

ASSESSMENT 2-hour terminal examination.

246 PHYSICS: THERMAL PHYSICS

L. A. Bursill

16 lectures; tutorials; 3rd term; 2 points.

Prerequisites: 120 or 140 Physics; 110 or 111 Mathematical Sciences.


ASSESSMENT One 2-hour terminal examination.

247 PHYSICS: OPTICS

G. J. Wood

16 lectures; tutorials; assignments; 1st term; 2 points.

Prerequisites: 120 or 140 Physics; 110 or 111 Mathematical Sciences.

SYLLABUS Ray optics: Image formation by reflection and refraction at spherical surfaces; thick and thin lenses; aberrations. Wave optics: reflection and refraction at plane surfaces, thin film interference; Fraunhofer diffraction, diffraction grating; Fourier optics: spatial and temporal coherence, laser light; interferometry; resolving powers of telescope and microscope; Fresnel diffraction by circular aperture and in straight edge geometries.

ASSESSMENT One 2-hour terminal examination.

299 PHYSICS: LABORATORY WORK

V. C. Officer

72 hours laboratory work, 8 hours lecture seminar sessions; 2nd and 3rd terms; 4 points, examined continuously throughout the course.

This laboratory course consists of a group of experiments drawn from diverse areas of physics. It is accompanied by seminar studies of widespread techniques, and analyses of famous and challenging experiments.

300 LEVEL

Third year units fall into two groups; core units and supplementary units. The core units are 320 or 340, 321 or 341, 322 or 342, 323 or 343, 324
or 344, and 360. Students taking 11 or more points worth of third year
lecture units are required to include core units and laboratory work
according to the following table:

<table>
<thead>
<tr>
<th>Type of study</th>
<th>Laboratory work unit required</th>
<th>No. of core units taken</th>
<th>Max. pts. allowed for supplementary units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics major</td>
<td>393</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>(&gt; 27 pts.)</td>
<td>393</td>
<td>&gt; 5</td>
<td>no limit*</td>
</tr>
<tr>
<td>Physics sub-major</td>
<td>398</td>
<td>&gt; 2</td>
<td>no restriction*</td>
</tr>
<tr>
<td>(19-26 pts.)</td>
<td>none</td>
<td>—</td>
<td>no restriction*</td>
</tr>
<tr>
<td>Separate units</td>
<td>allowed</td>
<td>—</td>
<td>no restriction*</td>
</tr>
<tr>
<td>(&lt; 10 pts.)</td>
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<td></td>
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</tbody>
</table>

Students majoring in Physics must include Laboratory Work Unit 393.
Students majoring in advanced level Mathematics may take three
advanced core units without any Laboratory Work.

Any course which does not include Laboratory Work Unit 393 does not
constitute a Physics major. Such courses are intended for students
wishing to take Physics in conjunction with a major study in some
other discipline.

**310 PHYSICS: UNDERGRADUATE SEMINAR**

One hour per week throughout the year.

The **aim of this unit is to encourage students to consider the wider aspects**
of physics; indeed students are encouraged to present papers on topics
which are of particular interest to them.

The following topics typify the nature of the seminar:

(a) Recent advances in physics.
(b) The Physics Research Scene in the School of Physics, elsewhere
    in Australia, and overseas.
(c) The efficient use of scientific literature.
(d) Report and paper writing.
(e) The impact of physics on society.

Each seminar will be led by a staff member, visitor or student who will
give a brief talk and lead discussion in which all students are expected
to participate. The whole seminar programme will be organized by a
senior staff member.

*Subject to faculty approval.*
320 PHYSICS: QUANTUM MECHANICS (ADVANCED)
G. I. Opat
30 lectures plus tutorials; 1st term; 5 points; 3-hour terminal examination.
Prerequisites: 223 or 243 Physics; (220 and 230) or 250 Mathematics.
SYLLABUS General principles of non-relativistic quantum mechanics; wave mechanics; representations; Hilbert space; symmetry; commuting observables; conservation laws; simultaneous measureability and uncertainty relations; angular momentum theory; spin; electromagnetism and gauge transformation; the harmonic oscillator; the hydrogen atom; antisymmetry and the Pauli principle; the helium atom; atomic structure; scattering theory; approximation methods.

321 PHYSICS: THERMAL PHYSICS (ADVANCED)
N. E. Frankel
30 lectures; tutorials; 2nd term; 5 points; 3-hour terminal examination.
Prerequisites and syllabus as for 341 Physics, with additional lectures on the following:
SYLLABUS Non-equilibrium statistical mechanics and thermodynamics; Onsager relations. Elementary account of transport properties in gases. The Boltzmann Equation and its application to transport properties in gases, solids and plasmas. Boltzmann’s H theorem and the approach to equilibrium.

322 PHYSICS: NUCLEAR PHYSICS (ADVANCED)
H. H. Bolotin
30 lectures; tutorials; 2nd term; 5 points; 3-hour terminal examination.
Prerequisites, books and syllabus as for 342 Physics, with additional lectures extending some of the topics.

323 PHYSICS: SOLID STATE PHYSICS (ADVANCED)
J. W. G. Wignall
30 lectures; tutorials; 3rd term; 5 points; 3-hour terminal examination.
Prerequisites, books and syllabus as for 343 Physics, with additional lectures on the following topics:
SYLLABUS Dielectric and magnetic properties of solids. Interaction of solids with electromagnetic waves and other radiations; spin resonance. Superconductivity.

324 PHYSICS: ELECTRODYNAMICS (ADVANCED)
K. C. Hines
30 lectures; tutorials; 3rd term; 5 points; 3-hour terminal examination.
Prerequisites and syllabus as for 344 Physics, with additional lectures as follows:
SYLLABUS Radiation from an accelerated charge; synchrotron radiation; Electromagnetic field tensor; stress-energy-momentum tensor; Lagrangian and Hamiltonian formulation for motion of particles in the electromagnetic field and of the field itself.
Faculty of Science

340 PHYSICS: QUANTUM MECHANICS
D. G. Sargood
24 lectures; tutorials; assignments; 1st term; 4 points; 2-hour terminal examination.
Prerequisites: 223 or 243 Physics; (220 and 230) or 250 Mathematics.
SYLLABUS The general principles of non-relativistic quantum mechanics, including a selection from:
Solution of the Schrödinger equation for simple potentials, including the harmonic oscillator and the Coulomb potential;
Hermitian operators, their significance and properties, their eigenfunctions and eigenvalues;
Uncertainty relations, commutator algebra;
Central Forces and angular momentum;
Spin; Linear vector spaces; Dirac notation;
Approximate methods — Bound state perturbation theory, degeneracy, variational methods, Pauli exclusion principle, antisymmetry.

341 PHYSICS: THERMAL PHYSICS
N. E. Frankel
18 lectures; tutorials; 2nd term; 3 points; 2-hour terminal examination.
Prerequisites: 226 or 246 Physics.
It is recommended that students should have taken some second year Mathematics: 250 Mathematics.

342 PHYSICS: NUCLEAR PHYSICS
H. H. Bolotin
18 lectures; tutorials; 2nd term; 3 points; 2-hour terminal examination.
Prerequisites: 223 or 243 Physics.
A knowledge of 320 or 340 Quantum Mechanics is assumed.
SYLLABUS A selection from the following: static nuclear properties; nuclear stability; the two nucleon problem; nuclear models for structure and reactions; α-decay; β-decay; γ-ray transitions.

343 PHYSICS: SOLID STATE PHYSICS
J. W. G. Wignall
18 lectures; tutorials; 3rd term; 3 points; 2-hour terminal examination.
Prerequisites: 223 or 243 Physics.
A knowledge of 320 or 340 Quantum Mechanics is assumed.
SYLLABUS Atomic arrangement and binding in solids: crystal structure, cohesive energy, imperfections, alloys. Lattice vibrations and thermal properties of solids. The behaviour of electrons in metals and semiconductors; band theory.
344 PHYSICS: ELECTRODYNAMICS  
K. C. Hines  
18 lectures; tutorials; 3rd term; 3 points; 2-hour terminal examination.  
Prerequisites: Physics 225 or 245; Mathematics 230 or 250.  
SYLLABUS  
Revision of Maxwell's equations; Electromagnetic waves in vacuum, in  
dielectric materials and in conducting materials (Polarization); Vector  
and scalar potentials, gauge transformations, solutions to the wave  
equations for the potentials; Derivation of classical optics from Max­  
well's equations; Boundary value problems for both static and oscillatory  
fields; Transmission lines, cavity resonators, wave guides; Energy momen­  
tum relations in the electromagnetic field—radiation; Radiation from an  
oscillating dipole; (Multipole) expansions.  
Special relativity and electrodynamics — electromagnetic field tensor  
(Lorenz electron theory: dispersion, anomalous dispersion and con­  
ductivity).

360 PHYSICS: ATOMIC AND MOLECULAR PHYSICS  
G. G. Shute  
18 lectures; 2nd term; 3 points; 2-hour terminal examination.  
Prerequisites: 223 or 243 Physics.  
A knowledge of 320 or 340 Quantum Mechanics is assumed.  
SYLLABUS The study of the structure and properties of atoms and  
molecules and of various atomic and molecular processes.

361 PHYSICS: MODERN OPTICS AND DIFFRACTION  
A. G. Klein  
18 lectures; 1st term; 3 points; 2-hour terminal examination.  
Prerequisites: 222 or 227 or 242 or 247 Physics; 230 or 250 Math­  
ematics.  
An introduction to the production and interpretation of diffraction patterns  
and images formed by the scattering of light, x-rays, electrons and neut­  
rions from regular and irregular macroscopic and atomic systems.

362 PHYSICS: ELECTRONICS  
A. G. Klein  
18 lectures; 1st term; 3 points.  
Prerequisite: 241 Physics.  
Response of linear systems to non-sinusoidal inputs. Laplace Transforms.  
Transients in linear systems. Description of circuits in the complex fre­  
cquency domain. Wide-band amplifiers, pulse amplifiers, tuned amplifiers,  
operational amplifiers and typical applications. Non linear circuits.  
Voltage comparators. Switching.  
ASSESSMENT One 2-hour terminal examination.
Faculty of Science

363 PHYSICS: ASTRONOMY
D. G. Sargood
12 lectures; 2nd term; 2 points.
ASSESSMENT 1½-hour terminal examination.

365 PHYSICS: ASTROPHYSICS
V. C. Officer
12 lectures; 3rd term; 2 points.
SYLLABUS Stellar structure of the sun; polytropes, nuclear energy generation, energy transfer, spectroscopy, solar wind, neutrinos and cosmic rays.
ASSESSMENT One 1½-hour terminal examination.

366 PHYSICS: DIGITAL SYSTEMS
12 lectures; 1st term; 2 points.
This is a course designed to lead to an understanding of the operation of computers and other digital systems at an introductory level, with a special emphasis on systems of interest to physicists.
SYLLABUS Number representation; codes. Boolean Algebra and combinatorial logic. Sequential logic. Functional blocks; Registers; Memory systems. Computer instructions and their implementation.
ASSESSMENT One 1½-hour terminal examination.

375 PHYSICS: PARTICLE PHYSICS
G. N. Taylor
18 lectures; 3rd term; 3 points; 2-hour terminal examination.
Prerequisite: Physics (223 or 243) and (222 or 242).
SYLLABUS An introduction to the physics of the "elementary" particles produced in high energy interactions—hadrons, leptons, photons—and to the interactions between them. A broad review of the whole field of high energy physics, the course will include: experimental methods of particle generation, detection, identification and dynamical analysis; phenomenology of the particle "zoo", interaction processes, symmetries, and conservation laws; theoretical models of fundamental processes—quantum electrodynamics, Feynman diagrams, leptonic and hadronic currents, quark models, unified field theory; a survey of the current world scene in particle physics.
393-398 PHYSICS: LABORATORY WORK

J. L. Rouse.

9-23 weeks; four mornings a week; all three terms; 8-20 points; examined continuously throughout course.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Period</th>
<th>Points</th>
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<tbody>
<tr>
<td>393</td>
<td>14 weeks</td>
<td>12</td>
</tr>
<tr>
<td>397</td>
<td>5 weeks</td>
<td>4</td>
</tr>
<tr>
<td>398</td>
<td>9 weeks</td>
<td>8</td>
</tr>
</tbody>
</table>

Unit 397 may be taken only in conjunction with 393.
Unit 398 may be taken alone or in conjunction with 393.

Laboratories available include: Astronomy, Atomic Physics, Diffraction, Electronics, Nuclear Physics, Particle Physics, Workshop Practice.

536 PHYSIOLOGY

DEPARTMENTAL SUGGESTED COURSE

100 Level Chemistry 101; Physics 100 level; Biology 101, together with one of the following: Mathematical Sciences 110 or 140; Psychology 101, History and Philosophy of Science 101 or 103.

200 Level Physiology 202; Biochemistry 201, 202; and, if possible, Histology 201; together with one of the following combinations: Microbiology 201, 202; Pharmacology 201 and Chemistry 221 or 201; Genetics 201, 202; Zoology 202, 205.

300 Level 18-32 points of Physiology; together with selections from the following: Biochemistry 301, 302, 303, 304, 305, 321, 323; Pathology 300 level; Pharmacology 301, 302, 304, 305; Zoology 301, 303, 304.

B.Sc.(HONS.) ADMISSION REQUIREMENTS

Admission is open to students qualifying for B.Sc. in Physiology or in related disciplines.

200 LEVEL

Enrolment priority will be given to students taking, or having completed Biochemistry 201 and 202 and/or Histology 201. Enrolment priority into 300 level units in Physiology (see 300 level entry) will be given to students who have completed Physiology 202 except under special circumstances as determined by the Chairman.

Students may not enrol for more than one 200-level Physiology unit.

Students should report to the department’s office by the second last week of the long vacation.

201 PHYSIOLOGY

48 hours lectures; 3 terms; 6 points.

Tutorials are not assessed but attendance is strongly recommended.

Prerequisites: Two of Chemistry, Physics and Biology at 100 level.
Faculty of Science

Exceptions will be considered by the Chairman, e.g., students completing Mathematical Science instead of Biology.

SYLLABUS As for Physiology 202 excluding the practical component.

ASSESSMENT As for Physiology 202 excluding practical and tutorial component.

202 PHYSIOLOGY

48 hours’ lectures; 72 hours’ laboratory work; 3 terms; 9 points.
Prerequisites: Two of Chemistry, Physics and Biology at 100 level. Exceptions (e.g. students completing mathematical sciences instead of biology) will be considered by the Chairman.
The aim of the unit is to introduce the investigation of body systems and their control at the cellular and systemic levels, with emphasis on quantitative aspects of Physiology studied as an experimental science.
It is intended to provide an adequate background for all third year Physiology units, and to stand alone as the physiological component for students with majors in other disciplines.

SYLLABUS The course provides an introduction to (a) cellular physiology, concerned with both those properties that characterize all living cells, and those that are unique to special cell types such as neurones and muscle fibres, (b) systemic physiology, in which the activity of different tissues and organs subserving the various coordinated functions of the human body (e.g. the cardio-vascular, respiratory and nervous systems) are considered. The emphasis is on the functions of the human body, although the foundations of this knowledge commonly depend on observation and experiment in other animals.
Laboratory experiments, tutorials and demonstrations are coordinated with the lecture course. Students must report to the Department of Physiology by the second last week of the long vacation and provide a full preference list from the four available practical class times. They should also collect a copy of the course handbook. Students absent from Melbourne should communicate the information by letter. Students who do not provide this preference list may only be offered the lecture-only course (201) because of quota restrictions. Students require a set of dissecting instruments, a white coat, a roll of recording paper obtainable from the Level 3 Prep. Room and a record book (No. 536) obtainable from the University Bookroom.

LABORATORY MANUAL. Students should obtain these from the Department of Physiology.

ASSESSMENT One 1-hour examination at the end of first term and one 2½-hour examination at the end of term 3. Practical class assessment will be made on written laboratory reports from each practical class. Reports should not exceed 6 pages; there is a maximum of 24 practical sessions in the year. Participation in 1-hour scheduled tutorials is required unless exemption is made by the Chairman. The weighting of the various components of the assessment procedure will be posted in the first week of term 1.

205 PHYSIOLOGY (OPTOMETRY)

48 lectures; 72 hours’ laboratory work; 3 terms; 9 points.

SYLLABUS As for Physiology 202.

ASSESSMENT As for Physiology 202.
300 LEVEL

Students who wish to study Physiology with 18 or more points at the 300-level, must have completed Physiology 202 unless exempted by the Chairman.

Students who have not studied Physiology at the 200-level, but who wish to take 300-level Physiology units pertinent to their major discipline, can be enrolled on approval by the Chairman. In particular, students who have completed Anatomy, Biochemistry, Physics, Psychology or Zoology at the 200-level, may be admitted to individual 300-level units. These students should consult with course advisers in the department during the third term of their second year.

311 PHYSIOLOGY: THE BRAIN, PERCEPTION AND BEHAVIOUR
Drs J. S. McKenzie and R. E. Kemm
26 lectures and seminars plus 5 tutorials; 1st term; 5 points.
Prerequisites: See general entry for 300 level units above.

The course will deal with neural mechanisms underlying certain aspects of perceptual and motor physiology in mammals, with relevance to man. Both lectures and group seminars will be used in order to introduce students to the critical examination of original papers selected to give an appreciation of contemporary knowledge and ideas. The combination of unit 311 and unit 322 is designed to provide a comprehensive training for students interested in the field of neuroscience.

SYLLABUS Elements of brain function: excitation and membrane ion channels; neuronal structure and function; modes of neuronal communication and response. Organization of the brain: significance of functional localization. Information processing in somatic sensory, visual, auditory, and chemical systems of perception, and the organizing role of synaptic junctions. Cortical control of voluntary movement; interdependence of sensory and motor function; chemical reception and appetitive behaviour. Speech, language, and brain laterality.

Methods for investigating brain function: microelectrode recording of single neurone activity for the analysis of neural mechanisms and for correlation with behaviour; investigations on brain slices and neurone cultures; uses and limitations of brain stimulation and lesions; tracing neural pathways by axonal transport of molecular markers; regional brain metabolic activity correlated with behavioural state.

ASSESSMENT Based on written assignments, seminar performance and a 2-hour examination at the end of the term.

The written assignments will consist of 12 to 15 one-page summaries of the lecture and seminar material. Seminar performance involves not more than two oral reports forming part of group discussion of lecture and seminar material.

Weightings of assessment components will be made known at commencement of unit.

313 PHYSIOLOGY: PHYSIOLOGICAL ASPECTS OF NUTRITION AND METABOLISM
Professor Day

A course of 12 lectures plus 6 tutorials/seminars; 1st term; 3 points.
Prerequisites: See general entry for 300 level units.
Faculty of Science

SYLLABUS Gastrointestinal physiology, digestion and absorption of food-stuffs, physiological principles of nutrition, exogenous and endogenous lipid transport and storage, hyperlipemias, metabolic aspects of atherosclerosis.

ASSESSMENT One 2-hour written examination.

314 PHYSIOLOGY: HAEMOPOIESIS AND CELL KINETICS
Dr N. Williams and Dr J. Radley (Cancer Research Institute)
A course of 16 lectures plus 25 hours practical work; 3rd term; 4 points.
Prerequisites: See general entry for 300 level units above.

SYLLABUS Measurement of cell cycle parameters. Theories and techniques in the development and differentiation of haemopoietic cells; erythropoiesis, granulopoiesis, macrophage formation and function, megakaryocytopoiesis, lymphopoiesis. Neoplastic cell populations and modes of action of cytotoxic drugs and irradiation. Practical classes include autoradiography, in vitro culture of cells, macrophage functions, colony assays for immature blood cells.

ASSESSMENT By 2 or 3 small assignments (3 pages each), an extended assignment (2,400 words) on a specific topic given during the course, and a report (3 or 4 pages) on a practical project.
Weightings of assessment components will be made known at commencement of unit.

315 PHYSIOLOGY: MAMMALIAN RENAL FUNCTION
Dr Harris
A course of 16 lectures; 4 tutorials; 18 hours practical; 1st term; 4 points.
Prerequisites: See general entry for 300 level units above.

SYLLABUS Renal morphology; Development of concepts of renal function; phylogeny of body fluid composition and excretory mechanisms; techniques for investigating renal function and their limitations; renal blood flow; the glomerulus and the juxta-glomerular apparatus; glomerular filtration; tubular epithelial transport; cell volume regulation; the production of concentrated and dilute urine; renin secretion; metabolic and endocrine functions of the kidney; control of individual nephron function; sodium, potassium and hydrogen balance; diuretics; renal failure; regulation of tissue perfusion and blood pressure.

ASSESSMENT An assignment (1,500 words) during the unit; one 2-hour written examination at the completion of same; one practical report.
Weightings of assessment components will be made known at commencement of the unit.

316 PHYSIOLOGY: CIRCULATORY AND RESPIRATORY PHYSIOLOGY (LECTURES ONLY)
Drs Bell, Chennells and Dusting
23 lectures; 4 tutorials; 2nd term; 4 points.
Prerequisites: See general entry for 300 level units.
Note: Students may not enrol for both 316 and 318.
318 PHYSIOLOGY: CIRCULATORY AND RESPIRATORY PHYSIOLOGY

Drs Bell, Chennells and Dusting

23 lectures; 4 tutorials; 18 hours practical; 2nd term; 5 points.

Prerequisites: See general entry for 300 level units.

SYLLABUS Lectures as for 536-316. Laboratory course will consist of three 6-hour sessions throughout term. Students cannot enrol for both 318 and 316.

ASSESSMENT One 3-hour written examination and three laboratory reports (1,000 words each) at end of unit.

Weightings of assessment components will be made known at commencement of the unit.

319 PHYSIOLOGY: ENDOCRINOLOGY AND REPRODUCTION

Dr Wintour-Coghlan

A course of 18 lectures plus 36 hours practical work; 3rd term; 5 points.

Prerequisites: See general entry for 300 level unit.

SYLLABUS Structure of hormones; methods of assessing endocrine status; concept of clearance; mechanisms of action of hormones; adrenal glomerulosa and aldosterone; adrenal cortex, cortisol and adrenal androgens; thyroid function; insulin, glucagon, growth hormone; parathyroid, calcitonin and calcium metabolism. Sex determination, ovarian and testicular development in the foetus, gonadal functions in foetal and prepubertal animals; male reproductive organs—morphological description, spermatogenesis, endocrine functions and control; breeding patterns and behaviour in non-primate mammals; endocrine control of oestrus cycles; breeding patterns and behaviour in primates—endocrine control of menstrual cycle; principles of contraception; fertilization, development of embryonic membranes; placentation in various species; hormonal patterns in pregnancy; possible mechanisms of parturition; hormonal control of lactation; the reproductive physiology has a strong comparative basis.

Laboratory classes are held in both the Department of Physiology and the Howard Florey Institute of Experimental Physiology and Medicine. These classes include testing of thyroid function, semen analysis, uterine contractility studies, the effects of angiotensin, steroid hormones, antidiuretic hormone on blood pressure, water and electrolyte balance in

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concentrated sheep, and various analytical procedures used for sequencing, synthesizing and measuring a variety of peptide and steroid hormones. ASSESSMENT (a) One 2-hour paper in November, (b) Reports on the practical sessions and a short written assignment. The various weighting of the individual components will be announced at the commencement of the course.

320 PHYSIOLOGY: PROJECT IN PHYSIOLOGY
A project commitment of 72 hours; at a time to be arranged.
4 points.
Prerequisites: Can only be taken if enrolled for 18 or more points in Physiology (see general entry for 300 level) unless exempted by the Chairman.
SYLLABUS In this unit the student participates actively in an investigation of some specific physiological problem. The work will be supervised by a staff member and the student is expected to write a report on this work which will be submitted in November. Assessment will be based on the Supervisor's report on the student and on the project report.
The subject for each project will be worked out following discussion with the Chairman, and with the potential Supervisor.

321 PHYSIOLOGY: WORK, EXERCISE AND SPORTS SCIENCE
Dr M. H. D. Chennells, Mr E. R. Sandstrom
16 lectures; 48 hours practical work; 3rd term; 5 points.
Prerequisite: See general entry for 300 level units. Can only be taken together with 316 or 318.
Laboratory work will involve a range of equipment used to monitor the responses of the muscular, cardiovascular and respiratory systems to physical activity. Measurement of oxygen consumption, heart rate, anaerobic threshold, aerobic and anaerobic power output, face-velocity relationship, fatigue, and the use of electromyography to investigate muscular involvement.
ASSESSMENT One 2-hour written examination and practical report. Weighting will be announced at the commencement of the course.

322 PHYSIOLOGY: BRAIN IN ACTION — MOVEMENT, MOTIVATION AND MEMORY
Drs J. S. McKenzie and R. E. Kemm
12 lectures and seminars; 36 hours' practical work; 2nd term; 4 points.
Intending students are advised to see the conveners before the beginning of term, for advice on textbooks and preliminary reading.

Prerequisites: See general entry for 300 level units.

The course deals with the cerebral mechanisms sustaining programmes of movement, goal-directed actions, and higher nervous functions such as learning, memory and cognition. The perspectives of enquiry broadly embrace neurophysiology, brain structure, molecular communication, neurochemistry and psychophysiology of behaviour. The combination of units 322 and 311 is designed to provide a comprehensive training for students interested in the field of neuroscience.

The laboratory segment includes demonstrations as well as participation by students in the use of selected experimental methods of brain research.

SYLLABUS Topics for detailed consideration in lectures will be drawn from the following areas:

The organization of posture and movement by brain stem, cerebellum, and forebrain. Structure-function relations and synaptic neurochemistry of the basal ganglia. Initiation of voluntary movement, and disorders of movement and behaviour resulting from dysfunction of the cerebral cortex, basal ganglia and related structures.


LABORATORY COURSE Demonstrations and experiments selected from:

Reflexes in man; experimental approaches to deep brain structures using stereotaxic brain atlases and apparatus; electrical stimulation and single neurone recording in the central nervous system; histological techniques in brain research; simple behavioural techniques. Neural activity of brain structures in experimental motor disorders. Structure-function correlations in brains of man and laboratory animals.

ASSESSMENT Based on one 2-hour written paper at the end of term, and assignments completed during the course. The assignments will consist of: one essay of not more than 2,000 words based on lecture topics; and laboratory reports. Weightings of assessment components announced at the start of the course.

323 PHYSIOLOGY: BRAIN IN ACTION—MOVEMENT, MOTIVATION AND MEMORY (LECTURES ONLY)

Drs J. S. McKenzie and R. E. Kemm

12 hours’ lectures and lecture-seminars; 2nd term; 2 points.

Prerequisites: See general entry for 300 level units.

SYLLABUS Lectures as for 536-322.

NO laboratory course.

ASSESSMENT As for 322 without practical component.
Faculty of Science

171 PSYCHOLOGY

DEPARTMENTAL SUGGESTED COURSE

100 Level Psychology 101 together with units from: Biology 100 level, History and Philosophy of Science, Mathematical Sciences.

200 Level Psychology 201 together with units from Computer Science; Mathematics; Genetics; Physiology; Zoology.

300 Level Psychology 301, and 302 or, if not proceeding to BSc (Hons), units from Computer Science; Mathematics; Statistics; Genetics; Physiology; Zoology. The department encourages students to undertake a broad program of study.

Psychology is concerned with the study of human behaviour and experience. Those wishing to make Psychology their career in either academic or professional (applied) fields are advised that a pure Honours degree is the usual minimum qualification. Membership of the Australian Psychological Society requires four years of academic training in psychology and two years of supervised postgraduate experience. Students should consult the Department of Psychology for further information.

B.Sc. (HONS.) ADMISSION REQUIREMENTS

To be admitted to candidature for the degree of Bachelor of Science with honours in 1990 and following years a candidate:
(a) should have completed Psychology 301 at an A or B grade level. Because of constraints on supervisory resources, a quota may be applied for entry to fourth year honours. In the event that there are more applicants than places, and that these applicants cannot be distinguished on the basis of their Psychology 301 grades, performance in Psychology 101 and Psychology 201 may be taken into account, together with grades in any other 300 level courses.
(b) must have qualified for the ordinary degree of B.Sc.

To be admitted to candidature for the degree with honours in 1988 or 1989, a candidate should normally:
(a) have completed Psychology 101, 201, and 202 with honours, and obtained at least a high B in at least one of these subjects.
(b) obtained at least a B in 301 and 302.
(c) achieved at least passes in all quantitative methods and research methodology sections.
(d) have qualified for a B.Sc.

100 LEVEL

101 PSYCHOLOGY

Convenor: Dr N. E. McMurray

3 lectures per week, 2 hours per week of laboratory classes and 1 hour per week of laboratory assignments throughout the year; 8 points.

SYLLABUS The topics covered will include the biological foundations of behaviour, human development, cognition, social psychology, quantitative methods, and history and method in psychology. Students intending to major in Psychology should consider including one or more related subjects in their first year programme. Examples of such subjects are Biology, Economics, Mathematical Sciences, and History and Philosophy of Science.
ASSESSMENT Mid-year and end-of-year examinations will be held. The total time spent in examinations across the year will not exceed four hours. A laboratory logbook and not more than two laboratory reports with neither report exceeding 3,000 words in length must be presented, and a satisfactory standard reached in both in order to be eligible for a pass in the subject. In addition each student must participate in 5 hours of experiments. Exemption on medical or ethical grounds may be granted by the convenor, but in such cases alternative work will be prescribed. Assessment details, including information about examinations, will be published on the departmental notice-board at the beginning of first term and in the First Year Manual which will be available from the Department.

FURTHER COURSE DETAILS including information about recommended reading, will be available in the FIRST YEAR MANUAL which is available from the Department of Psychology at the beginning of term 1, and will also be published on the Departmental notice-board.

**200 LEVEL**

**201 PSYCHOLOGY**

Convenor: Dr D. Rosenthal

3 lectures per week and one 3-hour laboratory session per week throughout the year; 12 points.

Prerequisite: Psychology 101 or its equivalent.

SYLLABUS Students will take 6 sections (each comprising 12 lectures) from the list below. Quantitative Methods is compulsory for all students. In selecting the remaining five sections students will need to ensure that at least one section is selected from each of the four core areas (listed as 2-5 below). Students will enrol at normal time for Psychology 201, and their selection of sections will take place at the beginning of the week preceding the beginning of Term 1 classes.

ASSESSMENT (a) examinations in the middle and at the end of each year: No more than six and one half hours in total will be spent in examinations. In order to achieve a pass in the subject at least a pass must be recorded in every section taken. (b) Four short laboratory reports of no more than 2,000 words each. A satisfactory standard in all practical work reports must be achieved in order to gain at least a pass in the subject. Further details including details of practical work assessment requirements will be published on the Departmental notice-board at the beginning of Term 1 and in the Second Year Manual which will be available from the Department.

1. QUANTITATIVE METHODS:
An examination of some basic areas of data analysis including the analysis of categorical data, analysis of variance, correlation and regression.

2. COGNITION:
(a) Language and Cognition
A consideration of selected aspects of language and cognition in their biological and social context. Topics may include: individual differences in language ability; reading; bilingualism; language disorders; the relation of language and thinking; decision making and problem solving.
(b) Information processing
Faculty of Science

A study of the complexities of skilled behaviour, and human abilities to sense, perceive, store and transmit information; broader applications of information processing principles.

3. BIOLOGICAL BASES:
   (a) *Brain mechanisms in behaviour*
   An examination of the link between brain activity and everyday behaviour. Topics may include brain regulation of eating (including eating disorders), drinking, temperature, sleep and arousal.
   (b) *Sensation and perception*
   An introduction to the operation of the sensory system with a particular emphasis on vision. The course will examine the structure of the system, its development, the ways in which it relates a person to his or her environment, and some of its disorders.

4. DEVELOPMENT:
   (a) *Social development*
   Approaches to the socialization process and its outcomes. Topics may include moral development, aggression and sex typing.
   (b) *Development and its context*
   An analysis of various aspects of, and issues in development over the life span from an ecological perspective.

5. SOCIAL PSYCHOLOGY:
   (a) *Intergroup relations and group processes*
   Social psychological explanations of group behaviour which may include: interaction, communication and influence within groups; group cohesiveness; intergroup relations; prejudice, stereotyping and discrimination; identity functions of language; crowds, riots and disturbances.
   (b) *Applications of social psychology*
   The application of principles of social psychology to selected issues in industrial, consumer and organizational psychology, cross-cultural psychology, personality and social processes.

300 LEVEL

301 PSYCHOLOGY (PASS AND HONOURS)

Convenor: Dr W. K. Bartlett

3 hours of lectures and 6 hours of laboratory tutorial and project work per week; 20 points.

Prerequisite: Psychology 201, or its equivalent.

SYLLABUS There will be six sections each comprising 12 lectures. *Introduction to Psychological Measurement* will be compulsory for all students. In addition, students will choose five sections from the list below, with at least two sections being selected from each of the two groups. Not every section will be offered in any one year. Sections offered will depend on availability of teaching staff. Details will be announced in November of the preceding year. Students will enrol at the normal times in Psychology 301, and their selection of sections will take place at the beginning of the week preceding the beginning of Term 1 classes.

**COMPULSORY SECTION**

*Introduction to Psychological Measurement*
GROUP 1 — OPTIONAL SECTIONS

*Psychology of Adjustment*

*Psychosocial Interaction*
Process and analytic models of individual and group behaviour in social contexts. Topics from the history of psychology.

*Topics in Life-Span Psychology*
Issues in studying changes over the life span. Topics may include aging, neo-natal development, cognitive and emotional development, adolescence and family dynamics.

*Topics in Applied Psychology*
The application of theoretical principles of social psychology to selected problems in applied psychology.

*Personality Integration*
Selected personality theories and issues in personality psychology. Comments on the concepts and assumptions of the field and relations with neighbouring disciplines.

GROUP 2 — OPTIONAL SECTIONS

*Psychopathology*
Issues from the following: the concept of psychopathology and its socio-legal implications, historical perspective, biological and constitutional factors, major categories of mental illness and symptom formation and treatment.

*Methodology in Psychosocial Research*
Conceptual issues; measurement and model building in contemporary psychosocial research.

*Topics in Neuropsychology*
Issues in neuropsychology, including recent theoretical and empirical developments in our understanding of brain mechanisms and applications of these to clinical problems.

*Introduction to Sports Psychology*
The relation of psychological theory and findings to sports performance.

*Topics in Cognitive Science*
Topics may include thinking, problem solving in individual and social contexts, including the development of complex cognitive processes, perception, language processes, and artificial intelligence.

ASSESSMENT For each section, the assessment will consist of either an examination not exceeding 2 hours or a laboratory report or essay not exceeding 3,000 words or an examination not exceeding 1 hour and a laboratory report or essay not exceeding 2,000 words. In order to achieve a pass in the subject, at least a pass must be recorded in every section taken. Students will be notified at the beginning of first term of the pattern of assessment which will be followed in that year. A satisfactory standard in all practical work reports must be achieved in order to gain at least a pass in the subject.
Faculty of Science

Further details including details of practical work assessment requirements will be published on the departmental notice-board at the beginning of first term and in the Third Year Manual available from the Department.

302 PSYCHOLOGY (HONOURS)

Convenor: Dr W. K. Bartlett
Corequisite: Psychology 301.

To be accepted into the Psychology (Honours) course students must have completed each of 101 Psychology, 201 Psychology and 202 Psychology (Honours) at a good honours level and have received a minimum of three B grades, at least one of which is a high B. The Quantitative Methods sections of both 201 Psychology and 202 Psychology (Honours) must have been completed with at least a pass (D) level.

SYLLABUS The course consists of six compulsory sections. Each of the six sections consists of not less than 24 and not more than 28 hours of lecture/discussions and not more than 12 hours of laboratory and practical work; 21 points.

The Sections are:

QUANTITATIVE METHODS C An introduction to multivariate analysis in psychological research; the use of the computer, with particular reference to applications of SPSS-X and BMDP packages.


THEORY IN PSYCHOLOGY A Principal psychological concepts in their historical context. The development of psychology as a systematic enquiry. An analytical examination of some major theoretical systems.

RESEARCH METHODOLOGY SEMINAR Discussion of research methodologies and procedures in psychology; selected problems in data collection and analysis using the computer; the conduct and writing up of several brief research projects; discussion of special problems associated with choosing and carrying out a final honours project.

The SPSS\textsuperscript{x} system will be taught using interactive computer terminals. No previous knowledge of computing will be assumed, however students should be familiar with the "QWERTY" typewriter keyboard. Students who cannot type are strongly recommended to complete a basic keyboarding skills course such as those offered by the CAE or various TAFE colleges before the commencement of classes.

PROFESSIONAL SKILLS Includes consideration of such topics as interviewing, assessment, and ethical issues in professional psychology.

PERCEPTION A Structure and function of perceptual subsystems. In particular, vision and hearing with emphasis on human pattern perception processes.

ASSESSMENT For all sections listed above, the assessment will consist of either a final examination of not more than 2 hours at the end of the year or the conclusion of the unit or a practical work report or an essay not exceeding 5,000 words in length or any combination of two
of these. Further details will be published on the Departmental notice board at the beginning of first term regarding which form of assessment will be used with each unit, and the dates of any unit examination.

Weightings of assessment components will be made known at commencement of the unit.

For those units in which there is a practical work component, a satisfactory standard will need to be achieved to obtain at least a pass in the unit.

Achievement of at least a Pass grade (D) in each of the Research Methodology Seminar and the Quantitative Methods C sections is a prerequisite for entry into the fourth year programme.

FURTHER DETAILS References in addition to prescribed reading and details of the syllabus for each section will be published in the department’s *Third Year Honours Manual*, which will be available in the department in February.

**619 STATISTICS**

**DEPARTMENTAL SUGGESTED COURSE**

100 Level  
(a) *Ordinary stream* (for students not wishing to proceed to B.Sc.(Hons.)); Mathematical Sciences 110, 120 and 130, together with one subject from Science, Arts or Economics such as Economics A; Chemistry 101; Physics 140; Psychology 101.

(b) *Advanced Stream*: Mathematical Sciences 111, 120 and 130; together with one subject from Science, Arts or Economics such as Economics A; Chemistry 101; Physics 120; Psychology 101.

200 Level  
(a) *Ordinary stream*: Statistics 210; Mathematics 250; together with units from Computer Science 214, 250; Mathematics 260; Statistics 230; or other units following on from 100 level studies.

(b) *Advanced stream*: Statistics 210; Mathematics 210, 220; together with units from Computer Science 214, 250; Mathematics 230, 260; Statistics 230.

300 Level  
(a) *Ordinary stream*: Statistics (301, 311, 313, 314, 315, 316, 317) or (313, 314, 315, 316, 317, 321, 361) or (311, 313, 314, 315, 316, 317) or other combination of 300 level units; together with units following on from 200 level studies.

(b) *Advanced stream*: Statistics 301, 302, 311, 313, 314, 321, 331; together with Mathematics 310 and either 320 or 330 or 360.

Some Statistics units require students to spend time on practical assignments in addition to lectures, practice classes and tutorials. However, the total time involved for each such unit is about the same as that for any other science unit of the same level and point score.
Faculty of Science

Students taking units for which the practical work or examinations include numerical calculations shall be required to provide themselves with electronic calculators of an approved type.

Students intending to take major studies in Statistics or to proceed to B.Sc. (Hons.) in Mathematical Statistics should consult the Department about appropriate units in Mathematics to be included in their course.

B.Sc.(HONS.) ADMISSION REQUIREMENTS

Students will be permitted to enter fourth year if they are awarded faculty honours and have at least a C average in 20 points of 300-level Statistics units. In addition students are strongly advised to take some 300 level Mathematics units as part of their third year.

Students who do not meet the above requirements but who achieve very good results in other areas may be considered for entry to fourth year on the recommendation of the Chairman of the Department of Statistics.

100 LEVEL

Students should refer to Mathematical Sciences units 120, 130, 140 and 150.

200 LEVEL

The second year unit, 210 is intended to give a basic understanding of mathematical statistics and a broad introduction to the more specialized units at 300 level.

Students taking this course should have studied or be studying concurrently Mathematics at 200 level. This course should be taken by all students intending to major in Statistics.

The unit 220 is intended for students majoring in fields such as Psychology, Economics, Education or any of the biological sciences. This course, which requires a slightly lower mathematical level than Statistics 210, is intended to give a basic understanding of the methods of applied statistics.

Unit 230 is intended for students with an interest in Operations Research. Students intending to study Operations Research should take 230 in addition to either 210 or 220 together with Mathematics 260 and other appropriate units from Mathematics and Computer Science.

Unit 250, which consists of the probability component of 210, is intended for students who have taken Statistics 220 and who would like to proceed to some of the more theoretical 300 level Statistics units, in particular 301 and 302.

210 PROBABILITY AND STATISTICS

72 lectures and 72 tutorial/practice class hours; all year; 12 points. Prerequisite: Mathematical Sciences 120.

Statistics

(ii) Statistical Inference: Estimation of parameters of probability distributions: desirable properties of estimators — consistency, unbiasedness and efficiency. Methods of estimation. Minimum variance bound for unbiased estimators. Properties of maximum likelihood estimators. Confidence intervals for parameters. Testing of hypotheses concerning parameters; critical region, size and power of tests. Likelihood ratio tests. Particular reference is made to the case of sampling from a normal distribution for which the t, χ² and F distributions are required. Details of some commonly occurring statistical tests including contingency tables, goodness of fit tests, and some distribution free tests.

(iii) Statistical Analysis: Linear regression and the method of least squares. Correlation. The theory and applications of the general linear model — with particular reference to regression problems including multiple and polynomial regression, the analysis of one-way and two-way classifications, and the analysis of standard statistical experiments. Basic principles of experimental design including randomization and formation of blocks. The study of some standard experimental designs, including randomized block, balanced incomplete block and 2ᵏ factorial experiments.

ASSESSMENT A total of not more than 6 hours of written examination; assignments (a maximum of 100 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

220 STATISTICAL METHODS

36 lectures; 36 tutorials/practice classes; 6 points.
Prerequisites: Mathematical Sciences 120 or 140 or 150.
Conditions: Students may not gain credit for 220 and 210.
ASSESSMENT A total of not more than 4 hours of written examination; assignments (a maximum of 75 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

230 OPERATIONS RESEARCH

36 lectures; 36 tutorials/practice classes; 6 points.
Prerequisites (or Corequisites): Statistics 210 or 220.
ASSESSMENT A total of not more than 4 hours of written examinations; assignments (a maximum of 75 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.
250 PROBABILITY
24 lectures; 24 tutorials/practice classes; 4 points.
Prerequisites: Statistics 220.
Conditions: Students may not gain credit for 250 and 210. This unit may not be taken concurrently with 220.
SYLLABUS As per 210 (i) Probability.
ASSESSMENT No more than 2 hours of written examination; assignments (35 pages maximum) may be assessed.
Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL
The Statistics units in third year develop the material of Statistics 200 level and introduce new probabilistic and statistical areas. Students may take any selection of units, subject to prerequisites. There are streams in Probability and Stochastic processes (301, 302, 321), in inference (311, 313, 314, 315, 316) and in Operations Research (317, 321, 361). Students majoring in Statistics should take at least five Statistics 300 level units. Some units from Mathematics, Computer Science or other Science disciplines should also be taken. Other students may take individual units.

Students intending to study fourth year honours in Statistics should take at least five of the 4-point Statistics 300-level units including 301, 302, 311 and 313. In addition students are strongly advised to take Statistics 331 and some 300-level Mathematics units, preferably at the advanced level. Mathematics 310 is recommended.

301 PROBABILITY A
16 lectures; 24 tutorial/practice class hours; 4 points.
2nd term.
Prerequisites: Statistics 210 or Statistics 220 and 250; Mathematics 250 (or 210) recommended.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed.
Weightings of assessment components will be made known at commencement of the unit.

302 PROBABILITY B
16 lectures, 24 tutorial/practice class hours; 3rd term; 4 points.
Prerequisites: Statistics 301.
SYLLABUS A selection of topics from stochastic process theory. Further convergence and limit theorems.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed.
Weightings of assessment components will be made known at commencement of the unit.
311 STATISTICAL INFERENCE
16 lectures and 24 tutorial/practice class hours; 4 points.
Prerequisites: Statistics 210 or 220; Mathematics 250 (or 210) recommended.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

313 LINEAR MODELS
16 lectures and 24 tutorial/practice class hours; 4 points.
Prerequisites: Statistics 210 or 220. Statistics 311 recommended.
SYLLABUS General least squares theory of estimation and hypothesis testing. Application to one and two-way classifications, analysis of covariance, multiple regression, polynomial regression, non-linear regression, discriminant analysis, use of statistical computer packages.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

314 EXPERIMENTAL DESIGN AND DATA ANALYSIS
16 lectures and 24 tutorial/practical class hours; 4 points.
Prerequisite: Statistics 313.
SYLLABUS Design and analysis of experiments, particularly factorial and quasi-factorial designs; confounding, fractional replication, orthogonal contrasts. Analysis of experimental data using examples from practical situations.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

315 DISTRIBUTION-FREE METHODS
16 lectures and 24 tutorial/practice class hours; 4 points.
3rd term.
Prerequisite: Statistics 210 or 220. Statistics 311 recommended.
SYLLABUS Estimation, including U-statistics, estimation of quantiles, tolerance intervals. Hypothesis testing, including permutation and rank tests for the one-, two- and k-sample problems; tests of independence. Optimum ranks tests and comparisons with parametric tests. Kolmogorov-Smirnov statistics.
Faculty of Science

ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

316 SAMPLE SURVEYS
16 lectures and 24 tutorial/practice class hours; 4 points.
1st term.
Prerequisite: Statistics 210 or 220.
SYLLABUS Simple random sampling; stratified random sampling; ratio and regression estimators; cluster sampling; sampling with probability proportional to size; some other sampling techniques.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

317 TIME SERIES ANALYSIS
16 lectures and 24 tutorial/practice class hours; 4 points.
3rd term.
Prerequisite: Statistics 210 or 220; 313 recommended.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

321 STOCHASTIC PROCESSES
16 lectures and 24 tutorial/practice class hours; 1st term; 4 points.
Prerequisite: Statistics 210 or 230.
ASSESSMENT One 2-hour written examination; assignments (up to a maximum of 40 pages) may be assessed. Weightings of assessment components will be made known at commencement of the unit.

331 STATISTICS READING PROJECT
The study of a special topic and presentation of a written report; 36 hours; 2 points.
Prerequisite: Statistics 301 or 311.
SYLLABUS An approved topic in Statistics not covered in any of the student’s other units.
361 OPERATIONS RESEARCH, MODELLING, ANALYSIS AND SIMULATION

16 lectures and 24 tutorial/practice class hours; 4 points.
Prerequisite: Statistics 321. Statistics 230 strongly recommended.
ASSESSMENT One 2-hour written examination. Assignments (40 pages maximum) may be assessed.
Weightings of assessment components will be made known at commencement of the unit.

451 SURVEYING

200 LEVEL

Students can receive credit for only one of 210, 211 or 312.

210 SURVEYING PART A

52 lectures, 26 hours of tutorials and practice classes and 52 hours of practical work; 10 points.
The course is in the main a study of the theory, practice, instrumentation and computations associated with plane surveying. An introduction to photogrammetry is also given.
Science students will be required to do some preliminary reading in lieu of Introduction to Surveying.
SYLLABUS
Angle Measurement: Use of theodolite, its construction and adjustment, angle measurement procedures; use of magnetic compass and sextant, precision of angle measurement. Use of electromagnetic distance measuring equipment.
Traversing: Compass and theodolite traverses, field procedures and office calculations; closure calculations, simple adjustments, missing data problems; precision of location by traversing.
Differential Levelling: Factors influencing precision, adjustment of instruments, procedures for precise levelling, precision of level traverses, adjustments of traverses.
Tacheometric Methods Instruments and precision.
Barometric Heighting: Instruments, procedures, precision.
Control Surveys: Trigonometric levelling and resection.
Area and volume calculations: Curve layout; contouring; cut and fill problems.
Photogrammetry: Introduction to cameras and photography; the geometry of single aerial photographs, height and tilt displacements; elementary stereoscopic measurements and photointerpretation, review of photogrammetric mapping in Australia.
PRACTICAL WORK The equivalent of three hours per week devoted to practice classes, field and office work and excursions.

ASSESSMENT One 3-hour paper and up to three 1-hour tests during the year. There will be no formal practical examination, the assignments performed during the year will be assessed as part of the examination.

211 SURVEYING (FORESTRY COURSE)
20 hours' lectures; 20 hours' practical work; 3 points.
The course introduces the concepts of plane surveying which would enable the practicing forestry science graduate to carry out measurements most applicable to his field of work.
This unit is normally given at the Forestry School, Creswick. The department of Surveying should be consulted as to location and timetable.
SYLLABUS Control and detail surveys; the level, theodolite and electromagnetic distance meters; traversing, tacheometry. Differential levelling, measurement of elevations, contours. Survey computations, areas, volumes. Applications of photogrammetry.
PRACTICAL WORK Field exercises in the use of surveying instruments. Surveying projects including plotting and plan drawing. Office computations in connection with control surveys, traverses, areas and volumes.
ASSESSMENT One 2-hour examination (which may be held at the end of the course) for pass only. Practical work and assignments performed during the course will be included in the assessment.

213 SURVEYING (ENGINEERING COURSE)
A course of 26 hours lectures, 10 hours tutorials and practice classes and 16 hours practical work. Part of the lecture and practical program may be given as a one week field course held during the non-instruction period at a location other than the University. 4 points.
The subject provides an introduction to the principles and practice of surveying with particular emphasis on engineering applications.
SYLLABUS The construction, geometrical requirements and use of surveying instruments. Methods of measurement. Recording and reduction of field data. Engineering surveying including specifications, measurement of earthworks quantities and setting out. Introduction to specialist branches of surveying including geodetic, topographic and cadastral surveying. Photogrammetry and its engineering applications.
PRACTICAL WORK A total of 26 hours of tutorials, field demonstrations and practical work.
ASSESSMENT One 2-hour examination paper. The examination may be held at the conclusion of the course. Assignments and practical work will be included in the assessment.

300 LEVEL
301 SURVEYING 2
78 lectures; 52 hours of tutorials and practice classes; 78 hours of practical work; 20 points.
This course has four main areas of study. Engineering Surveying—an extension of plane surveying techniques into engineering and mining applications; Astronomy—observations for survey control in latitude,
longitude and azimuth; An introduction to Geodesy and Map projections; Least Squares adjustment of survey measurements. Theory and application of E.D.M.

SYLLABUS Engineering Surveying: The planning and execution of control surveys. The measurement of deformations. Surveys for road, railways and water supply. Terminology, equipment, procedures and computations in mine surveying.

Astronomy: Spherical Trigonometry, astronomic phenomena, observations for latitude, longitude and azimuth. Effect and compensation of errors in observations and reductions.

Geodesy: Convergence of meridians. Setting out parallels of latitude; geodetic levelling. Reduction of E.D.M. lines to the spheroid. Calculations of geographical coordinates from azimuth and distance on spheroid. Calculation of azimuth and distance from geographical co-ordinates.


Map Projections: Theory and application of selected map projections for a spherical earth.

PRACTICAL WORK Total of 78 hours of field work, practice classes and excursions.

ASSESSMENT Two 3-hour papers for pass and honours and up to three 1-hour tests during the year. There will be no formal practical examination; the practical work performed during the year will be assessed as part of the examination.

302 PHOTOGRAMMETRY 1

and

402 PHOTOGRAMMETRY 2

For details of these subjects, refer to the Faculty of Engineering Handbook.

654 ZOOLOGY

DEPARTMENTAL SUGGESTED COURSE

100 Level Biology 101 or 102 and 103; Chemistry 101, together with units from Mathematical Sciences 100-level; Physics 100 level; Geography; Geology; Psychology etc.

200 Level Zoology 201, 202, 203, 204, 205; Genetics 201 together with units from: Anatomy; Botany; Biochemistry; Chemistry Category B course; Genetics 202; Geography; Geology; Marine Science 201, 202, 204; Microbiology; Physiology; Psychology 201 etc.

300 Level Zoology 301, 302, 303, 304 (and 305 for selected students) together with units from other Science disciplines.

See also Marine Science section.
Faculty of Science

B.Sc.(HONS.) ADMISSION REQUIREMENTS

Candidates are expected to have completed 24 points of 300-level Zoology, or an equivalent level of studies.

200 LEVEL

Students wishing to major in Zoology must enrol for Zoology 201, 202, 203 and 204; Zoology 205 and 201 General Genetics are recommended.

201 ZOOLOGY: INVERTEBRATE ZOOLOGY

Drs Macmillan and Watson

22 lectures; 45 hours of formal practical work. In addition students are required to attend excursions and to spend up to 2 hours per week on demonstration material; 6 points; 1st term.
Prerequisites: 101 Biology, or 102 and 103 Biology.

SYLLABUS The characteristics of all major and many minor invertebrate groups are studied. Each group is used to illustrate specific structural, physiological, behavioural and evolutionary responses to common environmental and biological demands.

ASSESSMENT One 2-hour paper; one 2-hour practical paper in May. Essays and excursion reports may also be used in the assessment. Weightings of assessment components will be made known at commencement of the unit.

202 ZOOLOGY: VERTEBRATE ZOOLOGY

Drs Rogers and McLean

20 lectures; 42 hours of formal laboratory practical work; up to one hour per week on demonstration material; up to 6 hours of excursion; 1st and 2nd terms; 5 points.
Prerequisites: 101 Biology, or 102 and 103 Biology.

SYLLABUS The structure and functional organization of selected vertebrates considered in an evolutionary and taxonomic framework. The main emphasis will be placed on segmental patterns and the distinctive aspects of somatic and visceral regions (principal organ systems).

ASSESSMENT One 2-hour written examination in August; one 2-hour practical examination in August. Weightings of assessment components made known at commencement of unit.

203 ZOOLOGY: ZOOPHYSIOLOGY

Professor Campbell and Dr Satchell

15 lectures; 30 hours practical; 2nd and 3rd terms; 3 points.
Prerequisites: Biology 101 or 102 and 103; Chemistry 101.

SYLLABUS The physiological basis of animal behaviour, with emphasis on the cellular physiology of excitability and contractility.
ASSESSMENT One 2-hour written paper in November. A maximum of 10 reports on practical work (up to 6 pages each) will be included in the assessment. One 2-hour practical examination in November if these reports are below standard. Weightings of assessment components will be made known at commencement of the unit.

204 ZOOLOGY: ECOLOGY

Drs Day and Littlejohn

A course of 15 lectures, and 30 hours practical work including excursions; 3rd term; 3 points.

Prerequisite: 201 Zoology.

SYLLABUS Experimental approach to ecology, including the effects of the physical environment and biotic interactions. Population ecology — characteristics and dynamics of populations. Structure and organisation of communities. The nature of ecosystems. Both marine and terrestrial examples will be considered.

ASSESSMENT One 2-hour written paper in November. Reports on practical work and/or excursions will be marked and included in the assessment of the student.

Weightings of assessment components will be made known at commencement of the unit.

205 ZOOLOGY: THE BIOLOGY OF ANIMAL ADAPTATION

Drs Martin and Young

24 lectures; three terms; 3 points.

Prerequisites: 101 Biology, or 102 and 103 Biology.

SYLLABUS This course is centred on the concept of evolutionary adaptation, and is developed around the general themes: natural selection and adaptation; ways of animal life; adaptive biology of animals. The course complements other Zoology 200 units; Zoology 300 units assume a knowledge of the material in the course.

ASSESSMENT One 2-hour written paper in November.

Weightings of assessment components will be made known at commencement of the unit.

300 LEVEL

301 ZOOLOGY: ANIMAL BEHAVIOUR

Drs Martin, Young and Macmillan

24 lectures; 72 hours practical work; 3rd term; 8 points.

Prerequisites: Zoology 201 and 203.

SYLLABUS The scientific approach to animal behaviour. The mechanisms of behaviour analysed in terms of motor, sensory and central nervous systems. Social behaviour, with emphasis on its evolution and adaptive significance.
Faculty of Science

ASSESSMENT One 3-hour written examination in November; essays and practical assignments may be prescribed and marked and included in the assessment.
Weightings of assessment components will be made known at commencement of the unit.

302 ZOOLOGY: ZOOPHYSIOLOGY
Dr Else and Professor Campbell
24 lectures; 72 hours practical work; 2nd term; 8 points.
Prerequisite: Either 203 Zoology or 201 Physiology.

SYLLABUS A study of aspects of the control of physiological processes in animals. Emphasis will be placed on physiological adaptations of animals to diverse environments. The course will include accounts of the endocrine and neural control of such processes as salt and water balance, respiration and circulation.

ASSESSMENT One 3-hour written examination in August. Essays and practical assignments may be prescribed, and marked and included in the assessment. An 8-hour practical examination if unsatisfactory performance in practical classes.
Weightings of assessment components will be made known at commencement of the unit.

303 ZOOLOGY: MARINE ECOLOGY
Drs Watson, Keough and Day
24 lectures; one essay; 72 hours practical work including excursions; 1st term; 8 points.
Prerequisites: 201 and 204 Zoology.

SYLLABUS A synthesis of ecological principles and concepts, with emphasis on the marine biota. Topics will include: population dynamics and demography; life history patterns; dynamics of interactions between species; structure and organisation of communities; ecological energetics; management and exploitation of populations.

ASSESSMENT One 3-hour written paper in May. Students will also be assessed on the essay, and on reports of practical work and excursions. Weightings of assessment components will be made known at commencement of the unit.

304 ZOOLOGY: EVOLUTION
Drs Littlejohn, Rogers and Watson
24 lectures; 1st, 2nd and 3rd terms; 4 points.
Prerequisites: 101 Biology, or 102 and 103 Biology.

SYLLABUS A consideration of evolutionary theory and processes through a treatment of topics such as: natural selection and adaptation; species
Zoology

concepts and speciation; co-evolution; origin and evolution of the Australian fauna; the history of evolutionary thought.

ASSESSMENT One 3-hour written paper in November. An essay may be prescribed and included in assessment. Weightings of assessment components will be made known at commencement of the unit.

305 ZOOLOGY: RESEARCH PROJECT

All academic staff in the Department of Zoology; or suitably qualified members of affiliated institutions in association with Zoology staff.

72 hours practical work; 1st, 2nd and 3rd terms; 4 points.

Prerequisites: 201, 202, 203 and 204 Zoology.

SYLLABUS An original investigation of an approved topic in Zoology through observation and/or experimentation and/or a critical review of published works.

ASSESSMENT Assessment of a written report describing the topic of research.

Weightings of assessment components will be made known at commencement of the unit.
CHAPTER 6

BACHELOR OF SCIENCE IN OPTOMETRY

REGULATION

Regulation 3.76—Degree of Bachelor of Science in Optometry

1. Candidates for the degree of Bachelor of Science in Optometry shall after matriculating pursue a course of study for four years and fulfil the conditions hereunder prescribed.

2. The course for this degree, the subjects of the course and the years to which they pertain, shall be as prescribed by the Academic Board on the recommendation of the faculty of Science (hereinafter called "the faculty").

3. During each year of the course and between years of the course, a candidate shall perform laboratory work, attend demonstrations and undergo experience of such an extent and in such a manner as is prescribed from time to time by the Academic Board on the recommendation of the faculty. Subject to dispensation by the faculty in special cases no candidate shall be admitted to examination in a subject in which he has not conformed with the preceding requirements unless he satisfy the faculty that he has had appropriate training elsewhere.

4. The faculty may allow a candidate to substitute for any subject of his course another subject or subjects of a university course which in its opinion is of at least equal standard. Subject to the approval of the appropriate faculty, a candidate may compete for the exhibition, scholarship or prize in any subject which he is allowed so to substitute. Approval of any such change must be obtained from the faculty before entering for the subject concerned.

5. (1) To pass a year of a course a candidate shall comply with one of the following conditions—

(a) he shall pass at an annual examination in or obtain credit for each subject of that year; or

(b) he shall have been passed by the faculty in the year of the course as a whole. In awarding such pass the faculty shall take into account his performance in all subjects whether passed at one examination or more, and may take into account his performance in any work done during the year, in accordance with the principles determined by the faculty from time to time and approved by the Academic Board. A candidate passed by the faculty in the year as a whole who has not passed at the annual examination in or obtained credit for any particular subject shall not be recorded as having passed in that subject, but shall be allowed to proceed with subjects of a later year of the course for which a pass in each subject may be prerequisite.

(2) Where a candidate's course has been varied in accordance with the provisions of section 4, the faculty shall define the content of the candidate's year for the purpose of this section.
6. Except where permission is given by the faculty a candidate shall pass one year of the course in accordance with the preceding section before being allowed to proceed to any subject of a succeeding year of the course.

7. A candidate may be awarded honours in any subject of a year except those designated in the details of course as of pass standard only. A candidate who obtains honours in any subject of a year may be placed in the class lists and be awarded a prize, exhibition or scholarship in accordance with the conditions prescribed in the regulations relating to that particular subject. Subject to such condition a candidate may be awarded a prize, exhibition or scholarship only if he has passed or obtained honours in not less than three subjects (including the particular subject in question) at the annual examination of the year concerned.

8. For the purpose of completing a qualification for the degree a candidate shall not except by special permission of the faculty retain credit for any subject for more than seven years.

9. A candidate who has passed in or obtained credit for each year of the course and has fulfilled the requirements of section 3 may be admitted to the degree.

OPTOMETRY COURSE

Students Accepted for Fixed Courses

Once a student is accepted for a fixed course (that is, one for which there are no alternative subjects) and if she/he is not later prevented by failure from continuing in the course, the University must provide facilities for the student to complete the course as planned, should he/she so request. Note: Students should consult the appropriate Faculty handbook for special principles of selection, if any.

FIRST YEAR—100 LEVEL

600-101 Biology; or 103 Animal Biology, and 102 Biology
610-101 Chemistry
617-140 Mathematical Sciences 1E (Biological Sciences)*; or 111 Mathematical Science 1B or 110 Mathematical Science 1A
640-120 Physics or 140 Physics or 160 Physics

SECOND YEAR—200 LEVEL

516-201 Histology
516-203 Ocular Anatomy
521-201 Biochemistry
536-205 Physiology (Optometry)
655-210 Applied Optics
655-220 Physiological Optics

THIRD YEAR—300 LEVEL

526-203 Microbiology (Optometry)
531-307 General Pathology
534-306 Ocular Pharmacology
536-311 The Brain, Perception and Behaviour
655-310 Applied Optics

*Students with very good passes at the VCE examinations in Mathematics B and Physics may be permitted to substitute another subject (of equivalent workload) for Mathematics. Students wishing to do so should consult the chairman of the department.
Faculty of Science

655-320 Neuro-Physiology of Vision
655-330 Functional Disorders of Vision
655-340 Diseases of the Eye
655-350 Ophthalmic Prosthetics

FOURTH YEAR—400 LEVEL

655-410 Optometry
655-420 Public Health Optometry

Term dates for Optometry students are those for the Science faculty but fourth year students are required to attend the clinic in the following clinical terms:
1st term: Monday February 15 to Friday May 13
2nd term: Monday May 30 to Friday August 12
3rd term: Monday September 5 to Friday October 28

DETAILS OF UNITS

Details of first year units and later year units provided by other departments (i.e. 205 Physiology, 201 Biochemistry, 201 Histology, 203 Microbiology (Optometry), 203 Ocular Anatomy, 307 General Pathology, 311 The Brain, Perception and Behaviour and 306 Ocular Pharmacology) are given in Chapter 5.

655 OPTOMETRY

200 LEVEL

210 APPLIED OPTICS

Dr G. Smith

32 lectures; weekly tutorials; 3 hours laboratory work each week. First and second terms; 7 points.

Prerequisites: Physics 160 or 140 or 120, Mathematical Sciences 140 (or equivalent).

SYLLABUS


Aberrations of optical systems Limitations of Gaussian optics, the aberration polynomial. Image quality assessment, the optical transfer function. Resolution of optical instruments.


ASSESSMENT One 3-hour written paper in the August examination period. Students are required to attend the practical classes and submit reports of practical work. Assessment of work done in practical classes and of practical class reports contributes 15% to the final examination mark. Students are required to obtain a pass mark in the practical work.
220 PHYSIOLOGICAL OPTICS

Professor Cole

72 lectures; three hours of practical work per week; first, second and third term; 12 points.

Prerequisites: Physics 160 or 140 or 120, Chemistry 101 and Biology 101 or 102 and 103.

VISUAL FUNCTIONS OF MAN

25 lectures during first term.

Specifications of the stimulus; the radiometric and photometric quantities. The light sense: spectral luminous efficiency; absolute threshold and quantum effects; light and dark adaptation: increment thresholds. Temporal resolution; flicker and transient stimulation. The form sense: visual acuity and the contrast sensitivity function. The colour sense: the trivariance of vision and the systems for specifying chromaticity; colour discriminations; theories of colour vision. Perception of visual space: projection, retinal correspondence, the horopter, fusion and stereopsis.

PHYSIOLOGY OF THE VISUAL PROCESSES

16 lectures during second and third term.


MUSCULAR MECHANISMS OF THE EYE

15 lectures during second term.


VEGETATIVE PHYSIOLOGY OF THE EYE

8 lectures during third term.

The cornea; the anatomy and physical properties of the cornea; the chemistry and metabolism of the cornea, corneal permeability, turgescence and maintenance of transparency. The lacrimal apparatus and the tear film. The sclera. Formation and circulation of aqueous humour, intraocular pressure. The physical properties, chemistry, growth and metabolism of the lens. Vegetative physiology of the retina and vitreous.

OPTICS OF THE EYE

8 lectures during third term.

The optical system of the visual organs of vertebrates and invertebrates. Gaussian optics of the human eye and schematic eyes. Aberrations and image quality of real eyes. Schematic eyes.

ASSESSMENT Two 3-hours' written papers in the November examination period. One 3,000-word essay on an approved topic to be submitted no later than the first day of third term. The essay contributes 10% to the final mark.

Students are required to attend the practical classes and submit reports of work done. Assessment of work done in practical classes and of practical class reports contributes 15% to the final examination mark. Students are required to obtain a pass mark in the practical work.
310 APPLIED OPTICS
Dr G. Smith
32 lectures, 1st and 2nd terms; 2 hours practical class each week, 1st term; 6 points.
Prerequisite: 210 Applied Optics.
SYLLABUS
Optical System Assessment: Calculation of Gaussian characteristics from design data, laboratory measurement of these characteristics. Measurement of component constants. Assessment of image quality from design data and by laboratory measurement; spot diagrams, wave aberration, optical transfer function and resolving power. Visual optical instruments and the eye. Applications to low vision aids.
Photometry: Photometric measurement and standard sources.
Measurement of Light and Colour: Units. Sources. Principles of measurement, detectors. The CIE chromaticity system, uniform colour scales, colour rendering, metamerism.
PRACTICAL WORK Programming in BASIC language and application of computers to optical system assessment and design. A practical photometry assignment. Optical system assessment and design assignments.
ASSESSMENT One 3-hour written examination in the August examination period. Students are required to carry out the practical work assignments and submit reports for each assignment. Assessment of these reports contributes 35% to the final examination mark. Students are required to obtain a pass mark for these reports.

320 NEUROPHYSIOLOGY OF VISION
Dr Vaney
A course of one lecture and one 2-hour seminar each week during second term; 2 points.
Prerequisites: 220 Physiological Optics, 536-205 Physiology.
SYLLABUS The study of neurological activity related to the visual process.
PRESCRIBED READING Selected papers from the current literature.
ASSESSMENT One 2-hour written paper in the August examination period. Students are required to attend the seminars and are expected to have read the assigned papers in order to participate in the discussion. Participation in the seminars is assessed progressively and contributes to the final examination mark. Students are required to obtain a pass mark for this assessment.
330 OPTOMETRY: FUNCTIONAL DISORDERS OF VISION

Dr Johnston

80 lectures; 4 hours of practical and clinical work per week in first and second terms and clinical sessions in third term; 18 points.

Prerequisites: 203 Ocular Anatomy, 210 Applied Optics, 220 Physiological Optics. Students must have passed or be studying 340 Optometry: Diseases of the Eye and 350 Optometry: Ophthalmic Prosthetics.


Scientific Method in the Clinical Sciences (8 lectures). The design of clinical surveys, trials and experiments. Sampling methods. Methods of presenting data. Statistical analysis of data.

CLINICAL METHODS Two 2-hour classes per week throughout first, second, and part of third terms involving demonstration and practice of clinical methods for the determination of refraction, assessment and treatment of disorders of ocular motility and binocular coordination, and the detection of ocular disease.

CLINICAL PRACTICE Students are rostered to attend clinical sessions in third term, during which they will examine patients under supervision.

Equipment: Students must provide themselves with the following: streak retinoscope, direct ophthalmoscope, pre-focussed torch (penlight), inter-pupillary distance rule, tape measure, cover paddle, occluder, Traquair targets, Prentice phoria card, -2.0 lens flipper, and two white coats.

All equipment must be approved by a member of staff before purchasing. Students are advised that they must conform to the requirements of the Board of Management of the clinic of the Victorian College of Optometry with respect to dress and conduct when assigned to the clinic.

ASSESSMENT Students are required to attend the classes in clinical methods and clinical practice and to submit reports of clinical methods assignments. A practical examination in clinical methods is held in the August examination period and students are required to obtain a pass mark in this examination before proceeding to the classes in clinical practice. Students are assessed for each of the patients seen in the clinical practice sessions and the aggregate mark for clinical methods and clinical practice combined contributes 20% to the final examination mark. Students are required to obtain a pass mark for this practical component.

Two 3-hours' written examinations on the whole scope of the subject in November examination period.

340 OPTOMETRY: DISEASES OF THE EYE

Dr Brennan

72 lectures and tutorials, of which about 8 will be in tutorial form: first, second and third terms; two hours of clinical observation per week in second and third terms; 13 points.
Prerequisites: 203 Ocular Anatomy, 201 Histology. Students must have passed or be studying concurrently 330 Optometry, 307 General Pathology and 203 Microbiology. Students who have previously passed 330 Optometry are required to attend the practical classes and clinical sessions of 330 Optometry.


ASSESSMENT One 3-hours' written paper; one 1-hour's practical/oral examination; one 2-hours' slide recognition test; all in November examination period. The practical/oral examination and the slide recognition test contribute 10% and 15% respectively to the final examination mark.

350 OPTOMETRY: OPHTHALMIC PROSTHETICS
Dr Brennan

24 lectures; 24 hours of tutorials and practical classes; computational exercises; first, second and third terms. In addition, a 1-week course in dispensing practice will be held during the August vacation period which will comprise 35 hours of practical work. 7 points.

Prerequisite 210 Applied Optics. Students must have passed or be studying 330 Optometry and 310 Applied Optics.

SYLLABUS


ASSESSMENT One 3-hours' written paper in the November examination period. Students are required to attend the one-week practical course in ophthalmic prosthetics and to dispense 10 optical prescriptions satisfactorily in third term. Students are required to obtain a pass mark for the practical component.

410 OPTOMETRY
Professor Cole

A course of 94 lectures; 40 tutorials and 425 hours of clinical work; first, second and third terms; 42 points.

Prerequisites: 330, 340 and 350 Optometry.
B.Sc. (Optometry)

SYLLABUS


Communication and Counselling (16 hours). Introduction to the techniques of communication and counselling.

Ophthalmic Prosthetics (60 hours). Contact lens prosthesis. Advanced ophthalmic dispensing.

Practice Management (16 lectures). Ethics and professional behaviour; the law in relation to optometry; practice management.

TUTORIALS will be devoted to relating the studies of second and third years to clinical decision making and the discussion of patient management.

CLINICAL OBSERVATION Two hours per week. Examination and study of patients exhibiting unusual clinical features.

CLINICAL TRAINING 11 hours per week. Students are required to attend the routine, orthoptic, contact lens, and community health clinics of the Victorian College of Optometry and the Low Vision Clinic at Kooyong for 32 weeks of the year. Students will also be rostered to attend two approved private practices during one term.

PRACTICAL WORK Each student is required to dispense a proportion of the prescriptions he writes during his attendance at clinics.

ASSIGNMENTS An essay of approximately 4,000 words on a prescribed subject or other approved subject is to be submitted by the first day of second term. Each student is also required to prepare and submit before the last day of third term three general patient reports, a report on the colour vision assessment of three patients, three case reports on patients with binocular or motility dysfunction, and photodocumentation of at least three patients exhibiting features of interest.

ASSESSMENT Three 3-hours' written papers, three 2-hours' clinical examinations; one 1-hour's contact lens practical examination; a group of oral examinations all in the November examination period. Students are required to obtain a mark of at least 40% for each of the three written papers and to obtain an aggregate mark of at least 50% for the three papers and for the clinical examinations.

Students are required to attend the clinical training for which they are rostered. Clinical work is assessed throughout the year and students are required to obtain a pass mark of 65% from this assessment. Students are required to dispense satisfactorily at least 30 optical prescriptions during the course of the year.
420 PUBLIC HEALTH OPTOMETRY

Professor Cole

32 lectures; 2nd and 3rd terms; 5 points.

Prerequisite: 330 Optometry.

SYLLABUS

The nature and scope of public health and public health optometry. Human factors engineering: alteration of the task and environment to improve visual performance; illuminating engineering. Accident prevention: injury as a major public health problem, incidence and nature of occupational and avocational injury, theories of accident causation and strategies of accident prevention; eye injuries, eye protection in the industrial environment. Visual standards: Vision in relation to task demand, the evidence relating vision to task performance, the principles underlying the setting of visual standards. Vision screening.

ASSESSMENT One 3-hour written paper in the November examination period. Students are required to undertake an assessment of a lighting installation and to prepare a report for submission no later than the first day of the third term.
CHAPTER 7

SCHEDULE OF UNITS FOR B.Sc., AND B.Sc. OPTOM.
<table>
<thead>
<tr>
<th>Unit Course</th>
<th>Lectures (These figures are all approximate)</th>
<th>Practical Work (Hours)</th>
<th>Points</th>
<th>Prerequisites</th>
<th>Special Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>516 DEPARTMENT OF ANATOMY</td>
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<tr>
<td>201 Histology</td>
<td>27</td>
<td>48</td>
<td>5</td>
<td>Biology 101, or 102+103 Chemistry 101, (Physics 160, 120 or 140 rec.)</td>
<td>Must be studying or must have studied Physiology 200 or Biochemistry 200.</td>
</tr>
<tr>
<td>203 Ocular Anatomy</td>
<td>26</td>
<td>26</td>
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<td>As for 201</td>
<td></td>
</tr>
<tr>
<td>204 Human Anatomy</td>
<td>48</td>
<td>120 24 tuts.</td>
<td>12</td>
<td>Biology 101, or 102+103</td>
<td></td>
</tr>
<tr>
<td>301 Cellular and Developmental Biology</td>
<td>72</td>
<td>144</td>
<td>20</td>
<td>Histol. 201</td>
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<tr>
<td>302 Neuroanatomy</td>
<td>20</td>
<td>18</td>
<td>4</td>
<td>Anatomy 204††</td>
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<tr>
<td>303 Neuroscience</td>
<td>32</td>
<td>120 16 sems.</td>
<td>15</td>
<td>10 pts of 200-level Anat., Physiol., Zool., Pharm., or Bioch.</td>
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<tr>
<td>521 DEPARTMENT OF BIOCHEMISTRY</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>201 Biochemistry (lectures)</td>
<td>48</td>
<td></td>
<td>6</td>
<td>Chem. 101 Recommend: Biol. 101 or 102+103 or 102+104 Physics 140 or 160; Math. Sci. 140.</td>
<td>Enrolment priority for those taking also 202.</td>
</tr>
</tbody>
</table>

†† or Students in Physiology 311, or final honours Psychology students.
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Credits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry (practical)</td>
<td>202</td>
<td>72</td>
<td>3</td>
<td>Chem. 101 for all units: Biochem. 201 and 202. Chem. 200 incl. Org. Chem. strongly recom. If proceeding to grad. work in Biochem. should take at least 22 points incl. 10 prac. and 12 of lectures. Students wishing to take 8 or more points of lecture units must take a prac. unit. Any unit if selected by only a small number of students may be withdrawn.</td>
</tr>
<tr>
<td>Molecular aspects of biomembranes and cell biology</td>
<td>301</td>
<td>12</td>
<td>2</td>
<td>If proceeding to 300-level Biochem. required to take 201 and 202, strongly advised to take at least 5 points of 200-level Chemistry, preferably including 221.</td>
</tr>
<tr>
<td>Proteins: Structure, function and interactions</td>
<td>302</td>
<td>24</td>
<td>4</td>
<td></td>
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<tr>
<td>Gene structure and expression</td>
<td>303</td>
<td>24</td>
<td>4</td>
<td></td>
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<tr>
<td>Mammalian metabolism</td>
<td>304</td>
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<tr>
<td>Biochemistry of human nutrition</td>
<td>305</td>
<td>12</td>
<td>2</td>
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<tr>
<td>Photosynthesis and Related Topics</td>
<td>306</td>
<td>12</td>
<td>2</td>
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<tr>
<td>Glycans, glycoproteins and proteoglycans</td>
<td>307</td>
<td>12</td>
<td>2</td>
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<tr>
<td>Practical Biochemistry A</td>
<td>321</td>
<td>11 1/2 per week for 8 weeks</td>
<td>5</td>
<td>Biochem. 303 Special conditions may be waived by the Chairman.</td>
</tr>
<tr>
<td>Practical Biochemistry B</td>
<td>322</td>
<td>11 1/2 per week for 8 weeks</td>
<td>5</td>
<td></td>
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<tr>
<td>Practical Biochemistry C</td>
<td>323</td>
<td>11 1/2 per week for 8 weeks</td>
<td>5</td>
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<tr>
<td>Practical Biochemistry D</td>
<td>324</td>
<td>5 3/4 per week for 16 weeks</td>
<td>5</td>
<td></td>
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<tr>
<td>Biology</td>
<td>101</td>
<td>72</td>
<td>72 tuts.</td>
<td>9</td>
</tr>
<tr>
<td>Cell Biology and Genetics</td>
<td>102</td>
<td>24</td>
<td>32 tuts.</td>
<td>3</td>
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<tr>
<td>Animal Biology</td>
<td>103</td>
<td>48</td>
<td>64 tuts.</td>
<td>6</td>
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<tr>
<td>Plant Biology</td>
<td>104</td>
<td>48</td>
<td>64 tuts.</td>
<td>6</td>
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</table>

† Plus excursions.
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<thead>
<tr>
<th>Unit Course</th>
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<th>Points</th>
<th>Prerequisites</th>
<th>Special Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>201 The Land plants</td>
<td>21</td>
<td>56†</td>
<td>5</td>
<td>For 201-204: Biol. 101, or 102+104</td>
<td>Botany majors must take 201 to 204 (or 208 instead of 203), and Genetics 201 not necessarily concurrently. Chairman may waive prerequisites. Credit not given for both 203 and 208.</td>
</tr>
<tr>
<td>202 Plant Form and Function</td>
<td>24</td>
<td>48</td>
<td>5</td>
<td>For 202: Chem. 101</td>
<td></td>
</tr>
<tr>
<td>203 Algae and Fungi</td>
<td>16</td>
<td>32†</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>204 Ecology</td>
<td>16</td>
<td>30†</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>207 Conservation—Global and Local Aspects</td>
<td>16</td>
<td></td>
<td>2</td>
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<tr>
<td>208 Marine Botany</td>
<td>16</td>
<td>24</td>
<td>3</td>
<td>Biol. 101, or 102+104</td>
<td>Excludes credit for 203.</td>
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<tr>
<td>301 Community and Ecosystem Ecology</td>
<td>24</td>
<td>72**</td>
<td>8</td>
<td>201, 204, 202</td>
<td>Taking at least 20 points from 301 to 311 is regarded as majoring in Botany. Chairman or nominee may waive prerequisites. Essential preliminary reading in some instances.</td>
</tr>
<tr>
<td>302 Population and Evolutionary Ecology</td>
<td>16</td>
<td>24**</td>
<td>4</td>
<td>204 or Gen. 201</td>
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<tr>
<td>303 Environmental Plant Physiology</td>
<td>16</td>
<td>24</td>
<td>4</td>
<td>202</td>
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<tr>
<td>304 Systematics and Evolution</td>
<td>32</td>
<td>48†</td>
<td>6</td>
<td>201</td>
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<tr>
<td>305 Plant Cell Biology</td>
<td>24</td>
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<td>4</td>
<td>202 or Biochem. 202, 305</td>
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<tr>
<td>306 Practical Unit in Cell Biology</td>
<td>36</td>
<td></td>
<td>2</td>
<td>202 or Biochem. 202</td>
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<tr>
<td>307 Marine Benthic Algae</td>
<td>16</td>
<td>24**</td>
<td>4</td>
<td>203 or 208</td>
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<tr>
<td>308 Marine and Freshwater Phytoplankton</td>
<td>16</td>
<td>24</td>
<td>4</td>
<td>203 or 208</td>
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</table>

† Plus excursions.

** Includes excursions.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Contact Hours</th>
<th>Tutorials</th>
<th>Notes</th>
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<tbody>
<tr>
<td>309</td>
<td>Mycology and Plant Pathology</td>
<td>16</td>
<td>24</td>
<td>4</td>
<td>203</td>
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<tr>
<td>310</td>
<td>Project in Botany</td>
<td>36</td>
<td>2</td>
<td></td>
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<tr>
<td>311</td>
<td>Plant Reproductive Biology</td>
<td>16</td>
<td>24</td>
<td>4</td>
<td>201 or 202</td>
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### 610 DEPARTMENTS OF THE CHEMISTRY SCHOOL

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Contact Hours</th>
<th>Tutorials</th>
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<tr>
<td>101</td>
<td>Chemistry</td>
<td>72</td>
<td>66</td>
<td>20 tuts.</td>
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<tr>
<td>201</td>
<td>Physical Chemistry I</td>
<td>28</td>
<td>36</td>
<td>5</td>
<td>For 201 to 203: Credit cannot be held for more than one 200-level Physical Chemistry unit.</td>
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<tr>
<td>202</td>
<td>Physical Chemistry II</td>
<td>36</td>
<td>36</td>
<td>6</td>
<td>For 202 to 260: Credit cannot be held for more than one 200-level Organic Chemistry unit.</td>
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<td>203</td>
<td>Physical Chemistry III</td>
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<td>Credit cannot be held for more than one 200-level Physical Chemistry unit.</td>
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<tr>
<td>220</td>
<td>Organic Chemistry</td>
<td>22</td>
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<td>For 220 to 260: Credit cannot be held for more than one 200-level Organic Chemistry unit.</td>
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<td>221</td>
<td>Organic Chemistry</td>
<td>30</td>
<td>36</td>
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<td>Credit cannot be held for more than one 200-level Inorganic Chemistry unit.</td>
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<tr>
<td>222</td>
<td>Organic Chemistry</td>
<td>38</td>
<td>36</td>
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<tr>
<td>223</td>
<td>Organic Chemistry</td>
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<td>Chem. 101</td>
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<td>240</td>
<td>Inorganic Chemistry</td>
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<td>6</td>
<td>Chem. 101</td>
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<tr>
<td>241</td>
<td>Inorganic Chemistry</td>
<td>32</td>
<td>36</td>
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<td>Not to be taken if proceeding to 300-level Inorganic units.</td>
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<tr>
<td>242</td>
<td>Inorganic Chemistry</td>
<td>16</td>
<td>24</td>
<td>3</td>
<td>260 enrolment compulsory if enrolled for 13+ points in 200-level.</td>
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<tr>
<td>243</td>
<td>Inorganic Chemistry</td>
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<tr>
<td>260</td>
<td>Analytical Chemistry</td>
<td>8</td>
<td>42</td>
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<tr>
<td>Unit Course</td>
<td>Lectures (These figures are all approximate)</td>
<td>Practical Work (Hours)</td>
<td>Points</td>
<td>Prerequisites</td>
<td>Special Conditions</td>
</tr>
<tr>
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<tr>
<td>301 Physical Chemistry</td>
<td>30</td>
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<td>5</td>
<td></td>
<td>inc. 101</td>
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<tr>
<td>302 Spectroscopy and Its Applications</td>
<td>24</td>
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<td>4</td>
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<tr>
<td>303 Principles of Physical Chemistry</td>
<td>18</td>
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<td>3</td>
<td>201 or equivalent</td>
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<tr>
<td>304 Physical Chemistry Practical Work 1</td>
<td></td>
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<td>54</td>
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<td>305 Physical Chemistry Practical Work 2</td>
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<tr>
<td>320 Spectroscopic Methods</td>
<td>12</td>
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<td>2</td>
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<td>320 compulsory if enrolled in 335 or 336.</td>
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<tr>
<td>322 Organic Reaction Mechanisms</td>
<td>12</td>
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<td>323 Biological Chemistry</td>
<td>12</td>
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<tr>
<td>324 Natural Organic Substances</td>
<td>12</td>
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<td>2</td>
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<tr>
<td>325 Reactive Intermediates</td>
<td>12</td>
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<td>2</td>
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<td>220, 221, 222 or 223</td>
</tr>
<tr>
<td>326 Principles of Organic Synthesis</td>
<td>12</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>327 Organic Photochemistry</td>
<td>12</td>
<td></td>
<td>2</td>
<td></td>
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<tr>
<td>328 Chemistry of The Environment</td>
<td>12</td>
<td></td>
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<tr>
<td>329 Organic Polymer Chemistry</td>
<td>12</td>
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<tr>
<td>335 Organic Practical Work I</td>
<td>90</td>
<td></td>
<td>5</td>
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<td>335 enrolment compulsory if enrolled in 9+300-level organic theory points.</td>
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<td>336 Organic Practical Work 2</td>
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<td>335 or 336 enrolment compulsory if enrolled in 3-8 300-level organic theory points.</td>
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<td>Prerequisites</td>
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<td>64</td>
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13 plus 200 level points incl. 260

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<td>395</td>
<td>Organic Geochemistry of Fossil Fuels</td>
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<td>10 plus 200 Chem. points.</td>
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<td>396</td>
<td>Chemistry of Estuaries and Oceans</td>
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622 DEPARTMENT OF COMPUTER SCIENCE

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Summer School

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622-113 or (617-110 +120)

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<td>Structure of Computers</td>
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617-110, 120 & 130

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617-110, 120 & 130

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622-214

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<tr>
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622-312

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622-250

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622-214

† For students taking Chemistry with a biological science.
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<th>Lectures (These figures are all approximate)</th>
<th>Practical Work (Hours)</th>
<th>Points</th>
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<th>Special Conditions</th>
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<tr>
<td>324 Numerical Analysis</td>
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<td>618-250</td>
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<td>or (618-210 +220)</td>
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<td>352 Systems Analysis and Design</td>
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<td>361 Programming Languages and Compilers</td>
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<td>Genetical Evolution of Plants and Animals</td>
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<td>101</td>
<td>A Geography of Famine</td>
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<td>58</td>
<td>66</td>
<td>10</td>
<td>101, 104</td>
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^1 Tutorials.
^2 Or concurrent enrolment.
^3 Plus excursion and tutorials.
<table>
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<tr>
<td>213 Geographic Information Systems</td>
<td>40</td>
<td>72</td>
<td>9</td>
<td>101 or 104</td>
<td>4-day excursion</td>
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<td>311 Geomorphology</td>
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<td>72</td>
<td>18</td>
<td>201 or 626-101</td>
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<td>314 Maritime and Seabed Resources</td>
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**626 DEPARTMENT OF GEOLOGY**

Students enrolling in neither Geology nor Geophysics who wish to take a few units within the Department of Geology may, in certain circumstances, have the prerequisites waived.

<table>
<thead>
<tr>
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<th>Special Conditions</th>
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<td>111 The Dynamic Earth</td>
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<td>201 Mineralogy and Petrology</td>
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<td>Geology majors must enrol in 201 to 209 inclusive (18 points).</td>
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<td>202 Sedimentology and Structural Geology</td>
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<td>101, 201</td>
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<td>203 Palaeontology and Stratigraphy</td>
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<td>45</td>
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<td>101, 202</td>
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<td>209 Field Geology</td>
<td>14 days</td>
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<td>201, 202, 203</td>
<td>concurrent enrolment</td>
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^ Also have field work. See details of units
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<tr>
<td>301</td>
<td>Petrology and Geochemistry</td>
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<td>8 201, 202, 203</td>
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<td>Geodynamics</td>
<td>36</td>
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<td>8 201, 202, 203</td>
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<td>303</td>
<td>Economic Geology A—Metalliferous Deposits</td>
<td>23</td>
<td>45</td>
<td>6 201, 202, 203</td>
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<td>Economic Geology B—Fuels</td>
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<td>309</td>
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<td>Advanced Sedimentology, Palaeontology and Stratigraphy</td>
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<td>Surficial and Quaternary Geology</td>
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Geology majors must enrol in 301 to 309 inclusive and one of 311, 312 or 313 (40 points). Students who intend to proceed to B.Sc. (Hons.) in Geophysics should take a minimum of 15 points from units 332 to 372 inclusive. If without credit for 101 or 111 must enrol in either concurrently with Geophysics units.

4 days of excursions

332 not available with 303

Also have field work. See details of units.
<table>
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<td>36 hrs$^3$</td>
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<tr>
<td>103 Upheavals in Scientific Thought</td>
<td>24</td>
<td>12 tuts.</td>
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<tr>
<td>202 Science, Reason and Power</td>
<td>25</td>
<td>12 tuts.</td>
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<tr>
<td>203 Science, Life and Mind</td>
<td>25</td>
<td>12 tuts.</td>
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<td>222 Issues in Modern Life Sciences</td>
<td>25</td>
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<td>223 Darwinism</td>
<td>36 hrs$^3$</td>
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<td>224 The Scientific Revolution</td>
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<td>225 Social History of Medicine</td>
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<tr>
<td>226 Science, Technology and Society</td>
<td>36 hrs$^3$</td>
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<td>227 History of Australian Science</td>
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<td>Must have some acquaintance with modern formal logic</td>
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<td>303 Philosophy of Science</td>
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<td>320 Approaches to the History of Science</td>
<td>25</td>
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<td>Must have passed one of 221, 222, 223, 224, 225, 226 or 227.</td>
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<tr>
<td>322 Revolutions in Modern Biology</td>
<td>25</td>
<td>12 tuts.</td>
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<td>600-101 or 102</td>
<td>Must have one 200 level unit in Zoology, Botany or Genetics.</td>
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<td>333 History of Technology</td>
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$^3$ See Details of Units.
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<td>History and Philosophy of Science (Science)</td>
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<td>390</td>
<td>Directed Study</td>
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<td>201</td>
<td>Marine Geoscience</td>
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<td>2</td>
<td>20 points</td>
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<td>202</td>
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<td>203</td>
<td>Marine Ecology</td>
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<td>2</td>
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<td>204</td>
<td>Introduction to Physical Oceanography</td>
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<td>8</td>
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^5 See Details of Units.
## 618 DEPARTMENT OF MATHEMATICS

See Details of Units for full prerequisites and special conditions. First year: see details under Mathematical Sciences entry.

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<th>Unit Course</th>
<th>Lectures (These figures are all approximate)</th>
<th>Practical Work (Hours)</th>
<th>Points</th>
<th>Prerequisites</th>
<th>Special Conditions</th>
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<td>210 Real and Complex Analysis</td>
<td>48</td>
<td>24</td>
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<td>220 Group Theory and Linear Algebra</td>
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<td>230 Vector Analysis and Mathematical Methods</td>
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<td>240 Introduction to Mathematical Physics</td>
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<td>250 Analysis and Algebra</td>
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<td>260 Linear Programming and Optimization</td>
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<td>275 Differential Equations</td>
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^4 As a co-requisite.
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<td>320</td>
<td>Algebra and Topology</td>
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<td>220, 230 Excl. credit for 350 or 351 done before 1987. Must also take 310.</td>
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<td>384</td>
<td>Developments in Mathematics</td>
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<td>8</td>
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<td>385</td>
<td>Computational Mathematics B</td>
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<td>54</td>
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<td>386</td>
<td>Differential Equations</td>
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<td>250 (or 210, 230) Excl. credit for 330 done before 1987.</td>
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**DEPARTMENT OF METEOROLOGY**

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<th>Code</th>
<th>Course Title</th>
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<tr>
<td>101</td>
<td>Meteorology 1</td>
<td>72</td>
<td>72</td>
<td>8</td>
<td>101 Excl. credit for 201.</td>
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<td>102</td>
<td>Introductory Meteorology</td>
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<td>6</td>
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<td>102 Excl. credit for 201.</td>
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<td>103</td>
<td>Weather, Climate and People</td>
<td>24</td>
<td>2</td>
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<tr>
<td>201</td>
<td>Outline of Meteorology</td>
<td>16</td>
<td>6 equiv.</td>
<td>2</td>
<td>201 for all 200 and 300 level unit students without credit for 101 or 102. 201 excl. credit for 101 or 102.</td>
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** Includes excursion.
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<tr>
<th>Unit Course</th>
<th>Lectures</th>
<th>Practical Work (Hours)</th>
<th>Points</th>
<th>Prerequisites</th>
<th>Special Conditions</th>
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<tr>
<td>202 Meteorological Measurements</td>
<td>8</td>
<td>24**</td>
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<td>203 Thermodynamics of the Atmosphere</td>
<td>14</td>
<td>6</td>
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<td>204 Planetary Climatology</td>
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<td>205 Computer Meteorology</td>
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<td>206 The Urban Environment</td>
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<td>301 Dynamics</td>
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<td>304 Turbulence</td>
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<td>307 Synoptic Meteorology</td>
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<td>301</td>
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<td>308 Cloud Physics</td>
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<td>309 General Glaciology</td>
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<td>305</td>
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<td>323 Descriptive Physical Oceanography</td>
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** Includes excursion.
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<td>General Microbiology (Lectures)</td>
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<td>Pathogenesis and Epidemiology</td>
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<td>Principles of Immunology</td>
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<td>307</td>
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<td>309 Microbial Genetics (Lectures)</td>
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<td>312 Cellular Immunology and Infection</td>
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<td>313 Molecular Aspects of Immunology</td>
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<td><strong>32</strong></td>
<td><strong>48</strong></td>
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<td>Physiological Optics</td>
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<td>72</td>
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<td>Must have passed or studying concurrently Biochemistry 201, Physiology 205, Histology 201, Anatomy 203.</td>
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<td>Neurophysiology of Vision</td>
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<td>330</td>
<td>Functional Disorders of Vision</td>
<td>80</td>
<td>64 and 14 clinical work</td>
<td>18</td>
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<td>Must have passed or studying concurrently 340 and 350.</td>
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<td>Must have passed or studying concurrently 330 Optometry, 307 General Pathology, 203 Microbiology.</td>
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<td>Ophthalmic Prosthetics</td>
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<td>Must have passed or studying concurrently Optometry 310, 330.</td>
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<td>Public Health Optometry</td>
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531 DEPARTMENT OF PATHOLOGY

<table>
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<th>Practical Hours</th>
<th>Theory Hours</th>
<th>Prerequisites</th>
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<tr>
<td>301</td>
<td>General Pathology</td>
<td>24</td>
<td>32</td>
<td>6</td>
<td>2 of Histol. 201, Biochem. 201 or Physiol. 201</td>
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<td>302</td>
<td>Reactions to Injury</td>
<td>24</td>
<td>32</td>
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<td>303</td>
<td>Reactions to Injury (Practical)</td>
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<td>531-301</td>
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<tr>
<td>304</td>
<td>Cell Proliferation and Neoplasia</td>
<td>12</td>
<td>40</td>
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<tr>
<td>305</td>
<td>Haematological Aspects of Pathology</td>
<td>12</td>
<td>32</td>
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<td>531-301, Not available in 1988.</td>
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' Normally concurrent.
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<th>Practical Work (Hours)</th>
<th>Points</th>
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<th>Special Conditions</th>
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<tr>
<td>306 Transplantations and Immunogenetics</td>
<td>18</td>
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<tr>
<td>307 General Pathology (Optometry)</td>
<td>24</td>
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<td>308 Immunopathology</td>
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<td>309 Immunology Laboratory Project</td>
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<td>310 Histopathological Techniques</td>
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<td>311 Techniques for Electron Microscopy</td>
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<td>16</td>
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<td>531-301 and 531-310 (or 516-301)</td>
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<td><strong>534 DEPARTMENT OF PHARMACOLOGY</strong></td>
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<tr>
<td>201 Pharmacology</td>
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<td>Pharm. 201 Physiol. 201 Biochem. 201</td>
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<td>303 Pharmacokinetics</td>
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<td>Pharm. 201 Physiol. 201 Biochem. 201</td>
<td>Exemption from prerequisites in special cases.</td>
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<td>304 Pharmacology of Therapeutic Substances 1</td>
<td>15</td>
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<th>Remarks</th>
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<td>306</td>
<td>Ocular Pharmacology</td>
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**640 SCHOOL OF PHYSICS**

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<td>Physics (Standard)</td>
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<td>160</td>
<td>Physics (Terminal)</td>
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<td>Astronomy</td>
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<td>211</td>
<td>Energy and Environment</td>
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<td>212</td>
<td>Continuum Mechanics and Geophysics</td>
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<td>241</td>
<td>A.C. Circuits and Electronics</td>
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<td>640-120 or 140, 617-110 or 111</td>
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<tr>
<td>222</td>
<td>Optics and Relativity (Adv)</td>
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<td>Quantum Mechanics</td>
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<td>224</td>
<td>Classical Mechanics (Adv)</td>
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<td>640-120 or 140, 617-110 or 111, 617-120 or 618-275</td>
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* Plus tutorials.
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<th>Practical Work (Hours)</th>
<th>Points</th>
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<th>Special Conditions</th>
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<tr>
<td>226 Thermal Physics (Adv)</td>
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<td>2</td>
<td>640-120 or 140, 617-110 or 111</td>
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<td>246 Thermal Physics</td>
<td>16*</td>
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<td>227 Optics (Adv)</td>
<td>16*</td>
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<td>247 Optics</td>
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<td>299 Laboratory Work</td>
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**Core Units**

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<th>Points</th>
<th>Prerequisites</th>
<th>Special Conditions</th>
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<tbody>
<tr>
<td>320 Quantum Mechanics (Adv)</td>
<td>30*</td>
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<td>5</td>
<td>640-223 or 243, 618- (220 +230) or 250</td>
<td>Students required to include core units and laboratory work according to the table in 300 level Details of Units Chapter 6. At least 27 pts. 300-level Physics incl. 320 or 340 needed to proceed to B.Sc. (Hons).</td>
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<td>340 Quantum Mechanics</td>
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<td>321 Thermal Physics (Adv)</td>
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<td>226 or 246</td>
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<tr>
<td>341 Thermal Physics</td>
<td>18*</td>
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<td>3</td>
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<td>322 Nuclear Physics (Adv)</td>
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<tr>
<td>342 Nuclear Physics</td>
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<td>223 or 243</td>
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* Plus tutorials.
<table>
<thead>
<tr>
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<th>Course Title</th>
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<th>Credits</th>
<th>Restrictions</th>
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<tbody>
<tr>
<td>323</td>
<td>Solid State Physics (Adv)</td>
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<tr>
<td>343</td>
<td>Solid State Physics</td>
<td>18*</td>
<td>3</td>
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<tr>
<td>324</td>
<td>Electrodynamics (Adv)</td>
<td>30*</td>
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<td>640-225 or 245, 618-230 or 250</td>
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<td>344</td>
<td>Electrodynamics</td>
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<td>360</td>
<td>Atomic and Molecular Physics</td>
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**Supplementary Units**

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<td>Undergraduate Seminar</td>
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<td>361</td>
<td>Modern Optics and Diffraction</td>
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<td>640-222 or 242 or 227 or 247, 618-230 or 250</td>
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<td>362</td>
<td>Electronics</td>
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<tr>
<td>363</td>
<td>Astronomy</td>
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<td>365</td>
<td>Astrophysics</td>
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<td>366</td>
<td>Digital Systems</td>
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<td>622-214 and 431-382</td>
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<td>375</td>
<td>Particle Physics</td>
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<td>393</td>
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<td>397</td>
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<td>398</td>
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**536 DEPARTMENT OF PHYSIOLOGY**

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<td>Physiology</td>
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<td>205</td>
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<td>72</td>
<td>Enrolment priority to those taking or completed Biochem. 201 and 202, and/or Histol. 201.</td>
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* Plus tutorials.
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<th>Lectures (These figures are all approximate)</th>
<th>Practical Work (Hours)</th>
<th>Points</th>
<th>Prerequisites</th>
<th>Special Conditions</th>
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<tbody>
<tr>
<td>311 The Brain, Perception and Behaviour</td>
<td>26 5 tuts.</td>
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<tr>
<td>313 Physiological Aspects of Nutrition and Metabolism</td>
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<tr>
<td>314 Haemopoiesis and Cell Kinetics</td>
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<td>315 Mammalian Renal Function</td>
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<td>316 Circulatory and Respiratory Physiology (Lectures)</td>
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<td>321 Work, Exercise and Sports Science</td>
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<td>322 Brain in Action—Movement, Motivation and Memory</td>
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<td>323 Brain in Action—Movement, Motivation and Memory (Lectures)</td>
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<td>101 Psychology (Science)</td>
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<td>36a</td>
<td>6 617-120 or 140 or 150</td>
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<tr>
<td>321</td>
<td>Stochastic Processes</td>
<td>16</td>
<td>24a</td>
<td>4 210 or (220 and 230)</td>
<td></td>
</tr>
<tr>
<td>322</td>
<td>Applied Stochastic Processes</td>
<td>16</td>
<td>24a</td>
<td>4 321</td>
<td></td>
</tr>
<tr>
<td>331</td>
<td>Statistics Reading Project</td>
<td>36</td>
<td></td>
<td>2 301 or 311</td>
<td></td>
</tr>
<tr>
<td>361</td>
<td>Operations Research, Modelling, Analysis and Simulation</td>
<td>16</td>
<td>24a</td>
<td>4 321 (230 recom.)</td>
<td></td>
</tr>
<tr>
<td>Unit Course</td>
<td>Lectures (These figures are all approximate)</td>
<td>Practical Work (Hours)</td>
<td>Points</td>
<td>Prerequisites</td>
<td>Special Conditions</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>451 DEPARTMENT OF SURVEYING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>210 Surveying Part A</td>
<td>52</td>
<td>104</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>211 Surveying (Forestry Co.)</td>
<td>20</td>
<td>20</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>301 Surveying 2</td>
<td>78</td>
<td>130</td>
<td>20</td>
<td>210</td>
<td>Credit for only one of 210, 211 or 312.</td>
</tr>
<tr>
<td>302 Photogrammetry 1</td>
<td>52</td>
<td>92</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>312 Surveying (Eng. Co.)</td>
<td>26</td>
<td>26</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>402 Photogrammetry 2</td>
<td>40</td>
<td>80</td>
<td>11</td>
<td>302</td>
<td></td>
</tr>
<tr>
<td><strong>654 DEPARTMENT OF ZOOLOGY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201 Invertebrate Zoology</td>
<td>22</td>
<td>57*</td>
<td>6</td>
<td>Biol. 101 or 102 + 103</td>
<td>Zoology majors are advised to take Zoology 201-204.</td>
</tr>
<tr>
<td>202 Vertebrate Zoology</td>
<td>20</td>
<td>55</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>203 Zoophysiology</td>
<td>15</td>
<td>30</td>
<td>3</td>
<td>As for 202 + Chem. 101</td>
<td></td>
</tr>
<tr>
<td>204 Ecology</td>
<td>15</td>
<td>30</td>
<td>3</td>
<td>201</td>
<td>Prerequisites may be waived by the Chairman.</td>
</tr>
<tr>
<td>205 The Biology of Animal Adaptation</td>
<td>24</td>
<td></td>
<td>3</td>
<td>Biol. 101 or 102 + 103</td>
<td></td>
</tr>
<tr>
<td>301 Animal Behaviour</td>
<td>24</td>
<td>72</td>
<td>8</td>
<td>201 + 203</td>
<td>Prerequisites may be waived by the Chairman.</td>
</tr>
<tr>
<td>302 Zoophysiology</td>
<td>24</td>
<td>72</td>
<td>8</td>
<td>203 or Physiol. 201</td>
<td></td>
</tr>
<tr>
<td>303 Marine Ecology</td>
<td>24**</td>
<td>72</td>
<td>8</td>
<td>201 + 204</td>
<td></td>
</tr>
<tr>
<td>304 Evolution</td>
<td>24</td>
<td></td>
<td>4</td>
<td>Biol. 101 or 102 + 103</td>
<td></td>
</tr>
<tr>
<td>305 Research Project</td>
<td>72</td>
<td>4</td>
<td>201 + 202 + 203 + 204</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CHAPTER 8

BACHELOR OF SCIENCE WITH HONOURS

REGULATION

Regulation 3.21—Degree of Bachelor of Science (Degree with Honours)

1. An applicant for candidature for the degree of Bachelor of Science (degree with honours) shall—

(a) (i) have completed an approved course for the degree of bachelor of Science; or

(ii) have completed to a standard satisfactory to the faculty, a course of study which, in the opinion of the faculty, provides an appropriate background and training for the bachelor of Science (degree with honours) course;

(b) be recommended for candidature by the head of the appropriate department;

(c) obtain the approval of the faculty to enter the course; provided that in those departments in which the honours course is the last year of a specified course, a candidate shall have completed the requirements for all preceding years of that specified course, as prescribed in the details of subjects for the degree of Bachelor of Science degree with honours.

2. A candidate shall pursue for at least one year a course of study and investigation prescribed by the Academic Board in the details of subjects in such honour school or schools as the faculty may approve.

3. A candidate shall—

(a) pass such written examinations or viva voce examinations or both, as the faculty may decide; and

(b) submit for examination a detailed report on the investigations carried out by the candidate during that year.

4. A candidate for the degree of Bachelor of Science (degree with honours) may not, except by special permission of the faculty, enter at the annual examination for any subject other than those prescribed in the course for that degree.

5. The final assessment of the candidates shall be for honours only and first, second and third class honours may be awarded.

6. A candidate who has fulfilled the conditions prescribed may be admitted to the degree of Bachelor of Science (degree with honours).

1 Psychology, the Combined Mathematics and Physics, the combined Mathematics and Computer Science.

2 B.Sc.(Hons.) may be undertaken in the following schools: Anatomy, Biochemistry, Botany, Chemistry, Computer Science, Engineering, Genetics, Geography, Geology, History and Philosophy of Science, Industrial Science, Marine Science, Mathematics, Mathematical Statistics, Medical Biology, Medicine (Austin, Royal Melbourne and St. Vincent's Hospitals), Meteorology, Microbiology, Optometry, Otolaryngology, Paediatrics, Pathology, Pharmacology, Physics, Physiology, Psychiatry, Psychology, Statistics, Surgery (Austin and Royal Melbourne Hospitals), Surveying, Zoology, and the combined courses, Mathematics and Computer Science, and Mathematics and Physics.
Faculty of Science

GENERAL INFORMATION

STANDARD OF ENTRY
Except for the specific exemption stated below, all students accepted for B.Sc. (Hons.) must have obtained faculty third class honours or better in their final year. See entry on Faculty Honours at end of Chapter 4.
The exemption is that any department in any year may recommend a certain number of students into B.Sc. (Hons.) who, having qualified for B.Sc. have not obtained faculty third class honours. This number shall not usually exceed twenty per cent plus one of the total number of students recommended by that department in any one year for B.Sc. (Hons.).

SPECIAL REQUIREMENTS
Some departments require candidates to have completed certain undergraduate units before commencing B.Sc. (Hons.). Candidates are advised to check with the department concerned.

FORM OF ASSESSMENT
In the B.Sc. (Hons.) year, in addition to departmental seminars, students must receive at least 30 contact hours of advanced teaching per year in the form of either tutorials or formal lectures given by members of staff and/or visiting lecturers. Reading assignments may be used in conjunction with either of these teaching methods. N.B. Thirty hours of advanced teaching is defined as courses at the 400-level, designed specifically for students selected to undertake honours or Masters preliminary courses and does not include fourth and fifth year courses offered in other faculties for which pass degree students may enrol.
The B.Sc. (Hons.) year will also include a research component or equivalent in which a student will carry out individual project work under the supervision of a nominated supervisor.
Either the research component or the advanced course work component may count for up to 80 per cent of the year's total assessment. A written report of the work carried out during the year shall be the basis of the assessment of the research component and shall be examined by at least two examiners, one of whom shall be the candidate's supervisor. An oral examination may be given to assist in the assessment of this report.
The remaining marks shall be awarded on the basis of a written examination (of at least 3 hours duration) and/or written answers presented by the student during the year. The percentage of marks allocated to each component reflects the distribution of effort students are expected to devote to them. Oral examinations may be used to assist in this evaluation and the basis of these examinations and the written answers shall be the lecture course, tutorials and reading assignments given during the year. At least two examiners shall assess the written and/or oral examination. The pass mark in B.Sc. (Hons.) is 65%.
The B.Sc. (Hons.) course is normally taken over one year on a full-time basis but may, with Faculty's permission, be taken over two years. The course consists of approximately 36 weeks of full-time work (i.e., 40 hours per week) undertaken at times when supervision is normally available. Part-time candidates may be accepted if the department can certify that such students have available at least 1,440 hours (at times when supervision is normally available) to devote to their studies over the two-year period.
UNIVERSITY OF MELBOURNE RESEARCH REPORT

Students considering work for higher degrees should consult the University of Melbourne Research Report, available from the Baillieu Library. Since the 1986 edition this has been incorporated in a new publication, University of Melbourne Research.

516-401 ANATOMY

Admission requirements:

Students considering enrolling for the honours programme in the department of Anatomy should discuss their plans with a senior member of staff in the area of their special interest, or with the Chairman. In general, students should have completed the following studies with a grade of C or better:

- 200 Level: Histology 201 or Human Anatomy 204, plus units in Physiology or Biochemistry.
- 300 Level: Cellular and Developmental Biology 301 or Neuroanatomy 302 or Neuroscience 303 or equivalent studies in an appropriate field of biological science.

These requirements may be waived by the chairman in special circumstances.

Course outline: Candidates will be required to

1. Attend 30-40 hours of advanced formal course work which may include lectures, lecture/demonstrations, tutorials and practical work on a variety of topics in Cell and Tissue Biology, Developmental Biology, Neuroscience or Anatomy.
2. Undertake a research project in an area of special interest which is supervised by a member of staff. Written and oral reports will be required.
3. Write essays, evaluate scientific material and participate in departmental seminars and journal clubs as required.

Assessment will be based on the research report and other written and oral work by the students during the year.

521-401 BIOCHEMISTRY

To obtain entry to Biochemistry 401, students should have obtained credit for 22 points of Biochemistry at the 300-level, including 10 points for practical units and 12 points for lecture units.

Candidates will be required (i) to undertake advanced studies including lectures and reading courses, (ii) to present a Departmental seminar on a suitable paper chosen from the literature and (iii) to carry out and report upon a specialized research project under the supervision of a member of the academic staff. There will also be instruction in the use of special equipment.

The assessment of candidates will be made on the basis of research reports, essays, the seminar, work assignments and oral examinations. Written examinations may also be required.

606-401 BOTANY

Prerequisites: 20 or more points in 606-301 to 311. The chairman may waive the prerequisites.

Candidates will be required to undertake a course of advanced studies including lectures, practical work, reading assignments and the writing of essays. Candidates will also be required to carry out, under the
Faculty of Science

direction of a member of staff, a research project and to submit a written report on the results and a review of the relevant literature. Students must attend all Departmental seminars. The assessment of candidates will be based on the research report, literature review, essays and assignments, and an interview at the conclusion of the course.

411-400 BSc(Hons)-CHEMICAL ENGINEERING
Candidates will be required to attend courses of lectures and practical work as specified. These will be selected from those available in the departments of the Science and Engineering faculties. A written examination will be required and oral tests may be given. In addition candidates will undertake work on selected research problems and present reports on this work.

610-401 INORGANIC CHEMISTRY
610-402 ORGANIC CHEMISTRY
610-403 PHYSICAL CHEMISTRY
Candidates must have passed 24 points of 300 level Chemistry including at least six points in each of Physical, Organic and Inorganic Chemistry. They will be required to:
(i) attend lectures on specified parts of the subject and undertake a course of directed reading;
(ii) attend colloquia on selected topics, one of which they may be required to prepare and deliver;
(iii) undertake original work on a selected research problem, and submit a report on their work;
(iv) sit for written examinations, which may be accompanied by oral test.

421-400 CIVIL ENGINEERING
Candidates will be required to undertake a course of study, practical work and directed reading as may be determined in each case. A general review of literature on one or more engineering topics must be prepared, together with a report of an original research investigation of a subject approved by the chairman of the department.

622-401 COMPUTER SCIENCE
The fourth year consists of approximately 120 lectures and a research project. The minimum requirements for acceptance are:
(a) A third class faculty honour.
(b) Attainment of 300-level results at a standard prescribed by the department.
(c) Passes in 622-214, 222, 250, together with at least six of 312, 313, 325, 330, 332, 341 and 351.
(d) Passes in 618-250 or (618-210 and 220).
A desirable background also includes a pass in one 200-level Statistics unit.
Assessment will be based on examination of the lecture material (60%) and on the research report (40%).

431-400 ELECTRICAL ENGINEERING
To qualify for admission to study in the fields of digital circuits and small computer systems, candidates will be expected to have completed 431-382 Digital Circuits and to have obtained high grades throughout
B.Sc. (Honours)

their undergraduate record. Candidates will be required to attend a course of lectures and laboratory work (selected from those available in the Science and Engineering faculties) as specified by the chairman of the Department.

The lecture course will comprise not less than 100 hours. About one half of the laboratory work will be of a project nature. Units of Electronics and Computer Science are a desirable prerequisite.

Candidates will be assessed on their performance by means of written examinations and written reports on their project work.

**652-401 GENETICS**

Prerequisites: Candidates should normally have taken a minimum of 15 points at 300-level including at least one of 301 and 304.

Candidates will be required to undertake advanced studies and carry out under direction, and report upon, some research work connected with their special subject.

In addition, candidates will be required to attend not more than 30 lectures on advanced topics, to write essays, to present seminars and to attend the departmental seminars.

Honours will be awarded on the basis of an assessment of all of the above. The research report will account for 50% of final mark.

**121-411 GEOGRAPHY**

Admission: Completion of Geography 101; 19 points of 200 level units in Geography; 23 points of 300 level units in Geography (including 318), with a Faculty Honours score of at least 65% in 300-level units.

**SYLLABUS**

1. Research project. Students are expected to undertake original research on a selected research problem and to submit a thesis of no more than 12,000 words. This work should continue throughout the fourth year and will involve regular meetings with a supervisor. A literature review and statement of research problem of no more than 2,500 words must be submitted by the end of first term. A first draft of the thesis must be submitted no later than the first day of third term; this draft is then revised according to supervisor's advice and the finished thesis must be submitted by the end of October.

2. Advanced seminars. Students are required to attend departmental research seminars and in third term to present a short seminar that reports the results of their research.

3. Lectures. Students are required to attend a course of lectures and of directed reading as specified. Each year, depending on the availability of staff and the interests of students, several advanced courses of lectures and directed reading will be offered, of which students must participate in one. A paper of no more than 5,000 words is required to complete this course; it is due on the last day of third term.

**ASSESSMENT** Literature review and problem statement of up to 2,500 words (10%); thesis (50%); paper written for the advanced seminars (20%); an essay of no more than 5,000 words based on the lecture and reading course (20%).
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626-401 GEOLOGY

Geology
Admission to fourth year honours is normally open to students who have obtained 21 points or more in 300-level Geology.

Geophysics
Admission to fourth year honours is normally open to students who have obtained 18 points or more in 300-level Geophysics. Greater weight will be given to results in Geophysics units in considering applications.
Admission may also be granted to students from disciplines other than Geology with the approval of the Chairman. In such cases, Geology 111 will usually be a prerequisite.
Candidates will be permitted to specialize to a certain degree in an approved field within geology or geophysics. They will be required to:
(i) attend lectures and practical work as specified for each candidate;
(ii) attend seminars on selected topics, at least one of which they may be required to prepare and deliver;
(iii) undertake original work on a selected research problem and submit a report on their work;
In addition, some candidates may be required to commence field work connected with their research project during the preceding long vacation.

136-411 HISTORY AND PHILOSOPHY OF SCIENCE
Before entering the honours year candidates will be expected to have
(i) Completed introductory courses in both History and Philosophy of Science.
(ii) Have also completed H.P.S. unit 345 or its equivalent.
(iii) Have shown honours ability.
Students who do not fulfil these requirements may be admitted to a year of preliminary studies.
All intending candidates should consult the chairman of department before the end of their third year.
History and Philosophy of Science IV will normally consist of three two-term units including at least one History of Science and one Philosophy of Science unit. In addition, candidates must prepare an honours thesis of not more than 10,000 words. The final assessment will take into account required seminar papers, essays and the honours thesis.
Students should note that there are provisions to study for BSc Hons on a part-time basis.

456-400 INDUSTRIAL SCIENCE
Candidates will be required:
(i) To carry out a piece of original research work. A report is to be submitted on this work which should not exceed 35 typewritten double spaced A4 pages, excluding appendices, and should be submitted before 1 December of the year in which the candidate is presenting for the degree.
(ii) To carry out a literature survey of the chosen topic of research, and present this, in writing within two months of commencing the research.
(iii) To attend staff and postgraduate seminars held by the department, and such additional seminars held by other departments as are deemed appropriate.

(iv) To give such research colloquia as may be directed from time to time.

(v) To attend lectures and sit for written examinations and attend oral examinations as are specified for each candidate.

600-401 MARINE SCIENCE
Normally students will undertake an Honours programme in Marine Science within the department of their undergraduate major study. However, students wishing to undertake advanced study and a research project in the general field of Marine Science and who do not fit the conventional pattern of acceptance to B.Sc. (Hons.) in a specific discipline may be considered as an Honours student in Marine Science. Approved students would undertake a course of advanced lectures and a research project under supervision in a related department.

618-401 MATHEMATICS
Students will be permitted to enter fourth year only if they have a sufficiently good undergraduate record. Candidates must have obtained at least 27 points in 300-level Mathematics units. These units must normally include at least three units from 310, 320, 330, 340 and 360. Two of these units, or 330 and 350, in combination with other mathematics units, may be sufficient prerequisite with excellent results. This may, however, limit the choice of 400-level units.

The fourth year course will consist of:
(a) a minimum of 40 hours of formal lectures, which may include seminars, with a notional maximum of 120 hours made up of a combination of formal lectures, regularly scheduled discussions with lecturers offering reading courses and private study for such courses. The programme is made up of a study of broad areas of Pure and Applied Mathematics.

In special circumstances, and subject to approval, some Mathematics units may be replaced by 400-level units offered by other Departments.
(b) a thesis to be written on a special topic. The work for the thesis will involve the reading, analysis and collation of relevant mathematical literature. The topic should be chosen in consultation with the staff of the department, and the work will be supervised by a staff member.

Assessment will be based on written work and examinations including oral presentations. A substantial component of the assessment will be based on the thesis.

618-404 COMBINED COURSE IN MATHEMATICS AND PHYSICS
Students with sufficiently high marks in Physics and Mathematics at the 100, 200 and 300 levels may apply to enter the Combined School. In particular candidates must have at least 27 points in 300-level Physics units and at least 18 points in 300-level Mathematics units. The Mathematics units should normally comprise at least two units from 310, 320, 330, 340.
Faculty of Science

Candidates in the fourth year will undertake a programme which must be approved by both the department of Mathematics and the school of Physics. They will be required to:
(i) attend lecture courses and undertake directed reading;
(ii) attend colloquia on selected topics, one of which they may be required to prepare and deliver;
(iii) undertake original work on a selected research problem, and submit a report on their work;
(iv) sit for written examinations which may be accompanied by oral tests.

618-407 COMBINED COURSE IN MATHEMATICS AND COMPUTER SCIENCE

Students with sufficiently high marks in Computer Science and Mathematics at the 100, 200 and 300 levels may apply to enter the Combined School of Mathematics and Computer Science. In particular candidates must have at least 20 points in 300-level Computer Science units and at least 18 points in 300-level Mathematics units. The Mathematics units should normally comprise at least two units from 310, 320, 330, 340.

Candidates in the fourth year will undertake a programme which must be approved by both the department of Mathematics and the department of Computer Science. They will be required to:
(i) attend lecture courses and undertake directed reading;
(ii) attend colloquia on selected topics, one of which they may be required to prepare and deliver;
(iii) undertake original work on a selected research problem, and submit a report on their work;
(iv) sit for a written examination which may be accompanied by an oral test.

436-400 MECHANICAL ENGINEERING

Candidates will be required to:
(i) undertake advanced studies involving lectures and reading courses and
(ii) carry out and report upon a specialized research project under the supervision of a member of the academic staff. The assessment of candidates will be based on the research report, literature review, work assignments and oral and written examinations.

597-400 MEDICAL BIOLOGY

The honours course in the Department of Medical Biology will consist of approved research work conducted under the close supervision of the Director and/or one of the Senior Associates in the Department of Medical Biology. In addition, candidates will be required to attend a postgraduate lecture course run by the Department and participate in the weekly seminar series of The Walter and Eliza Hall Institute. Candidates may be asked to submit written assignments during the year and will be required to submit, in triplicate, a research report embodying the main results of the year’s investigations. An oral presentation of the work will also be given.
553-400 MEDICINE
DEPARTMENT OF JAMES STEWART PROFESSOR, ROYAL MELBOURNE HOSPITAL

Students are required to attend a weekly seminar in the department concerning their research work, and make interim reports on their research programme. At the end of the year students will be required to write up the results of their research in a form suitable for publication, and will also be called on to review the literature relating to their studies. When deemed appropriate, candidates may be required by arrangement to attend short courses of advanced instruction in other Departments of the University. The range of studies available is indicated in 553-601.

563-400 MEDICINE
ST VINCENT'S HOSPITAL

Students ordinarily work under the direction of a member of the department and are required to attend a weekly seminar in the department concerning their research work, and make interim reports on their research programme. At the end of the year students will be required to write up the results of their research in a form suitable for publication, and will also be called on to review the literature relating to their studies.

631-400 METEOROLOGY

Students with adequate background in Science including subjects such as Mathematics, Physics or Computer Science can take Meteorology at the fourth year or honours level even if Meteorology undergraduate units have not been completed. For those students who have not completed adequate Meteorology undergraduate units it will be necessary to undertake some of these at an advanced level as part of their fourth year studies.

Each student will be assigned a special aspect of meteorology or glaciology, and will be expected to attend specified lecture units, practical classes and seminars. Depending upon the department’s research programme and available specialist staff, survey lecture courses will be arranged on advanced topics such as ice dynamics, tropical meteorology, air pollution meteorology, atmospheric chemistry, climate modelling etc. If necessary, students may also take undergraduate units in Meteorology by arrangement with the department. In this case, additional advanced work is prescribed to allow for assessment at fourth year level.

Lectures will be concentrated as far as possible into the first and second terms. Each student will undertake a research project and prepare a report on the results of the work including a review of the relevant literature.

526-400 MICROBIOLOGY

Prerequisites: Candidates should normally have taken at least 22 points of 300-level Microbiology, including at least 6 points of practical units at 300-level.

The course is designed to develop the research student’s capacity to design, conduct and analyse experiments, to solve problems, to read and think critically, and to communicate articulately. Much of the time is
Faculty of Science

devoted to research in close collaboration with a member of the academic staff. In addition, there are a number of intensive short courses of advanced instruction and discussion. If it is particularly appropriate to their area of research, students may be required to undertake any of the third year unit courses that they did not complete in the third year.

ASSESSMENT A written report of 30-50 typed A4 pages describing the candidate's research. Also written examinations and/or essays based on the lecture-reading course.

577-400 OTOLARYNGOLOGY

Candidates will be required to:
(i) attend lectures and seminars on specified subjects;
(ii) prepare a written critical review of the literature on such topics as required by the head of the department;
(iii) undertake research work under the supervision of a member of the department, and submit a report on their work;
(iv) pass in such examinations as may be required by the chairman of the department.

571-401 PAEDIATRICS
ROYAL CHILDREN'S HOSPITAL

Students are required to carry out research under the supervision of a member of the department. They will normally be requested to review the literature on the selected topic and then to present a plan of their proposed research at a small meeting of research workers. Their research will be recorded in the usual thesis form for submission at the end of their period of study. Students are expected to attend relevant research meetings in the department and elsewhere within the hospital and also certain relevant seminars in other University departments. The student will also be requested to review literature on two or three other subjects more distantly relevant to their own research as exercises in the use of scientific literature.

531-400 PATHOLOGY

Students wishing to proceed to a B.Sc. (Hons.) course in the Pathology department should have taken 300-level Pathology units equivalent to at least 18 points.
(i) Candidates will be required to attend a course of lectures on theoretical and practical aspects of pathology.
(ii) A supervised reading course will be prescribed for each candidate and reports, reviews or seminars on selected topics will be required.
(iii) A research programme will be assigned to each candidate, either as a project to be carried out by the candidate under supervision, or as participation in one or more of the established programmes in the department. A research report must be submitted and a seminar given. It is recommended that the candidate begins the course during the long vacation.

ASSESSMENT The assessment of candidates will be made on the basis of a research report, a seminar, a literature review and an essay and the year's record will also be taken into account.
534-400 PHARMACOLOGY

The requirements for admission to B.Sc. (Hons.) in Pharmacology are a sufficiently good undergraduate record and the following 300 level units.

(1) Pharmacology 301 (5 points), 302 (7 points), 304 (6 points) and 305 (4 points), (a total of 22 points), or for those wishing to specialize in Toxicology, Units 301 (5 points), 302 (7 points), 303 (3 points) and 307 (5 points), (a total of 20 points). Either of these options may be taken, together with units of a second study in the biological sciences or:

(2) all 300 level Pharmacology units (a total of 30 points) together with units selected from Biochemistry, Pathology, Physiology or:

(3) candidates may be accepted with fewer points in Pharmacology than specified in (1) or (2) under special circumstances as determined by the Chairman.

The courses of study will be designed to meet the needs of each candidate. Students will work closely with members of staff and engage in the current research of the department. During the course of the year candidates will be required to:

(i) attend lectures, tutorials, practical sessions and seminars on specified subjects;

(ii) undertake research work under the supervision of a member of the department, and during the year they will receive training in other research methods and special techniques in Pharmacology and Toxicology;

(iii) present one seminar each per term in the department; and

(iv) submit a written report of project findings, including a critical review of the literature and present these results at a seminar at the end of 3rd term.

ASSESSMENT The final mark will be derived from a written report (20 typewritten pages, not including figures and references) and a verbal presentation of project findings (70%) and assignments set during the year (30%).

640-400 PHYSICS

Candidates should have passed in at least 27 points of third year Physics units including 320 or 340. They will be required to attend colloquia on selected topics, one of which they may be required to prepare and deliver, and to undertake original research in one of the School's current fields, which include Atomic and Nuclear Physics and their Applications, Gravitation, Neutron Physics, Optics, Particle Physics, Solid State Physics and Theoretical Physics.

All candidates are required to take two 20-lecture Quantum Mechanics courses and to take four other courses, which will depend on their speciality. The selection must be approved by the School. The average load is about 140 lectures.

Most, but not all, courses will be given every year. From time to time lecture courses will be offered on other topics related to the research interests of the School. With approval, subjects from other departments may be taken.
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FOURTH YEAR UNITS:

401 PHYSICS: QUANTUM MECHANICS
K. A. Amos, I. Morrison

40 lectures; 1st and 2nd terms; assessment based on problems and assignments during terms and open book examinations at end of each term.

The aim of this course, which builds on the work of the third year quantum mechanics units, is to give students a working knowledge of non-relativistic and one-particle relativistic quantum mechanics, adequate as preparation for other graduate courses and for their research. The main topics are: review of basic quantum ideas; transformations and symmetries (including the theory of angular momentum); exact and approximate methods for treating time-independent and time-dependent problems; scattering and collision theory; mixed states and the density matrix; many-body problems and 'second quantization'; path-integral formulation of quantum mechanics; the Dirac equation and other equations of one-particle relativistic quantum mechanics.

402 PHYSICS: NUCLEAR STRUCTURE
B. M. Spicer

20 lectures; 1st term; examination of open book form with 8 hours maximum to complete.

An advanced course on models of nuclear spectroscopy. Both macroscopic (collective) and microscopic (shell model) models of spectroscopy are discussed with specific reference to the spin, parity and static moments of and electromagnetic transition rates between low excitation states of nuclei.

403 PHYSICS: NUCLEAR REACTION THEORY
K. A. Amos

20 lectures; 2nd term; examination of open book form and 8 hours' maximum length, plus assessments of problems and/or written assignments.


404 PHYSICS: ASTROPHYSICS
G. I. Opat

30 lectures; 2nd term; assessment based on all-day open book examination and on problem sheets.

405 PHYSICS: DIFFRACTION
Z. Barnea
20 lectures; 1st term; written paper or project.
Starting from fundamental principles, a select number of important topics in diffraction is followed to the present state of their understanding. The use of current literature is introduced and encouraged.

406 PHYSICS: SOLID STATE PHYSICS
A. E. C. Spargo
20 lectures; 2nd term; project or written paper.

407 PHYSICS: CONDENSED MATTER PHYSICS
N. E. Frankel
30 lectures; 2nd term; all day examination plus problems throughout the term.
Perturbation theory for many-body systems is developed. Physical systems studied are: the electron gas, nuclear matter, superconductors, superfluid helium. Applications to plasma physics, astrophysics, and low temperature physics are emphasized.

408 PHYSICS: STATISTICAL MECHANICS
K. C. Hines
20 lectures; 1st term; assessment based on problems given throughout the course and on a “take home” examination.

409 PHYSICS: CLASSICAL FIELDS AND GENERAL RELATIVITY
R. Warner
30 lectures; 2nd term; examination by a combination of written examination and graded long and short assignments.
Review of special Theory of relativity.
Introduction to differential geometry, tensors and forms.

410 PHYSICS: QUANTUM FIELD THEORY
B. H. J. McKellar
30 lectures; 1st term.
Classical fields; quantum theory of radiation; Dirac equation; field quantization; CPT symmetry; covariant perturbation theory; renormalization.
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411 PHYSICS: PARTICLE PHYSICS I (EXPERIMENTAL AND PHENOMENOLOGICAL)
S. N. Tovey
20 lectures; 1st term, assessment based on 6-hour open-book examination and on problem sheets.
Historical introduction; Existing and planned facilities; Classification of particles and interactions; Kinematics; Lorenz invariant phase space; Intrinsic particle properties; Symmetries and conservation laws; Strong interaction phenomenology; Electron-positron interactions; Elastic and inelastic lepton-nucleon scattering; Phenomenology of the weak interactions; Introduction to gauge theories.

412 PHYSICS: PARTICLE PHYSICS II (THEORY)
G. C. Joshi
20 lectures; 2nd term; assessment based on 6-hour terminal examination and on problem sheets.

413 PHYSICS: ASTRONOMY
Not offered in 1988.
1st and 2nd terms; testing by continuous assessment during the course.
A number of topics — Interstellar dust; stellar structure and evolution; colour and temperature of stars; stellar atmospheres; stellar spectra — continuum and line; active galaxies — are studied in some detail.

536-400 PHYSIOLOGY
Admission to the 400 level is open to students qualifying for B.Sc. in Physiology or in related disciplines.
Candidates may specialize either in systemic or cellular physiology.
They will be required to:
(i) attend lectures, tutorials and seminars on specified parts of the subject and undertake a course of directed reading relating to these;
(ii) carry out under direction a circumscribed investigative study and prepare a report of this work;
(iii) prepare a critical review of the literature on one or more topics set by the supervisor;
(iv) pass in such examinations as may be required by the chairman of the department.

554-400 PSYCHIATRY
DEPARTMENT OF CATO PROFESSOR, ROYAL MELBOURNE HOSPITAL
A supervised reading course will be prescribed for each candidate and reports, reviews or seminars on selected topics will be required. A research project will be assigned and at the end of the year a report describing the results, together with a critical review of the relevant literature, must be submitted.

171-401 PSYCHOLOGY
Convener: Dr V. M. Holmes
SYLLABUS The work for the honours units in fourth year consists of a compulsory section of one unit, a further three units selected from a
set of options, and a mandatory research thesis based on a substantial project which is expected to involve in terms of work required approximately the equivalent of four units.

COMPULSORY AND OPTIONAL UNITS Units consist of not less than 24 and not more than 28 hours of lecture/discussions, and normally not more than 12 hours of laboratory and practical work. Not all units will be offered in any one year and all units have quotas. Details will be published on the Departmental notice board at the beginning of first term, and will also be available in the Fourth Year Honours Manual. Up to two Honours units may be substituted by units in cognate areas (e.g. Mathematics, Statistics, Physiology) with the approval of the Convenor of Fourth Year and the Chairman of the Department in cases where a student intends to specialize in a particular area of Psychology.

ASSESSMENT For all units (optional and compulsory) listed below, the assessment will consist of either a final examination of not more than 2 hours at the end of the year or the conclusion of the unit, or a practical work report or an essay not exceeding 5,000 words in length or any combination of two of these. Further details will be published on the Departmental notice board at the beginning of first term regarding which form of assessment will be used with each unit, and the dates of any unit examinations.

For those units in which there is a practical work component, a Pass (D) standard will need to be achieved in that component in order to obtain at least a pass in the unit.

The final grade will be based on Psychology 302 and the fourth year honours units and thesis. Each of the ten units will have a weighting of 1 and the thesis will have a weighting of 4.

FURTHER DETAILS References in addition to prescribed reading will be published in the Departmental Fourth Year Honours Manual which will be available in the Department in February.

COMPULSORY COURSES Students are required to complete one compulsory unit and three optional units to be chosen from the list below, and a research thesis.

COMPULSORY UNIT
Theory in Psychology B.

RESEARCH THESIS
This is normally planned by the end of third year and submitted toward the end of fourth year. For further details see the Fourth Year Honours Manual issued by the department.

OPTIONAL UNITS
Three of the following units are to be selected in fourth year. Not all of the units will be offered in any one year; the department's Fourth Year Honours Manual lists the units available in the current year, the unit quota, the syllabus and the assessment details for each unit.

Group A
Psychology of Language; Cognitive Processes; Information Processing; Perception B; Human Performance; Psychophysics; Introduction to Simulation; Models of Data in the Social Sciences; Analysis of Categorical Data; Applied Psychological Measurement; Neuropsychology B.
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Group B
Interaction in Groups; The Child and its Family; Cognitive Development B; Social Interaction Processes C; Psychology of Religion; Social Indicators and Public Policy; Psychology of Politics; Sex, Gender and Behaviour; Psychology of Adolescence; Adjustment in Childhood.

Group C
Introduction to Occupational Psychology; Communication and Specific Learning Disorders; Psychopathology B; Neuropsychology C.

619-400 STATISTICS

Students will be permitted to enter fourth year if they are awarded faculty honours and have at least a C average in 20 points of 300-level Statistics units. In addition, students are strongly advised to take some 300-level Mathematics units as part of their third year. Students who do not meet the above requirements but who achieve very good results in other areas may be considered for entry into fourth year on the recommendation of the Chairman of the Department of Statistics.

The fourth year will consist of:
(a) About 160 lectures (arranged in units), at least half of which must be in Statistics units, subject to the following restrictions:
(i) The Statistics units may be selected from Statistics 400 level units, Statistics 300 level units not previously taken, and approved units from the Statistics MSc coursework units. Not all these units may be offered depending on staff availability and enrolment numbers.
(ii) All students are required to take the unit 619-411: Data Analysis, which includes gaining some practical experience through the Statistical Consulting Centre.
(iii) Any student who has not taken Statistics 301 and 302 in third year must do so as part of their fourth year.
(iv) The remaining units are to be taken in appropriate courses offered by other departments. These units are usually, but not necessarily, Mathematics units.
(v) Each student's selection of units must be approved by the Chairman of the Department of Statistics.

(b) A special project to be written on a selected topic. The work will involve reading, analysis and collation of relevant probabilistic or statistical literature. A written and verbal report on the project must be presented during third term. The work will be supervised by a staff member. All students are required to present a talk on their project topic at the Annual Statistical Workshop.

The final result of the fourth year will be determined on the basis of examinations, set work and the special project. Weightings of assessment components will be made known at the commencement of the course. Individual units at Statistics 400 level may be taken by students in other disciplines, with the approval of the Chairman of the Department of Statistics.

ASSESSMENT FOR STATISTICS 400-LEVEL UNITS One 2-hour written examination and/or assignments up to a maximum of 40 pages. The unit examinations will be held in the times provided during the year.
401 ADVANCED PROBABILITY

402 FURTHER ADVANCED PROBABILITY

403 DISTRIBUTION THEORY
SYLLABUS A selection of topics from: mixtures of distributions, non-central distributions of test statistics; infinitely divisible distributions; characterization of distributions.

404 MULTIVARIATE ANALYSIS
SYLLABUS Structure of bivariate and multivariate distributions; multivariate normal distribution. Regression of vectors on vectors; canonical variables and correlations, discriminant analysis; linear functional relations. Tests for hypotheses about multivariate normal populations.

405 ADVANCED INFERENCE
SYLLABUS Estimation and hypothesis-testing, including a selection of topics from applications of likelihood, sufficiency, conditionality, the invariance principle; asymptotic methods. Bayesian inference.

406 STOCHASTIC PROCESSES A

407 STOCHASTIC PROCESSES B

408 QUEUES AND STORAGE
SYLLABUS M/M/C as birth and death processes, limit results. M/M/C, M/D/C, M/E_k/1 limit results. M/G/1, transient and limit results, queue size, imbedded Markov chain, virtual waiting time, modifications, applications to traffic. GI/G/1, waiting time, Spitzer’s identity. Priority queues. Moran model of discrete dam. Continuous and compound Poisson input processes, uniform and general release rates.

409 SPECIAL LECTURES
SYLLABUS Topics offered by staff and visiting lecturers based on current research interests.
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411 DATA ANALYSIS
The study of a selection of topics relating to data analysis. Possible topics include: log-linear models, probit analysis, discriminant analysis and transformations. In addition students will be required to analyse data arising from consulting projects and to write reports that summarize in both technical and non-technical terms the salient results of the work.

430 PROJECT
The study of a special topic in Statistics or Probability or related Mathematics, involving the reading and collation of the relevant literature, and the presentation of a thesis embodying this work.

556-400 SURGERY
DEPARTMENT OF JAMES STEWART PROFESSOR, ROYAL MELBOURNE HOSPITAL
Candidates may undertake a research project in a variety of surgical science subjects including immunology and oncology. Exposure to principles of research and scientific communication will be obtained, and ample opportunity is provided to attend relevant courses. Candidates will take part in regular departmental seminars, and will be expected to review relevant scientific and medical literature, and prepare a report of their work in an acceptable form for publication. Enquiries are welcomed and can be directed to Professor G. J. A. Clunie.

654-400 ZOOLOGY
Candidates are expected to have completed 24 points of 300-level Zoology or an equivalent level of studies. Acceptance is subject to the availability of suitable supervisors and topics, and placement is treated competitively. The chairman may waive these requirements at his or her discretion.

Candidates will be required to:
(i) undertake a research project and present both a written and an oral report on it at the end of the year;
(ii) attend prescribed course work on selected practical and general topics;
(iii) undertake prescribed written and tutorial assignments; and
(iv) attend departmental and other recommended seminars.
Assessment will be based on the research report and on relevant information from essays, courses, etc.
CHAPTER 9

MASTER OF SCIENCE

REGULATION

Regulation 3.24—Degree of Master of Science

1. A person (other than a candidate under section 8) who—
   (a) (i) has completed the degree of bachelor of Science or bachelor of Science (degree with honours) in the University; or
   (ii) has been admitted in another university or tertiary educational institution to a degree recognised by the Faculty of Science ("the faculty") pursuant to Regulation 3.3.1 as appropriate for the purpose of this regulation; or
   (iii) produces evidence satisfactory to the faculty that the person has had adequate training and has the ability to pursue the course of advanced study and research proposed for the degree of Master of Science ("the degree"), and
   (b) has undertaken any preliminary courses of study required by the faculty and has satisfied the examiners in relation to any assessments prescribed by the faculty;

may, with the consent of the faculty, be admitted to candidature for the degree.

2. (1) A person who qualifies for admission to candidature pursuant to section 1 shall, before being admitted to candidature, obtain the approval of the faculty for—
   (a) candidature; and
   (b) the course of advanced studies ("the approved course") which the applicant proposes to pursue as a candidate for the degree.

(2) The approved course for the purpose of this regulation may be an approved course—
   (a) by thesis; or
   (b) by coursework and minor thesis.

(3) A candidate shall obtain the approval of the faculty for any subsequent change in the approved course.

(4) A candidate shall comply with such Rules made pursuant to this section as may be approved by the Academic Board on the recommendation of the faculty and published with the details of subjects.

(5) Where a candidate fails to comply with any rule made pursuant to paragraph (4) hereof, either generally or specially in relation to that candidate, the faculty, after giving the candidate concerned an opportunity to be heard, may—
   (a) make such changes in the conditions of the candidature, including variation of the candidature from full-time to part-time, as it thinks fit;
   (b) suspend the candidature for such period as it deems appropriate; or
   (c) terminate the candidature.
3. (1) A candidate for the degree by thesis will engage in an approved course of advanced study and research on a full-time basis for a period of not less than twelve months under such supervision as the faculty may prescribe.

(2) A candidate for the degree by thesis may be required to undertake formal study in one or more subjects where the Faculty, on the recommendation of the chairman of the appropriate department, considers such study to be necessary or desirable to complement the candidate's research.

(3) A person including a full-time candidate may be accepted by the faculty as a part-time candidate if the faculty is satisfied that any occupation in which that person is engaged leaves that person substantially free to pursue the course under the direction of a department of the University.

(4) A part-time candidate will engage in an approved course of advanced study and research for a period of not less than twenty-four months under such supervision as the Faculty may prescribe.

(5) A candidate shall submit for examination within the period prescribed by the faculty a thesis based on the work carried out by the candidate during the approved course and satisfy the examiners in the assessment of such subjects as may be prescribed.

4. (1) A candidate for the degree by coursework and minor thesis shall —

(a) pursue advanced studies in an approved course under such supervision as the faculty may prescribe —

(i) on a full-time basis for not less than twelve months; or

(ii) on a part-time basis over a period of not less than twenty-four months; or

(iii) on a basis including full-time and part-time study deemed by the faculty to be the equivalent of (i) and (ii) in a particular case;

(b) satisfy the examiners in such assessment as may be prescribed; and

(c) submit a minor thesis based upon work carried out by the candidate during the approved course.

(2) The subjects of the course for the degree and the conditions upon which such subjects may be taken shall be as prescribed from time to time by the Academic Board on the recommendation of the faculty and published with the details of subjects.

5. Notwithstanding anything to the contrary the faculty may accept previous candidature for a higher degree of the University as satisfying part or all of the minimum period of candidature prescribed in sections 3 and 4.

6. The maximum period of candidature for completion of the course whether by thesis or by coursework and minor thesis shall be as prescribed in the Rules made pursuant to section 2(4).

7. (1) After being accepted a candidate shall pursue a course of advanced study and training in research in the University under supervision prescribed by the faculty, save that when the chairman of the appropriate department recommends that it is essential for the candidate to obtain material for his or her course away from the University the faculty may grant permission for the candidate to be absent from the University for such periods as may be deter-
mined in each case, provided that supervision satisfactory to the faculty can be maintained; 

(2) a candidate for the degree of Master of Science may not except by special permission of the faculty enrol for any subject other than those prescribed for the completion of the course for that degree.

8. A full-time candidate shall be required during the course to devote his or her whole time to the approved course save that the faculty may allow a candidate on application to undertake a limited amount of university teaching or outside work which in its judgement will not interfere with the pursuit of the approved course.

9. Notwithstanding anything to the contrary a candidate who has qualified to graduate as a bachelor of Science of this university not less than four years previously and has graduated may with the approval of the faculty on the recommendation of the Chairman of the relevant department, submit for examination his or her published or unpublished work based on research in an approved branch of Science.

10. For the purposes of Regulation 4.4.1 the thesis or minor thesis shall be written in the English language unless the Council on recommendation of the faculty and the Academic Board otherwise determines.

11. A candidate in submitting a thesis or minor thesis shall state generally in a preface, and specifically in notes, the sources from which the information is derived, the extent to which he or she has collaborated with others, and in general terms the portions of the work which he or she claims as original. When a candidate submits work carried out in collaboration with another person, the candidate's share of the work shall be indicated.

12. A candidate may not present as a thesis any work for which a degree has been conferred in this or another university or institution. If a candidate incorporates such work as background, the work or any part thereof which has been incorporated in the thesis or minor thesis must be clearly indicated, and the examiners are instructed to take account thereof.

13. Where a thesis has been judged unsatisfactory by the examiners but the examiners have recommended that the candidate be given an opportunity to re-submit the thesis or minor thesis for re-examination, the faculty shall specify the period within which the thesis or minor thesis must be re-submitted.

14. Candidates who have fulfilled the prescribed conditions and whose thesis or minor thesis has satisfied the examiners may be admitted to the degree of Master of Science.

TEMPORARY REGULATION

1. A candidate who has been admitted to the course prior to 30 June 1987 under the provisions of section 8(b) of the regulation in force on that date may complete the course under the regulation in force on that date provided that his or her published or unpublished work based on an approved research topic is submitted for examination prior to 30 June 1993.

2. This temporary regulation shall expire on 31 December 1993.

GENERAL PRINCIPLES OF SELECTION FOR ENTRY TO POSTGRADUATE COURSES

See Appendix 1.
Faculty of Science

MELBOURNE UNIVERSITY RESEARCH REPORT
Students considering work for higher degrees should consult the Melbourne University Research Report, available from the Baillieu Library. Since the 1986 edition this has been incorporated in a new publication, University of Melbourne Research.

FORMAT OF THESES
DIRECTIONS OF THE ACADEMIC BOARD PURSUANT TO REGULATION 4.4.1

(i) Theses should be typed on A4 paper with a left hand margin at least 4 centimetres wide.
(ii) Pages should be consecutively numbered: if sheets are interpolated they should be lettered consecutively, each letter being preceded by the number of the last previous numbered page.
(iii) Folding diagrams and charts should be arranged so as to open out to the top and right.
(iv) The title page must show the title of the thesis or work, the degree or diploma for which it is submitted, the name of the department or faculty to which it is submitted and the full name of the author.
(v) The original or a good quality photocopy on bond paper shall be bound in such manner that it will stand on a shelf as a book (with the name of the author and the title or an abbreviation thereof appearing on the spine) for deposit in the library of the University pursuant to Regulation 4.4.4.

FACULTY RULES CONCERNING THE DEGREE OF MASTER OF SCIENCE
The Degree of Master of Science is controlled by the Faculty of Science and is governed by both Regulation 3.24 and the following rules which have been adopted by Faculty and approved by the Academic Board.

1. Preamble
   The following rules apply to both full-time and part-time candidature. Additional rules governing special candidature under Section 8 are set out below in Section 9.

2. Minimum and Maximum Periods of Candidature
   The minimum period of full-time candidature is one year and the maximum period is two years. The minimum period of part-time candidature is two years, and the maximum is four years. Candidates who change their enrolment status will have minimum and maximum periods assigned on a pro rata basis. (Note: It is expected that full-time candidates will generally complete within 18 months, and part-time candidates in 3 years.)

   Extensions may be granted by Faculty only in special circumstances on the recommendation of the relevant Chairman of Department.

3. Supervision
   A supervisor must be a full-time or fractional full-time member of the academic staff of the University.

   (In the case of limited tenure staff, care should be taken to appoint as supervisors, staff who are eligible to be employed for the duration of the student’s candidature in order to ensure continuity of supervision.)

4. Employment
   4.1 Full-time Candidates
   Full-time candidates are advised that they should not undertake
more than 6 hours per week on average of paid or unpaid employment over the calendar year.

4.2 *Part-time Candidates*
Chairmen of Departments should satisfy themselves that part-time candidates have sufficient time available to devote to their research in order to complete the M.Sc. degree in the specified time, and certify to this effect. Students should note that extensions will *not* be granted on the grounds of outside work commitments.

5. *Change of Status*
A candidate may apply to change status from full-time to part-time candidature (or vice-versa) if employment conditions vary from those at the time of initial enrolment. Such applications should be made *in advance*, and should be endorsed by the supervisor and chairman of department.

6. *Leave of Absence*
Leave of Absence is granted on the understanding that, during the period of leave of absence, the candidate is not undertaking work towards the degree. Written requests for Leave of Absence stating reasons for request must be endorsed by the Supervisor and Chairman and then forwarded to Faculty *in advance* of the period of Leave of Absence.
Leave of Absence may be granted for up to 12 months in any one instance by Faculty on the recommendation of the Chairman of the Department.

7. *Study Away from the University*
Candidates are required to apply *in advance* for permission to spend time away from the University (e.g. overseas), to be counted towards their M.Sc. candidature.

8. *Non-Attending Status*
Non-attending status is a form of enrolment and not a category of candidature. A full-time or part-time candidate not attending the University or using the facilities (e.g. when writing up the thesis) can apply to Faculty to have non-attending status. Applications must be endorsed by the supervisor and Chairman of Department. Such candidates are not liable for Amenities and Services fees, but will be required to pay the Government Administration charge.

9. *Candidature under Section 8*
9.1 A candidate submitting a thesis under section 8 will enrol once only at the time of submission of the thesis.
9.2 *Submission of Collection of Papers*
A candidate who intends to present a collection of papers either published or in manuscript, should include a general introduction and literature survey, a co-ordinating summary and a general discussion. When a candidate submits work carried out in collaboration with another person or persons, the candidate's share in that work shall be indicated.

10. *Examination of Theses* (major and minor)
10.1 *Binding of Thesis*
A candidate may submit three copies of the thesis in a loose-bound form for examination purposes. However, two hard-bound copies of the thesis will be required to be submitted before a pass result will be returned.
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10.2 Examiners
Two examiners, at least one of whom will be external, will be appointed to examine the thesis.

10.3 Oral Examinations
In addition to submitting a thesis, a candidate pursuant to section 8 of Regulation 3.24 is normally required to attend for an oral examination.

516-601 ANATOMY
Candidates are required to carry out original research in a branch of Anatomy to be approved by the professor of Anatomy; to prepare a thesis embodying the results of this work; and to prepare a critical review of the international literature on the subject.

577-602 AUDIOLOGY
The department of Otolaryngology offers a three year part-time graduate programme leading to a Master of Science by course work and minor thesis in Audiology. This is equivalent to a one-year full-time programme. The programme aims to provide a higher level of training in special areas with clinical application for children and adults than provided in the department’s Postgraduate Diploma in Audiology. Both clinical and research skills are regarded as important and the teaching programme combines the academic courses with supervised practical work. Candidates should normally hold the Postgraduate Diploma in Audiology from the University of Melbourne or its equivalent, or have appropriate training and qualifications in accordance with regulations for the Master of Science degree.
The course is offered on a three-year part-time basis. Students who have full-time employment may be admitted to the course providing a substantial amount of time in their employment is spent in clinical audiology and that a significant amount of their research can be undertaken in working hours. These candidates must also be free to attend the University for at least half a day per week in normal working hours.

SYLLABUS
The programme is composed of academic/educational, clinical and research components. Students must complete the clinical component in their first two years of the programme; the academic/educational component will be spread over the three years.
1. Academic/educational: This component is divided into nine units, from which six are selected, each consisting of thirteen 2-hour seminar/lectures held in the early evening. Students must complete the compulsory Research Methods unit in the first year. This unit will be offered every year; all other units in every second or third year.
Students must select five of the remaining eight units. The units are scheduled so that students will average a seminar load of two hours per week throughout the three academic years of the course.
2. Clinical: All students will be required to participate in 32 three-hour clinical/practical sessions which will be distributed throughout the programme. These will be directly related to the selected academic units. Students will also be required to do a further 18 half-day supervised clinics per semester for the first two years or will be supervised for a similar number of clinics in their employment. The arrangements for each student will depend on the nature of the student’s employment.
There are 312 clinical/practical hours in the programme. The nature of the clinics will be both diagnostic and rehabilitative with emphasis depending on the unit selected.

3. Research: Candidates must complete a thesis on an approved topic of clinical or scientific interest. The thesis (maximum length 20,000 words) will constitute 35% of the final assessment.

ASSESSMENT OF COURSE WORK
For each unit:
(a) one 3-hour written examination or one essay (maximum 5,000 words) and —
(b) assessment during the course consisting of an oral seminar paper or a practicum assignment (maximum 2,500 words).

At the completion of all course work, there will be one viva voce examination of about one hour.

The clinical component will be assessed separately. Regular attendance at, and participation in clinical/practical classes will be required. Over the three years of the programme students may be required to submit not more than eight clinical/practical reports (maximum length 2,500 words each). Satisfactory completion of each report is required.

The course work component constitutes 65% of the total assessment of which approximately 45% is from the unit assessments and 20% from the clinical/practical assessments.

Details of course work assessment will be published at the commencement of the academic year.

COURSE UNITS

611 RESEARCH METHODS
Issues relating to research strategies and procedures including aspects of quantitative methods to assist the students in planning of the research component of the course.

612 ADVANCED DIAGNOSTIC TESTING
Not available in 1988.

Advanced techniques in the assessment of adult patients. Topics covered may include: Otology, speech audiometry, site of lesion tests, evoked response audiometry, auditory brainstem responses, electrocochleography, tests for central auditory dysfunction, electronystagmography, compensation testing. The unit will be supplemented by clinical/practical sessions.

613 HEARING AIDS AND REHABILITATION
Issues relating to the selection and evaluation of hearing aids and the aural rehabilitation of adults. Topics covered may include the electroacoustic characteristics of hearing aids, hearing aid selection and evaluation, mould acoustics, directional microphones, radio systems, hearing aid orientation and counselling, individual rehabilitation, auditory training related to speech production, the development of tests and training material for perceptual skills. The unit will be supplemented by clinical/practical sessions.

614 SPEECH PERCEPTION AND SENSORY AIDS FOR THE DEAF
The latest advances in cochlear implants and tactile vocoders. Topics covered may include cochlear implants, tactile vocoders, psycho physics of electrical stimulation, psychophysics of tactile stimulation, coding of speech, patient selection, rehabilitation and postoperative testing of
implant patients, rehabilitation with tactile vocoders, research directions. The unit will be supplemented by clinical/practical sessions.

**615 ADVANCED PEDIATRIC AUDIOLOGY**
Not available in 1988.
Issues relating to advanced pediatric audiological evaluation. Topics covered may include pediatric otology, development of infant and young child, behavioural tests of hearing in the infant and young child, objective tests of hearing, auditory perception and testing, perceptual testing, central testing, the multiply-handicapped deaf child, theories of speech perception, disorders of speech perception, pediatric speech audiometry, articulation and articulation disorders. The unit will be supplemented by clinical/practical sessions.

**616 THE AUDITORY SYSTEM — PHYSIOLOGY AND PSYCHOPHYSICS**
Not available in 1988.
Auditory physiology and psychoacoustics. Topics covered may include the anatomy of the ear and auditory neuroanatomy, middle ear physiology, cochlear physiology, auditory neurophysiology, psychoacoustics including pitch perception, binaural listening, localization, psycho-physical tuning curves, critical bands. The unit will be supplemented by practical sessions.

**617 EDUCATIONAL AUDIOLOGY**
Advanced issues in the audiological assessment and management of the hearing-impaired child in the educational setting. Topics covered may include hearing aid selection and evaluation in children, environmental acoustics, psychoacoustics and speech perception, specialized speech audiometry, development of auditory skills and its relation to visual and tactile perception of speech, the use of audiological results in planning programmes for children, auditory training methods. The unit may be supplemented by practical sessions.

**618 EARLY INTERVENTION AND PARENT GUIDANCE FOR THE HEARING-IMPAIRED CHILD**
Not available in 1988.
The early intervention and education of young (pre-school) hearing-impaired children and their parents. Topics covered may include rationale for early intervention, approaches to counselling and the counselling needs of parents with hearing-impaired children, role of the parent in the cognitive, social and communicative development of hearing-impaired children, assessment of parent-child interaction and communication, parent-child relationships, family structures, anxieties of parents with hearing-impaired children. The unit may be supplemented by practical sessions.

**619 LINGUISTIC DEVELOPMENT OF HEARING-IMPAIRED CHILDREN**
Not available in 1988.
Issues relating to the development of language in hearing-impaired children with delayed or deviant linguistic development, including the assessment of linguistic skills and the natures of the various language programmes used in educational setting for hearing-impaired children. Topics covered may include social and cognitive bases of language development, semantic and syntactive development, deviant delayed language development, developmental and remedial treatment of delayed and deviant language, language acquisition by hearing-impaired children,
comprehension and acquisition of written language by hearing-impaired children, language programmes and curriculum for hearing-impaired children in various settings, assessing language and communication development. The unit may be supplemented by practical sessions.

521-601 BIOCHEMISTRY
Candidates will be required to spend one year as full-time students in the Department of Biochemistry during which time they will be expected to undertake an original investigation on an approved subject and present a thesis containing a literature survey related to the investigation.

606-601 BOTANY
Candidates are required to submit a thesis which embodies the results of research in some approved field of Botany and incorporate with this report (generally the Introduction) a critical survey of the relevant literature (including that in foreign languages). Candidates commencing MSc studies with BSc ordinary degree may be required to pass a qualifying examination at the end of the first year. This will be essentially similar to the BSc Hons. course (606-401). Internal candidates are required to participate in all official seminars of the Department.

411-605 MSc-CHEMICAL ENGINEERING
Candidates will undertake original research on an approved topic and present a thesis thereon. Course work and written and/or oral examinations may fulfil part of the requirements if approved.

610-601 INORGANIC CHEMISTRY
610-602 ORGANIC CHEMISTRY
610-603 PHYSICAL CHEMISTRY
Candidates will undertake original research under the supervision of a staff member. The student's choice of topic must be approved by the chairman of the department. Candidates will submit a report embodying the results of their research, together with a review of cognate literature, including that in foreign languages. Written and/or oral examinations may also be given to test the candidate's general knowledge of Chemistry, with special reference to its modern developments.

421-605 CIVIL ENGINEERING
Candidates will undertake original research under the supervision of a member of the Civil Engineering staff. Advanced course work within the graduate school of civil engineering or course work provided by other departments may be required if it is considered relevant by the chairman of department. Candidates are encouraged to submit interdisciplinary research projects which interface between science and engineering. A copy of the course details is available from the co-ordinator of graduate studies in the department of Civil and Agricultural Engineering.

622-601 COMPUTER SCIENCE
Candidates are required to undertake original research in an approved field of Computer Science. They will submit a report on the outcome of this research together with a critical survey of the relevant literature.
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230-601 DENTAL SCIENCE
Candidates are required to undertake research in a field approved by the Chairman of the appropriate department in the Faculty of Dental Science. The research project undertaken will be conducted under supervision. Candidates may be required to submit progress reports and to attend courses of lectures and seminars related to their studies. At the end of the course, candidates will be required to submit a thesis for examination that conforms to the requirements approved by the Faculty of Science.

431-605 ELECTRICAL ENGINEERING
Candidates will be required to attend such advanced lecture courses as are offered each year in the department not exceeding 50 lectures total. Candidates will also be required to carry out an original research investigation, submitting this as a formal written report, and attend research seminars.
Candidates may also be given selected topics in literature to review and present as written submissions.

705-608 ENVIRONMENTAL STUDIES
Candidates shall have completed the requirements for the degree of Bachelor of Science (degree with honours) or equivalent. Candidates will be required to carry out original research, under supervision, in an approved field of Environmental Studies pertinent to the interdisciplinary research work of the School of Environmental Planning to be determined in consultation with the Chairman of the School; and to submit a thesis embodying the results of this work, incorporating with it a critical survey of the relevant literature. They may also be required to attend special lectures and seminars and to take part in field work.

585-601 EPIDEMIOLOGY
Potential candidates should direct inquiries to the Department of Community Medicine before applying for admission through the faculty. Approved candidates are required to undertake original research in an approved field of inquiry under the direction of a member of the department. They are required to submit a thesis embodying a literature review relevant to the field of study and the results of their research.

652-601 GENETICS
Candidates will be required to carry out and present a report upon some original research. They may also be required to write a review of the literature of some wide branch of Genetics. If a written examination is to be held, candidates will be so informed before the end of the first term. Candidates will be expected to attend and take part in the seminars which are held periodically in the department.

121-602 GEOGRAPHY
Candidates must hold the degree of Bachelor of Science with Honours, or an equivalent qualification. Potential candidates should make enquiries to the Chairman of the department before applying for admission through the faculty.
Candidates are required to conduct original research, upon a topic approved by a committee of the Department (that will include the chairman and the candidate's supervisors). Candidates are advised to begin any necessary field work in the preceding long vacation. Candidates will also be required to attend departmental research seminars and to give seminars on work in progress, as appropriate, and may be required to attend courses relevant to their research problem. The results of the research are to be written up in a thesis that may not exceed 40,000 words. An oral examination may also be required.

626-601 GEOLOGY
Candidates are required to carry out original research in an approved field within geology or geophysics, to be determined in consultation with the head of the school; to commence field work connected with their research project during the preceding long vacation; to attend all official departmental seminars and to prepare and deliver at least one of these; and to submit a thesis which embodies the results of their research. An oral examination may also be required.

136-602 HISTORY AND PHILOSOPHY OF SCIENCE
Candidates who have completed the requirements for BSc Hons. or equivalent, must prepare a thesis on an approved subject, and must also undertake specified seminar work. It is possible to study for the MSc degree as a part-time candidate. Please consult the current edition of the Faculty of Arts Handbook under the listing of Master of Arts.

456-605 INDUSTRIAL SCIENCE
Candidates shall have completed the requirements for the degree of Bachelor of Science (degree with honours) or equivalent.
Candidates will carry out study and research in some field of science pertinent to the work in the department. They will be required to submit a thesis embodying the results of their research together with a critical review of the literature.
Candidates will be required to give such research colloquia as may be directed from time to time.
Written and/or oral examinations may also be given.

618-601/603 MATHEMATICS

By Thesis (618-601)
Candidates must hold the degree of Bachelor of Science with Honours in Mathematics, or an equivalent qualification. They will carry out study and research in some approved field of Pure or Applied Mathematics, involving the reading of the relevant periodicals and other literature. They will present a thesis embodying their reading and research.
Candidates also may be examined orally on the subject of the thesis. Colloquia are held to assist students in their work.

By Course Work and Research Report (618-603)
The course is available to candidates who have either: (i) an honours B.Sc. degree in mathematics or related disciplines, or (ii) a pass B.Sc. degree comprising a substantial mathematics component, or an equivalent qualification.
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The degree for entry point (i) will require one year of full-time or two years of part-time study comprising a total of five units of lectures chosen from the list below, and a research report written on a special topic under the supervision of a member of staff. The research report will normally be about one-quarter of the length of a thesis submitted by a candidate proceeding to the degree of M.Sc. by thesis alone, and will comprise 20% of the final assessment.

The degree for entry point (ii) will require two years full-time or four years part-time study (the first part being an M.Sc.(Prelim.) course), comprising a total of ten units of lectures chosen from the list below, and a research report as described above also comprising 20% of the final assessment.

A series of three units, each consisting of an equivalent of 24 one-hour lectures, will be offered under each of the following headings:
610 Analysis, 620 Algebra, 630 Geometry and Topology, 640 Applications and Modelling, 650 Mathematical Physics, 660 Operations Research.

Units are of equal value and will be examined at the end of the term in which they are offered by one 2-hour written examination or assignments totalling approximately 20 written pages but not more than 30 written pages.

Type (i) students will normally be expected to choose their course units from at least two different subject headings and type (ii) students from at least four different headings.

With the approval of the Chairman of the Department and the Faculty of Science, units offered elsewhere may be substituted for some of the above units, provided such units have not constituted part of a qualification already held by the candidate.

610 ANALYSIS

611 Measure theory and functional analysis:

612 Spectral theory and distributions:
Bounded linear operators on Banach spaces, resolvent and spectrum, compact operators, normal operators. Test functions, differentiation and structure of distributions, transforms, Sobolev spaces, PDEs.

613 Banach algebras:
Regular and singular elements, representations, radical and semi-simplicity, commutative Banach algebras, Gelfand mapping, $C^*$ and $B^*$ algebras, joint spectra.

614 Research topics in analysis:
A selection of not more than two of the following topics: almost periodic functions, generalized variations, generalized integrals, locally convex spaces, non-linear analysis.

620 ALGEBRA

621 Combinatorial group theory:
Presentations of groups by generators and relations, properties of group theoretic constructions.
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622 *Infinite soluble groups:*
Properties of soluble and nilpotent groups, techniques of commutative algebra.
623 *Mathematical logic:*
Topics in model theory, decision problems in algebraic systems.

630 GEOMETRY AND TOPOLOGY
631 *Differential geometry I:*
Connections, curvature, classical theory of surfaces in Euclidean space.
632 *Differential geometry II:*
Index theory for geodesics, comparison theorems, Lie groups, symmetric spaces, minimal surfaces.
633 *Geometric topology:*
Covering spaces, Dehn's lemma and the loop theorem, geometric structures and decompositions of 3-manifolds.

640 APPLICATIONS AND MODELLING
641 *Numerical techniques for applications:*
642 *Continuum mechanics in Industrial Modelling:*
Moving boundary problems, heat and mass transfer, elastic and plastic deformations, sedimentation processes.
643 *Research topics in applications:*
Surface science, colloids, growth processes, phase transitions, biophysics, percolation theory, supersonic flow.
644 *Mathematical Economics:*

650 MATHEMATICAL PHYSICS
651 *Continuum mechanics:*
Navier-Stokes equations, inviscid flow, viscous flow, rotational flow, stability, elasticity, beams, stress, strain, elastic waves.
652 *Statistical mechanics:*
Gibbs ensembles, thermodynamic limit, model systems, phase transitions, scaling and renormalization group.
653 *Methods of mathematical physics:*
Mixed boundary value problems, potential theory, integral equations, nonlinear waves, perturbation techniques, asymptotics, bifurcation and stability.

660 OPERATIONS RESEARCH
661 *Mathematical programming:*
Theory of constrained linear and nonlinear optimization, Lagrange multipliers, duality, optimal control.
662 *Applications of optimization:*
Problems in economics, business management, mathematical biology, etc. which can be formulated as optimization problems.
663 *Algorithms for mathematical programming:*
Selection of algorithms for nonlinear programming and optimal control, considered both theoretically and computationally.

An entry form for examination for higher degrees must be submitted to the faculty office. Three copies of the thesis (typewritten, double spaced) should be submitted; one of them will, if approved, be deposited in the University Library.
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670 RESEARCH REPORT (MINOR THESIS)
Candidates will be required to submit a research report on a special topic under the supervision of a member of staff. The thesis will be approximately one-quarter of the length of a thesis submitted by a candidate proceeding to the degree of MSc by thesis alone.

436-609 MECHANICAL ENGINEERING
Candidates will undertake original research under the supervision of a member of staff of the Department of Mechanical and Industrial Engineering, and present a thesis embodying the results of the investigation together with a survey of the relevant literature. Advanced coursework may be required if it is considered relevant and appropriate by the chairman of department.

597-601 MEDICAL BIOLOGY
Candidates are required to undertake original research in an approved field of Medical Biology to be conducted under the supervision of the Director of The Walter and Eliza Hall Institute and/or one of the Senior Associates in the Department of Medical Biology. In addition, candidates will be required to attend a Postgraduate lecture course held by the department, and will also be required to participate in the weekly Walter and Eliza Hall Institute seminar series. At the end of the course, candidates will be required to submit, in triplicate, a thesis embodying a brief literature review relevant to the field of study, and the results of their research. Candidates may also be required to take an oral examination dealing with the lecture course and/or their own research.

543-601 MEDICINE
AUSTIN AND REPATRIATION HOSPITALS
Approval to enter this course will be given to those with a BSc (Hons) or approved equivalent in some field of the Biological Sciences. Candidates will carry out original research in some field of biological science related to the work of the department. Opportunities for basic research exist in Cell and Molecular Biology, Pharmacology, Biochemistry, Endocrinology, Protein Chemistry, Cardiology and Nephrology. They will be required to submit a thesis incorporating the results of their research and a critical review of the literature pertinent to their own studies. They will also be required to attend seminars on selected topics and to deliver at least one of these related to their own work.

553-601 MEDICINE
DEPARTMENT OF JAMES STEWART PROFESSOR, ROYAL MELBOURNE HOSPITAL
Candidates are required to undertake original research in an approved field of enquiry with an essential scientific basis, which may include Biochemistry, Cardiology, Cell Biology, Endocrinology and Metabolism, Epidemiology and Statistics, Microbiology, Molecular Biology, Nephrology, Pharmacology or Physiology and Rheumatology. Students are also required to attend a weekly seminar in the department concerning their research work, and make interim reports on their research programme. At the end of the year, students will be required to write up
the results of their research in a form suitable for publication, and
will also be called on to review the literature relating to their studies.

563-601 MEDICINE
ST. VINCENT'S HOSPITAL
Students ordinarily work under the direction of a member of the department and are required to attend a weekly seminar in the department concerning their research work, and make interim reports on their research programme. At the end of the year students will be required to write up the results of their research in a form suitable for publication and will also be called on to review the literature relating to their studies.

631-601 METEOROLOGY
Candidates are required to carry out original research on a meteorological or glaciological subject and to prepare a thesis from the results of their work, including a critical review of the international literature on the subject. They may also be required to attend special lectures and seminars and to take part in field work.

526-601 MICROBIOLOGY
Candidates will undertake research in collaboration with a member of the academic staff and present a thesis describing this work. Research students are expected to participate in staff seminars, discussion and occasional advanced lecture courses.

ASSESSMENT By thesis. An oral examination is rarely required.

579-601 OBSTETRICS AND GYNAECOLOGY
A four-year course is available for selected candidates with an ordinary BSc degree. Candidates will carry out full-time research on some aspect of human reproduction under the supervision of senior staff and will attend weekly departmental seminars. At the end of the course, candidates will be required to submit a thesis embodying the results of their research together with an adequate literature review. They will also be required to present a seminar on their work to the department and/or to a scientific society and to prepare an article for publication.

655-602 OPTOMETRY
Candidates will be required to undertake an original investigation on an approved subject in visual science or optics and submit a thesis reporting the results of their work. The thesis will include a critical review of the literature pertaining to the subject of their investigation. Candidates will also be required to undertake the study of and sit the examination for one or more of the undergraduate units offered by the Department which relates to the subject of their investigation. Candidates commencing M.Sc. studies with a B.Sc. ordinary degree will be required to undertake a preliminary year of study involving a planned course of reading, attending and sitting the examinations of selected units in the undergraduate optometry course, attending fourth year seminars and tutorials and completing a preliminary investigation.
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577-601 OTOLARYNGOLOGY

Candidates will be required to:

(i) attend lectures and seminars on specified subjects;
(ii) prepare a written critical review of the literature on such topics as required by the head of the department;
(iii) undertake research work under the supervision of a member of the department, and submit a report on their work;
(iv) pass in such examinations as may be required by the head of the department.

571-601 PAEDIATRICS
ROYAL CHILDREN’S HOSPITAL

Students are required to carry out research under the supervision of a member of the department. Areas available for research include genetics (with a special interest in areas of cytogenetics, enzymology and metabolism, molecular genetics, cell biology and trace elements), the chemistry of collagen, immunology, microbiology, respiratory physiology, gastro-intestinal physiology, biostatistics and epidemiology, endocrinology and embryology. Students will normally be requested to review the literature on the selected topic and then to present a plan of their proposed research at a small meeting of research workers. Their research will be recorded in the usual thesis form for submission at the end of their period of study. Students are expected to attend relevant research meetings in the department and elsewhere within the hospital and also certain relevant seminars in other University departments.

531-601 PATHOLOGY

Candidates will be required to carry out original research, under supervision, and present a thesis describing this work. The thesis must include a critical survey of the literature relevant to the topic of the research. Candidates must also attend and participate in staff meetings and seminars, and prepare and submit such assignments and reports on pathological subjects as may be prescribed.

ASSESSMENT By thesis. An oral examination may also be required.

534-601 PHARMACOLOGY

Research will be carried out under supervision on an original topic in Pharmacology or Toxicology. Candidates will be expected to present seminars on their work and/or other prescribed topics, to attend scientific meetings and to participate in the general scientific activities of the department.

Examination will be by thesis. This will consist of a report of the research carried out by the candidate and a critical review of the literature in a prescribed field which will not necessarily be the same as that in which the candidate has undertaken research. Candidates may also be required to support the thesis in an oral examination.

640-601 PHYSICS

Approval to enter this course will be given only to those with a sufficiently good record in the BSc Hons year.
Candidates are required to carry out original research in an approved field of Physics. They will submit a report which embodies the results of this research together with a critical survey of the relevant literature (including that in foreign languages).

536-601 PHYSIOLOGY

Candidates are required to conduct under supervision original research in some branch of Physiology, and to submit a report embodying their results to the examiners. A critical review of literature on a selected subject must also be submitted. In addition, candidates may be required to attend lectures and practical work and to sit for examination in such subjects as may be prescribed by the chairman of the department.

554-601 PSYCHIATRY

DEPARTMENT OF CATO PROFESSOR, ROYAL MELBOURNE HOSPITAL

Candidates will be required to carry out original research, under supervision, and present a thesis describing this work. The thesis must include a critical survey of the relevant literature. Candidates must also attend departmental seminars and submit such assignments on selected topics as may be prescribed.

171-602 PSYCHOLOGY

All candidates are required to take part in a programme of seminars, lectures, departmental colloquia and laboratory work, and to submit a thesis based on advanced research on an approved topic.

The thesis will normally be a report written by the candidate on an empirical study or set of studies; it must be presented in the form of an article for publication in the case of the Master’s degree by coursework and thesis, or in the form of an extended journal article or short monograph in the case of the research Master’s degree. The maximum length of a thesis submitted by candidates for the Master’s degree by coursework and thesis is 6,000 words, and the maximum length of a thesis submitted by candidates for the Master’s degree by research is 35,000 words.

Applications for admission to a course for the Master’s degree should be made on the appropriate forms available from the graduate secretary, Department of Psychology. Applications should be lodged by the last working day in October of the year preceding the first year of intended study. All intending students should consult the Department’s Manual of Graduate Studies which contains additional information about requirements.

Master’s Degree by Research

The course of Master of Science by research requires the equivalent of one-year full-time study. Candidates are required to satisfactorily complete four graduate units and to submit a research thesis. For detailed requirements, refer to the faculty of Arts Handbook and the Departmental Manual of Graduate Studies.

Master’s Degree by Coursework and Thesis

The course of Master of Science by coursework and thesis normally requires the equivalent of two years full-time study. The course comprises (a) a compulsory core of four units, (b) one major course of
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study of six units, (c) one minor course of study of three units, and (d) a research project.

Major and minor course options are made up from the list of graduate units presented in the Faculty of Arts Handbook. Units are grouped into four major categories: Clinical Neuropsychology, Clinical Psychology, Applied Psychology and Other. It should be noted that not all units are necessarily offered in any one year, and that the list of options available in a given year will be published in the Departmental Manual of Graduate Studies. Selection of major and minor courses of study should be made on application for the course, in consultation with members of the Departmental Graduate Studies Committee. Some combinations of major and minor courses may serve as the necessary pre-requisites for registration with the relevant Boards (e.g. Clinical or Clinical Neuropsychology) of the Australian Psychological Society.

The class work for each unit consists of a combination of lectures, seminars, clinical sessions and practical work, as appropriate, and will not exceed 24 hours of formal instruction and 36 hours of practical or clinical work. For some units, practical and clinical work will be held in the early mornings, late afternoons and evenings, and some units include clinical and field work during weekends and University non-teaching periods. For further details of units, consult the Faculty of Arts Handbook.

619:600 STATISTICS

Candidates for the degree may proceed in one of two ways:

1. By thesis only (619-601)
Candidates will, under supervision, prepare a thesis on an approved subject in which they will be advised as to a suitable course of reading. Three copies of each thesis (A4, typewritten, double spaced) should be submitted, one of which will be deposited in the University Library. Candidates may also be examined orally on the subject of the thesis.

2. By coursework and minor thesis (619-603)
This programme is conducted in collaboration with La Trobe and Monash Universities and R.M.I.T. and candidates may be required to attend courses at each of these institutions.

(a) The programme is open to candidates who
(i) have been awarded the degree of B.Sc.(Hons.) in Statistics; or
(ii) hold a degree regarded as the equivalent of (i) above; or
(iii) have achieved an overall standard in the M.Sc.(Prelim.) regarded by the Faculty to be equivalent to the B.Sc.(Hons.) degree and who have been accepted for the degree of Master of Science by the faculty.

(b) The course of advanced studies will consist of two components:
(i) a set of coursework units 75%
(ii) a minor thesis (610) 25%

A candidate will be required to pass both (i) and (ii) in order to qualify for award of the degree.

Candidates will be required to take five 20 lecture units in addition to the two compulsory units:
619-610 Computer Familiarity
The unit 619-610: Computer Familiarity is a hurdle requirement. The unit 619-611: Consulting and Applied Statistics is equivalent to three of the 20 lecture units.

Each of the institutions collaborating in the scheme will offer a collection of 600 level units. At least half of the coursework must be undertaken at the University of Melbourne. Those to be offered at the University of Melbourne (subject to staff availability and enrolment numbers) will be

- 619-610 Computer Familiarity
- 619-611 Consulting and Applied Statistics
- 619-612 Probability and Distribution Theory
- 619-613 Stochastic Processes
- 619-614 Statistical Inference
- 619-615 Applied Probability Models
- 619-616 Operations Research
- 619-617 Forecasting
- 619-620 Analysis of Categorical Data
- 619-621 Advanced Probability Theory
- 619-622 Design and Analysis of Surveys
- 619-632 Design and Analysis of Experiments
- 619-639 Special Lectures

**ASSESSMENT**

For all units other than Consulting and Applied Statistics: One 2-hour written examination and/or assignments up to a maximum of 40 pages.

For Consulting and Applied Statistics: Assignments up to a maximum of 120 pages.

Weightings of components of assessment will be notified to students at the commencement of the course.

**Unit Descriptions**

**610 Computer Familiarity**
Use of the major statistical packages such as MINITAB, GLIM, GENSTAT, SAS, MBDP and SPSS in data analysis and a critical comparison of their behaviour.

**611 Consulting and Applied Statistics**
Case studies and consulting work performed under supervision.

**609 Minor Thesis**
Candidates will be required to submit a minor thesis on a special topic prepared under the supervision of a member of staff. The thesis will be approximately one third of the length of a thesis submitted by a candidate proceeding by thesis only.

**612 Probability and Distribution Theory**
Limit theory for sums of independent random variables and its extensions to martingales and other classes of dependent variables.

**613 Stochastic Processes**
Discussion of the principal prototype processes, their properties and their areas of application. The treatment will include Markov, Gaussian, point, renewal, diffusion, branching and stationary processes and martingales.

**614 Statistical Inference**
Methodologies of inference and their comparison. Parametric and non-parametric, Bayesian and Neyman-Pearson approaches. Overview of key

615 Applied Probability Models

616 Operations Research
A selection of topics from queueing, inventories, storage, scheduling, optimization, programming, game theory, forecasting, reliability and simulation together with a number of case studies.

617 Forecasting
Box-Jenkins forecasting: forecasts based on linear and non-linear regression models; Kalman algorithm for linear forecasts.

620 Analysis of Categorical Data
Logistic and log-linear models; contingency tables in 2 and higher dimensions; ordered categories; computer analysis.

621 Advanced Probability Theory
Measure theoretic approach to probability.

622 Design and Analysis of Surveys
Simple random, stratified, systematic and cluster sampling; ratio and regression estimates for finite sampling situations; valid and efficient designs of surveys and questionnaires.

623 Exploratory Data Analysis
Data handling, stem and leaf plots; transformations; relationships, resistant regression, median polish; resistant smoothing of time series.

624 Foundations of Statistical Inference
Interpretation of concepts; difficulties with the frequentist approach to inference; comparison of frequentist, Bayesian and other approaches.

625 Regression Analysis
Linear and generalised linear models; optimal choice of design; non-linear regression.

626 Robust Statistical Inference

627 Statistics for Quality and Productivity in Industry
Process capability; control chart design; acceptance sampling.

628 Time Series Analysis
Linear processes, spectral analysis, estimation and hypothesis testing for ARMA processes.

629 Actuarial and Demographic Statistics
Risk theory; applications to life insurance and business planning. Demography; life tables, population projection, instabilities.

630 Analysis of Failure and Survival Data
Reliability models and their applications; survival curves for censored data; the proportional hazard model.

631 Analysis of Medical Data
Case/Control studies with application to cancer trials; design and analysis of clinical trials.
632 Design and Analysis of Experiments
Planning of experiments; factorial experiments; split-plot and incomplete block designs; repeated measurements; response surfaces; analysis of variance and covariance; nearest neighbour analysis.

633 Distribution Free Inference
Exact distribution-free methods based on randomization. The one-sample and two-sample location problems. Linear regression models.

634 Multivariate Analysis
Multivariate normal; graphical techniques; data analysis; Hotelling's $T^2$; multivariate analysis of variance; principal components; factor analysis; discriminant analysis.

635 Statistical Computing
Use of computers in statistics; computer representation of numbers; sources of error in computations; computational methods for least squares problems; unconstrained optimization methods; generation of pseudo-random variables.

639 Special Lectures
Topics offered by staff and visiting lecturers based on current research interests.

546-601 SURGERY
DEPARTMENT OF SURGERY, AUSTIN HOSPITAL
Candidates will be required to carry out research under supervision and present a thesis on their work. The thesis must include a critical survey of the literature relevant to the topic of the research. The major research interests are the ontogeny, function and metabolism of peptides. The work can involve research on foetal and adult sheep and in man, or can be orientated to peptide chemistry and molecular biology. Candidates will also take part in research and Departmental seminars. Enquiries may be made to Professor K. J. Hardy or Dr. A. Shulkes.

556-601 SURGERY
DEPARTMENT OF JAMES STEWART PROFESSOR, ROYAL MELBOURNE HOSPITAL
Candidates may undertake a research project in a variety of surgical science subjects including immunology and oncology. Exposure to principles of research and scientific communication will be obtained, and ample opportunity is provided to attend relevant courses. Candidates will take part in regular departmental seminars, and will be expected to review relevant scientific and medical literature, and prepare a formal report or thesis of their work. Enquiries are welcomed and can be directed to Professor G. J. A. Clunie.

260-605 VETERINARY PRECLINICAL SCIENCE
270-605 VETERINARY PARA CLINICAL SCIENCE
Candidates are required to undertake research in a field approved by the chairman of the appropriate department in the faculty of Veterinary Science. The research project undertaken will be conducted under supervision. Candidates may be required to provide progress reports and to
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attend courses of lectures and seminars related to their studies. At the end of their course, candidates will be required to submit a thesis for examination that conforms to the requirements approved by the Faculty of Science.

654-601 ZOOLOGY

Candidates will be required to carry out original research, under supervision, and present a thesis describing this work. The thesis must incorporate a critical review of relevant literature. Candidates must also attend prescribed seminars.
CHAPTER 10

MASTER OF SCIENCE IN OPTOMETRY

REGULATION

Regulation 3.77—Degree of Master of Science in Optometry

1. (1) A candidate for the degree of Master of Science in Optometry other than a candidate under section 8 shall either—

(a) have qualified for the degree of Bachelor of Science in Optometry; or

(b) have been admitted to a degree recognized by the Faculty of Science pursuant to Regulation 3.3.1 for the purposes of this regulation; or

(c) be a graduate or diplomate of the University or any other university or tertiary educational institution who satisfies the faculty that he or she has had adequate scientific training, is qualified to practise optometry and has the ability to pursue the course.

(2) The faculty, on the recommendation of the chairman of the department of Optometry, may prescribe an appropriate preliminary course of study and assessment for an applicant who has qualified pursuant to paragraph (b) or (c) of sub-section (1) hereof, which the applicant must complete to the satisfaction of the faculty before admission to candidature for the degree.

2. Each applicant shall submit to the faculty for approval the course proposed to be undertaken, which shall consist of either—

(a) a course of advanced study and training in research for a period to be specified in the proposal and to be of not less than twelve months; or

(b) a course of advanced study, clinical training and training in research for a period to be specified in the proposal and to be of not less than two years of which period an amount of time being not less than one-quarter or more than one-third of the applicant’s normal working time over two years shall be spent in clinical training.

3. The faculty may admit as a candidate for the degree an applicant whose candidature is recommended by the chairman of the department of Optometry, whose proposed course is approved by the faculty, and who has completed any preliminary course prescribed under sub-section (2) of section 1 hereof.

4. (1) Subject to sub-section (2) hereof a candidate shall pursue the approved course in the University under supervision prescribed by the faculty save that any clinical training shall be carried out in the clinical departments of the Victorian College of Optometry.

(2) If the chairman of the department of Optometry recommends—

(a) that it is essential for the candidate to obtain material for the course elsewhere than in the University; or

(b) that the candidate should undergo clinical training elsewhere than in the clinical departments of the Victorian College of Optometry:
then in either event the faculty may grant permission for the candidate to be absent from the University or to undergo clinical training elsewhere than in the clinical departments of the College (as the case may be) for such periods and in such places as may be determined in each case provided that supervision satisfactory to the faculty can be maintained.

5. (1) Subject to this section a full-time candidate shall devote the whole of his or her normal working time to the approved course.

(2) A full-time candidate may not, except by special permission of the faculty, enrol in the University for any subject other than those subjects (if any) prescribed for the course.

(3) The faculty may allow a full-time candidate whose course does not include clinical training to undertake a limited amount of university teaching or outside work which in its judgement will not interfere with the proposed course.

(4) A full-time candidate whose course includes training shall not be permitted to undertake University teaching or outside work but may be remunerated by the Victorian College of Optometry or other places where such clinical training is undergone pursuant to paragraph (b) of sub-section (2) of section 4.

6. The faculty may accept as a part-time candidate for the degree—

(a) a member of the staff of the University; or

(b) in special circumstances a person engaged in another occupation which in the opinion of the faculty leaves the candidate substantially free to pursue the course;

and the faculty shall prescribe the duration of the course of a part-time candidate having regard to the proportion of the candidate's time which he or she is able to devote to the course.

7. Each candidate shall—

(a) submit for examination within a time prescribed by the faculty a thesis embodying the results of research carried out during the course for the degree; and

(b) pass at the annual examination in any subject or subjects prescribed by the faculty.

8. Notwithstanding anything to the contrary in the preceding sections—

(a) a person who has graduated as a bachelor of Science in Optometry in the University may, not less than four years after qualifying to so graduate, be admitted to candidature for the degree of master of Science in Optometry and such candidate shall submit for examination for the degree published or unpublished work based on research in optometry or visual science; and

(b) any other person who has been for not less than four years qualified to practise optometry in Victoria may be admitted to candidature for the degree and such candidate shall—

(i) establish a substantial association with the University in a manner to be determined by the faculty; and

(ii) submit for examination within five years of admission to candidature published or unpublished work based on research in the field of optometry or visual science.
9. A candidate in submitting a thesis shall state generally in a preface, and specifically in notes, the sources from which information is derived, the extent to which use has been made of the work of others and in general terms the portions of the work which the candidate claims as original. When a candidate submits work carried out in collaboration with another person, the candidate's own share in the work shall be indicated.

10. Candidates who have fulfilled the prescribed conditions and satisfied the examiners may be admitted to the degree of Master of Science in Optometry.
CHAPTER 11

DOCTOR OF PHILOSOPHY AND DOCTOR OF SCIENCE

DOCTOR OF PHILOSOPHY

This is a degree awarded by the University, not the faculty of Science. For details see the Calendar, Regulation 3.60.

DOCTOR OF SCIENCE

Regulation 3.25—Degree of Doctor of Science

1. The faculty of Science ('the faculty') may admit as a candidate for the degree of doctor of Science a graduate, of not less than five years' standing since qualifying for the degree, who is either—
   (a) a bachelor of Science of the University; or
   (b) a graduate in some other faculty of the University who satisfies the faculty that he or she has had adequate scientific training; or
   (c) a graduate of another university or tertiary educational institution who—
      (i) has been admitted to a degree recognized by the faculty for the purposes of Regulation 3.3.1;
      (ii) satisfies the faculty that he or she has had adequate scientific training; and
      (iii) either—
         (A) is a member of the academic staff of the University of at least two years' standing; or
         (B) has had, in the opinion of the faculty, a substantial association with the University.

2. An applicant for candidature shall submit the prescribed number of copies of a thesis, which may consist of published or unpublished work of the applicant.

3. (1) The faculty shall appoint a perusal committee to determine—
   (a) whether the subject matter of the work presented falls within the scope of Science and, if so, 
   (b) whether, in general terms, the quality and quantity of the work presented justifies submitting the work to examination.

   (2) The faculty may appoint persons who are not members of the faculty to the committee.

   (3) If at least one member of the committee decides that an examination is justified, the committee shall—
      (a) nominate examiners, and

1. Three copies must be submitted (see Regulation 4.4).
b) recommend to the faculty that the applicant be admitted to candidature for the degree.

4. On the recommendation of the committee, the faculty may admit the applicant to candidature for the degree and forward the names of the examiners to the Council. If the committee should neglect or refuse to nominate examiners the faculty may nominate examiners for appointment by the Council pursuant to Statute 3.12.3.

5. If the committee determines not to recommend a work for examination it shall report to the faculty setting out the reasons for its decision.

6. The faculty, after considering the report of the committee pursuant to sub-section (5), may determine to admit the applicant to candidature and may nominate examiners for appointment by the Council pursuant to Statute 3.12.3.

7. Subject to the statutes and regulations of the University the faculty may give directions for the conduct of the examination.

4. Should the work have been undertaken in collaboration with others, the candidate shall satisfy the examiners that the candidate has been responsible for a significant portion of the research work by submission of a signed statement as to the extent of the candidate’s share in the work and by such other means as the examiners may require.

5. A candidate—
   a) whose work, in the opinion of the examiners,
      i) includes a substantial, original contribution to Science, and
      ii) is of such a standard as to give the candidate authoritative standing in the field of the candidate’s study, and
   b) who has fulfilled the prescribed conditions,
   may be admitted to the degree of doctor of Science.

NOTE FOR INFORMATION OF APPLICANTS

Further information is available from the Assistant Registrar (Science).
CHAPTER 12
POSTGRADUATE DIPLOMAS
COMPUTING STUDIES

Regulation 3.88—Post-graduate Diploma in Computing Studies

1. A person who—
   (a) (i) has qualified in the University for admission to a degree approved for the purpose by the faculty of Science, or (ii) holds a degree recognized by the faculty or a qualification which satisfies the faculty for the purposes of this regulation pursuant to Regulation 3.3.1(1)(b); and
   (b) has preliminary experience acceptable to the faculty in computer programming,
   may with the consent of the faculty, be admitted to candidature for the post-graduate diploma in Computing Studies.

2. (1) The course of study and the syllabus of each subject of examination shall be as prescribed by the Academic Board on the recommendation of the faculty and published with the details of subjects.
   (2) A candidate who has obtained credit during a previous course for a subject which is the equivalent of a subject prescribed for the course for the diploma may be permitted by the faculty to substitute for the subject so prescribed another subject approved by the faculty in its place.

3. (1) A candidate shall—
   (a) attend classes as prescribed; and
   (b) pass such examinations as the faculty requires during a period, if studying full-time, of not less than one academic year or, if studying part-time, of not less than two academic years.

4. A candidate who has fulfilled the prescribed conditions satisfactorily may be granted the diploma in Computing Studies.

SPECIAL PRINCIPLES OF SELECTION FOR ENTRY TO THE POSTGRADUATE DIPLOMA IN COMPUTING STUDIES

1. Preamble
   These Special Principles of Selection for Entry to the Postgraduate Diploma in Computing Studies shall be read together with and shall be subject to the General Principles of Selection for Entry to Postgraduate Courses and in the event of any inconsistency the General Principles of Selection for Entry to Postgraduate Courses shall prevail.

2. Selection Committee
   The Selection Committee shall consist of the Chairman of the Department of Computer Science, a member of the Department of
Computer Science nominated by the Chairman and the Chairman of the Science Research Committee in Science or his nominee.

3. Eligibility

Applicants must be graduates who have successfully completed, to a standard satisfactory to the Selection Committee, a course of study which, in the opinion of the Selection Committee, provides an appropriate background and training for the diploma in Computing Studies course. Applicants must also have such experience in computer programming as is acceptable to the Selection Committee.

4. Selection

In identifying those applicants most likely to pursue the course successfully, the Selection Committee may give preference to applicants who have one or more of the following:

(i) an honours, master's or doctoral degree;
(ii) a record of high achievement in Mathematics;
(iii) substantial knowledge of programming;
(iv) some relevant work experience, preferably since graduation.

5. Reservation of Places (Deferment)

Reserved places may only be granted in exceptional circumstances and at the discretion of the faculty.

622-801 POSTGRADUATE DIPLOMA IN COMPUTING STUDIES

48 points or more of 200- and 300-level Computer Science; at least one year full-time or two years part-time.

Prerequisites: Students should have qualified either within the University of Melbourne or elsewhere for a degree approved for the purpose of the diploma and possess programming experience at the level 622-113, Introduction to Computing. Where students have already completed one or more of the units during their undergraduate studies, they may still enrol for the diploma by substituting other approved units offered by the Computer Science Department of equivalent value.

SYLLABUS The course consists of a number of Computer Science units drawn from the 200 and 300 levels of the B.Sc. degree course to a total of 48 points or more. Basic units recommended for students with little experience in the computer field are listed below.

213 Computer Science Methods
214 Structure of Computers
250 Computer Systems
313 Computer Design
332 Operating Systems
340 Computer Science Project
341 Software Engineering
343 Computers and Society
351 DataBase Systems
353 Networks and Communications
380 Graphics
Faculty of Science

Students may substitute other courses for those listed above with the approval of the Chairman of Department. Such courses may be drawn from second and third year units. These may only be taken after consultation with the Department to ensure that prerequisites have been satisfied.

ASSESSMENT Students in this course will take normal end of term examinations associated with the units. However failure in a unit will not preclude the student from taking subsequent units. The Diploma will be awarded on the basis of overall performance in all of the units.

UNSATISFACTORY PROGRESS IN POSTGRADUATE DIPLOMA IN COMPUTING STUDIES COURSE

The faculty of Science, in accordance with the provisions of Regulation 2.5, reviews annually the academic progress of all students undertaking the Postgraduate Diploma in Computing Studies. Students whose progress is considered to be unsatisfactory are given an opportunity to make a written submission or to appear before a Student Progress Committee, or to do both. Students who fail to gain 50% of the points attempted in any one calendar year have in the opinion of Faculty not made satisfactory progress.

The function of a Student Progress Committee is to consider the student’s results and any extenuating circumstances in order to determine the best proposal for the student’s academic future and to ensure that quota places are filled by students most likely to succeed in their courses. In considering a student’s progress the Committee would normally take into account personal, financial, and study problems. The Committee, after taking into account any circumstances which may have affected progress, may make any of the following decisions:

1. that the student be permitted to continue the course;
2. that the student be limited in the studies permitted in the following year;
3. that a recommendation be made to the Academic Board that the student be suspended from the course.

Students recommended for suspension have the right to be heard by the Academic Board, but if the recommendation of the Committee is upheld by the Board, the student will be suspended from the course on academic grounds. Students suspended from any course may apply for re-admission. If the Academic Board is satisfied that a student’s condition or circumstances are so changed that there is a reasonable probability that the student will make satisfactory progress, the Board may authorize the student’s re-admission, imposing any conditions it determines to be necessary. However, re-admission is normally gained only after satisfactory completion of studies of a similar nature at another institution.
CHAPTER 13

FINANCIAL ASSISTANCE AND PRIZES

NOTE ON PRIZES

For the purpose of Regulation 6.1, a candidate who obtains honours in a unit or group of units may be awarded a prize, exhibition or scholarship in accordance with the conditions prescribed in the regulation relating to any such award in that subject, provided the candidate has, at the one annual examination obtained a total point score of not less than twenty-eight (28).

SUMMARY OF AWARDS

The following table gives a summary of awards specially available to Science students at entrance, undergraduate, final examination and postgraduate levels. More precise information concerning these awards may be obtained from Appendix 1 in the Calendar or from the person or Calendar regulation indicated in the table.

In addition other awards and scholarships available to students generally are listed in the Calendar.

Note: Values of awards as shown below are approximate only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Title and Approximate Value</th>
<th>Calendar Reference or Information Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Scholarships for which it is necessary to apply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry (3rd yr)</td>
<td>Dow Chemical (Aust.) Ltd. Assistant Registrar Scholarship (Science) $1,000 p.a.</td>
<td>R.6.13.2</td>
</tr>
<tr>
<td>Metallurgy</td>
<td>Mining and Metallurgical Bursaries $100 p.a.</td>
<td>Metallurgy Co-ordinator</td>
</tr>
<tr>
<td>Science</td>
<td>F. Gordon Elford Fund</td>
<td>Registrar’s Office</td>
</tr>
<tr>
<td>(b) Prizes, Exhibitions etc. (It is not necessary to make application for these)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied Mathematics (first year)</td>
<td>Dixon Scholarship $30</td>
<td>R.6.13.2</td>
</tr>
<tr>
<td>Applied Mathematics (second year)</td>
<td>Dixon Scholarship $40</td>
<td>R.6.13.2</td>
</tr>
<tr>
<td>Applied Mathematics (third year)</td>
<td>Dixon Scholarship $70</td>
<td>R.6.13.2</td>
</tr>
<tr>
<td>Biochemistry (second year)</td>
<td>Exhibition $20</td>
<td>Chairman of Department</td>
</tr>
<tr>
<td>Field</td>
<td>Title and Approximate Value</td>
<td>Calendar Reference or Information Source</td>
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<tr>
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</tr>
<tr>
<td><strong>Biochemistry</strong> (third year)</td>
<td>Dunlop Rubber Company Exhibition $40</td>
<td>R.7.3.6</td>
</tr>
<tr>
<td><strong>Biology</strong></td>
<td>J. F. W. Payne Exhibition $40</td>
<td>R.7.3.6</td>
</tr>
<tr>
<td><strong>Botany (second year)</strong></td>
<td>E. F. Millar Exhibition $40</td>
<td>R.7.3.6</td>
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<tr>
<td><strong>Botany (third year)</strong></td>
<td>Exhibition $60</td>
<td>Chairman of Department</td>
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<tr>
<td><strong>Botany (third year)</strong></td>
<td>Brunning Prize $50</td>
<td>Chairman of Department</td>
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<tr>
<td><strong>Chemistry (first year)</strong></td>
<td>Dwight’s Prize $100</td>
<td>R.6.5</td>
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<tr>
<td><strong>Chemistry (first year)</strong></td>
<td>Exhibition $30</td>
<td>Chairman of School</td>
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<tr>
<td><strong>Chemistry (second year)</strong></td>
<td>Dixson Scholarship $40</td>
<td>R.6.13.2</td>
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<tr>
<td><strong>Chemistry (second year)</strong></td>
<td>Shell Exhibition $100</td>
<td>Chairmen of School</td>
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<tr>
<td><strong>Chemistry (third year)</strong></td>
<td>Cuming Scholarships $420, $280</td>
<td>R.6.49</td>
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<td><strong>Chemistry (third year)</strong></td>
<td>Walker Scholarship $500</td>
<td>R.6.58</td>
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<td><strong>Chemistry (third year)</strong></td>
<td>Dixon Scholarship $80</td>
<td>R.6.13.2</td>
</tr>
<tr>
<td><strong>Computer Science</strong> (622-340 and 622-341)</td>
<td>Lionel Singer Corporation Prize $200</td>
<td>Chairman of Department</td>
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<tr>
<td><strong>Engineering Part I</strong></td>
<td>Howard Smith Exhibition $40</td>
<td>R.7.3.6</td>
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<tr>
<td><strong>Genetics (second year)</strong></td>
<td>Dame Margaret Blackwood Prize $250</td>
<td>R.6.72.88</td>
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<td><strong>Genetics (third year)</strong></td>
<td>Dwight’s Prize $100</td>
<td>R.6.5</td>
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<tr>
<td><strong>Geology (first year)</strong></td>
<td>Argus Exhibition $50</td>
<td>R.6.3.1</td>
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<td><strong>Geology (second year)</strong></td>
<td>Exhibition $40</td>
<td>Chairman of Department</td>
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<tr>
<td><strong>Geology (third year)</strong></td>
<td>Exhibition $60</td>
<td>Chairman of Department</td>
</tr>
<tr>
<td><strong>Geology</strong></td>
<td>C. M. Tattam Scholarship $1,000</td>
<td>R.6.160</td>
</tr>
<tr>
<td><strong>Geography</strong></td>
<td>Dwight Prize $50</td>
<td>R.6.5</td>
</tr>
<tr>
<td><strong>History and Philosophy of Science</strong></td>
<td>Dwight Prize $50</td>
<td>R.6.5</td>
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<tr>
<td>Field</td>
<td>Title and Approximate Value</td>
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<tr>
<td>Mathematics (third year)</td>
<td>E. R. Love Prize Books ($30)</td>
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<td>Metallurgy (second year)</td>
<td>Dixson Scholarship $30</td>
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<td>Metallurgy (third year)</td>
<td>Exhibition $20*</td>
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<td>Microbiology</td>
<td>ASM Scholarship $200</td>
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<td>Microbiology</td>
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<td>Microbiology</td>
<td>Major Bartlett University Scholarships $200 each</td>
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<tr>
<td>Mining Part I</td>
<td>George Lansell Exhibition $40</td>
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<td>Natural Science</td>
<td>Wyselaskie Scholarship $350 p.a.</td>
<td>R.6.7</td>
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<td>Pathology</td>
<td>Walter and Eliza Hall Exhibition $60</td>
<td>Department concerned R.7.3.6</td>
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<tr>
<td>Physics (first year)</td>
<td>Dwight’s Prize $100</td>
<td>R.6.5</td>
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<td>Physics (second year)</td>
<td>Dixson Scholarship $40</td>
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<tr>
<td></td>
<td>William Sutherland Prize Books ($40)</td>
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<td>Physics (third year)</td>
<td>Dixson Scholarship $80</td>
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<td>Physics (third year)</td>
<td>E. M. and J. F. Ward Prize $500</td>
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<td>Physiology (second year)</td>
<td>Exhibition $20</td>
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<td>Physiology (third year)</td>
<td>Exhibition $40</td>
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<td>Psychology 101</td>
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<td>Psychology 201</td>
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<td>Psychology</td>
<td>Dwight Prize $50</td>
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<tr>
<td>Pure Mathematics (first year)</td>
<td>John MacFarland Exhibition $30</td>
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<td>Pure Mathematics (second year)</td>
<td>Dixson Scholarship $40</td>
<td>R.6.13.2</td>
</tr>
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</table>

*A Science student may be eligible for a $40 award if she or he is taking Metallurgy units equivalent to Metallurgical Engineering 2.*
### Faculty of Science

<table>
<thead>
<tr>
<th>Field</th>
<th>Title and Approximate Value</th>
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<tr>
<td>Pure Mathematics (third year)</td>
<td>Dixson Scholarship $70</td>
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<tr>
<td>Surveying Part I</td>
<td>H. B. Howard Smith Exhibition $40</td>
<td>R.7.3.6</td>
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<td>Surveying Part II and IIA Statistics (second year)</td>
<td>Exhibition $40</td>
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<tr>
<td>Statistics (third year), Statistics (fourth year)</td>
<td>Maurice H. Belz Prizes Books $400-$200</td>
<td>R.6.72(55)</td>
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<td>Statistics (third year)</td>
<td>Norma McArthur Prize $100</td>
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<td>Zoology</td>
<td>Dwight Prize $100</td>
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<td>Zoology (second year)</td>
<td>Baldwin Spencer Prizes Books $40</td>
<td>R.6.72(9)</td>
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<td>Zoology (third year)</td>
<td>Georgina Sweet Exhibition $40</td>
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<td></td>
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### GRADUATE

(a) Scholarships for which it is necessary to apply

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<tr>
<th>Science</th>
<th>Alcock Scholarship $600</th>
<th>Office for Research</th>
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<td></td>
<td>Daniel Curdie Scholarship $150</td>
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<td></td>
<td>Sir John and Lady Higgins Research Scholarship $2,000</td>
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<tr>
<td></td>
<td>Shell Scholarships £1,600 stg. p.a.</td>
<td>The Office Manager, Shell Co. of Aust Ltd., 155 William Street, Melbourne, Vic. 3000 Assistant Registrar (Science)</td>
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<tr>
<td></td>
<td>David Syme Research Prize $2,000</td>
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<td></td>
<td>1951 Exhibition Scholarship £1,000 stg. p.a.</td>
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<tr>
<td></td>
<td>Royal Society Rutherford Scholarship £900-£1,000 stg. p.a.</td>
<td>Office for Research</td>
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<tr>
<td>Biochemistry</td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
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<table>
<thead>
<tr>
<th>Field</th>
<th>Title and Approximate Value</th>
<th>Calendar Reference or Information Source</th>
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<tr>
<td>Biological Sciences</td>
<td>Dawson Bursary $2,517 p.a.</td>
<td>Assistant Registrar (Science)</td>
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<tr>
<td>Chemistry</td>
<td>Dixon Research Scholarship $1,800</td>
<td>Chairman of School R.6.13</td>
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<tr>
<td>Chemistry</td>
<td>Dow Chemical (Aust.) Ltd. Assistant Registrar (Science)</td>
<td></td>
</tr>
<tr>
<td>(Hons. year)</td>
<td>Scholarship $1,000 p.a.</td>
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<tr>
<td>Chemistry</td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
</tr>
<tr>
<td>(Hons in Organic or Physical)</td>
<td>Dulux Australia Prize $500</td>
<td>Assistant Registrar (Science)</td>
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<tr>
<td>Chemotherapy</td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
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<tr>
<td>Economic Geology</td>
<td>Georgina Sweet Memorial Fellowship</td>
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<tr>
<td>Economic Zoology</td>
<td>Georgina Sweet Fellowship</td>
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<tr>
<td>Engineering</td>
<td>Argus Research Scholarship $100</td>
<td>Dean, Faculty of Engineering</td>
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<td></td>
<td>Dixon Research on Travelling Scholarship $800</td>
<td>Dean, Faculty of Engineering</td>
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<tr>
<td></td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
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<tr>
<td></td>
<td>Melvin Memorial Scholarship $234</td>
<td>Dean, Faculty of Engineering</td>
</tr>
<tr>
<td>Geology</td>
<td>Stawell Scholarship $150</td>
<td>Dean, Faculty of Engineering</td>
</tr>
<tr>
<td></td>
<td>P. J. Adams Research Award $3,000</td>
<td>Assistant Registrar (Science)</td>
</tr>
<tr>
<td>Industrial Chemistry</td>
<td>Grimwade Prize $2,500</td>
<td>Asst. Reg. (Science) R.6.18</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Mobil Oil Company Research Scholarship $2,650 p.a.</td>
<td>Office for Research</td>
</tr>
<tr>
<td>Medicine</td>
<td>Alcock Scholarship $460</td>
<td>Office for Research</td>
</tr>
<tr>
<td>Field</td>
<td>Title and Approximate Value</td>
<td>Calendar Reference or Information Source</td>
</tr>
<tr>
<td>------------</td>
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<td>------------------------------------------</td>
</tr>
<tr>
<td>Metallurgy</td>
<td>Elizabeth Mary Sweet Fellowship</td>
<td>Office for Research</td>
</tr>
<tr>
<td></td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
</tr>
<tr>
<td></td>
<td>Conzinc Riotinto Scholarships $2,000</td>
<td>Assistant Registrar (Engineering)</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Major Bartlett University Scholarships $200</td>
<td>Chairman of Department</td>
</tr>
<tr>
<td>Mining</td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
</tr>
<tr>
<td></td>
<td>George Lansell Research Scholarship $100</td>
<td>Office for Research</td>
</tr>
<tr>
<td></td>
<td>Mobil Oil Company Research Scholarship $2,650</td>
<td>Office for Research</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
</tr>
<tr>
<td>Physics</td>
<td>Dixson Research Scholarship $1,800</td>
<td>Chairman of Physics R.6.13</td>
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<tr>
<td></td>
<td>Dunlop Aust. Ltd. Research Scholarship $600 (2)</td>
<td>Office for Research</td>
</tr>
<tr>
<td></td>
<td>I.C.I. Fellowships $1,800-$2,300</td>
<td>Office for Research</td>
</tr>
<tr>
<td></td>
<td>Sir Thomas Lyle Fellowship (determined by the Council)</td>
<td>Chairman of Physics R.6.69</td>
</tr>
<tr>
<td></td>
<td>Royal Society Rutherford Scholarship £950-£1,200 stg.p.a.</td>
<td>Office for Research</td>
</tr>
</tbody>
</table>

(b) Prizes, Exhibitions etc. (It is not necessary to make application for these)

<table>
<thead>
<tr>
<th>Field</th>
<th>Title and Approximate Value</th>
<th>Calendar Reference or Information Source</th>
</tr>
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<tbody>
<tr>
<td>Anatomy</td>
<td>Anatomy Scholarship $80*</td>
<td>Chairman of Department</td>
</tr>
<tr>
<td>Botany</td>
<td>Botany Scholarship $80</td>
<td>Chairman of Department</td>
</tr>
<tr>
<td></td>
<td>Howitt Scholarship $100 at least</td>
<td>Asst. Reg. (Science) R.6.6</td>
</tr>
<tr>
<td></td>
<td>Caroline Kay Scholarship $2,000 p.a.</td>
<td>Chairman of Botany R.6.20</td>
</tr>
<tr>
<td></td>
<td>MacBain Scholarship $400</td>
<td>Chairman of Botany R.6.14</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>Biochemistry Scholarship $80</td>
<td>Chairman of Department</td>
</tr>
</tbody>
</table>

* If not awarded in Microbiology.
## Financial Assistance and Prizes

<table>
<thead>
<tr>
<th>Field</th>
<th>Title and Approximate Value</th>
<th>Calendar Reference or Information Source</th>
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</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>Kernot Scholarship $1,300</td>
<td>Chairman of School R.6.8</td>
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<tr>
<td></td>
<td>Riseborough Prize $36</td>
<td>Chairman of School R.6.72 (46)</td>
</tr>
<tr>
<td></td>
<td>Stanley Harvey Prize $100 approx.</td>
<td>Chairman of Geology R.6.8</td>
</tr>
<tr>
<td>Geology</td>
<td>Howitt Scholarship $100 at least</td>
<td>Asst. Reg. (Science) R.6.6</td>
</tr>
<tr>
<td></td>
<td>Kernot Research Scholarship $1,300</td>
<td>Chairman of Geology R.6.8</td>
</tr>
<tr>
<td></td>
<td>Scholarship $80</td>
<td>Chairman of Department R.6.72(A)</td>
</tr>
<tr>
<td></td>
<td>J. H. Harvey Prize $100 approx.</td>
<td>Chairman of Department R.6.72(A)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Nanson Prize $200</td>
<td>Chairman of Mathematics R.6.72 (2)</td>
</tr>
<tr>
<td></td>
<td>Wilson Prize $350</td>
<td>Chairman of Mathematics R.6.72 (14)</td>
</tr>
<tr>
<td></td>
<td>Wyselaskie Scholarship $1,500</td>
<td>Chairman of Mathematics R.6.7</td>
</tr>
<tr>
<td>Metallurgy</td>
<td>Scholarship $80</td>
<td>Chairman of Department</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Scholarship $80</td>
<td>Chairman of Department</td>
</tr>
<tr>
<td>Natural Science</td>
<td>Wyselaskie Scholarship $350 p.a.</td>
<td>Chairman of Department concerned R.6.7</td>
</tr>
<tr>
<td></td>
<td>Bryan Scholarships (2) $1,300 ea.</td>
<td>Chairman of Department R.6.146</td>
</tr>
<tr>
<td>Pathology</td>
<td>Beaneys Scholarship</td>
<td>R.6.12</td>
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<tr>
<td>Physics</td>
<td>Kernot Research Scholarship $1,300</td>
<td>Chairman of Physics R.6.8</td>
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<tr>
<td></td>
<td>John Tyndall Scholarship $400</td>
<td>Chairman of Physics R.6.109</td>
</tr>
<tr>
<td>Physiology</td>
<td>Scholarship $80</td>
<td>Chairman of Department</td>
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<tr>
<td>Zoology</td>
<td>Margaret Catto Scholarship $1,000</td>
<td>Chairman of Zoology R.6.55</td>
</tr>
<tr>
<td></td>
<td>Howitt Scholarship $100 at least</td>
<td>Asst. Reg. (Science) R.6.6</td>
</tr>
<tr>
<td></td>
<td>MacBain Research Scholarship $450</td>
<td>Chairman of Zoology R.6.14</td>
</tr>
<tr>
<td></td>
<td>Scholarship $80</td>
<td>Chairman of Department</td>
</tr>
</tbody>
</table>
CHAPTER 14

OFFICERS
as at September 1987

FACULTY OF SCIENCE ADMINISTRATION

Dean, PROFESSOR T. W. HEALY
Deputy Dean, PROFESSOR P. C. POOLE
Associate Dean (Budgets), DR D. P. KELLY
Associate Dean (Planning and Resources), DR D. M. CALDER
Associate Dean (Research and Graduate Studies),
    PROFESSOR L. R. WHITE
Associate Dean (Students), DR P. Y. LADIGES
Seconded Assistant to the Dean, DR J. W. G. WiGNALL
Assistant Registrar (Science), to be appointed
Student Adviser, MRS C. A. FINLAY
Administrative Officer, MS J. M. BELL
Administrative Assistants, MR R. J. THOMPSON, MS K. S. WATERS

CHAIRMEN OF DEPARTMENTS

Anatomy
Biochemistry
Biology Laboratory
Botany
Chemistry School
Inorganic Chemistry
Organic Chemistry
Physical Chemistry
Computer Science
Electrical and Electronic Engineering
Genetics
Geography
Geology
History & Philosophy of Science
Mathematics
Meteorology
Microbiology
Optometry
Pathology
Pharmaceutical Science
Pharmacology
Physics
Physiology
Psychology
Statistics
Surveying and Land Information
Zoology

PROFESSOR I. DARIAN-SMITH
DR L. R. FINCH
DR B. T. O. LEE, co-ordinator
DR P. M. ATTIWILL
DR P. T. MC TIGUE
DR P. A. TREGLOAN
DR D. P. KELLY
DR P. J. THISTLETHWAITE
PROFESSOR P. C. POOLE
PROFESSOR K. M. ADAMS
PROFESSOR M. J. HYNES
PROFESSOR M. J. WEBBER
DR R. W. Le MAITRE
PROFESSOR R. W. HOME
PROFESSOR C. J. THOMPSON
PROFESSOR W. F. BUDD
PROFESSOR A. J. PITTARD
PROFESSOR B. L. COLE
DR R. McD. ANDERSON
PROFESSOR C. RAPER
DR D. F. STORY
PROFESSOR A. G. KLEIN
PROFESSOR T. O. MORGAN
PROFESSOR A. J. WEARING
DR R. K. WATSON
PROFESSOR I. P. WILLIAMSON
DR A. A. MARTIN
UNIVERSITY'S GENERAL PRINCIPLES OF SELECTION FOR ENTRY TO POSTGRADUATE COURSES

1. Preamble

Applicability

These principles shall not apply to such postgraduate courses under the direct control of the Academic Board as the Academic Board may prescribe from time to time.†

1.2 Selection Committee

1.2.1 There shall be a selection committee for entry to each postgraduate course consisting of the Dean of the faculty or Chairman of the board of studies concerned, or a person nominated by the Dean or Chairman, and such other members as may be appointed by the faculty or board of studies. If any member of a selection committee is unable to act, the Dean of the faculty or Chairman of the board of studies may approve the appointment of a substitute, on behalf of the faculty or board of studies concerned.

1.2.2 A selection committee shall identify those applicants to whom offers shall be made for places available for that course.

1.2.3 A selection committee shall make its decisions by the vote of a majority of the members present and voting and shall report those decisions to the faculty or board of studies as soon as possible.

1.3 Applications

1.3.1 Applicants for selection should submit applications on the appropriate form by the date prescribed or by such closing date as may be prescribed for the receipt of late applications.

1.3.2 No application for selection lodged after such closing date shall be considered unless the selection committee concerned is satisfied that special circumstances exist which justify a late application.

1.4 Special and General Principles

1.4.1 Special principles of selection for any faculty or board of studies may be approved by Council on the recommendation of the Academic Board.

1.4.2 Except insofar as is provided by general principles of selection those special principles shall not conflict with the general principles.

† Pursuant to Statute 2.3 (the Academic Board) the Academic Board exercises the powers and performs the duties of a faculty or board of studies for all courses not pertaining to any faculty or board of studies. The Master of Business Administration course and the Doctor of Philosophy course are under the direct control of the Academic Board and, in respect of these courses, the Board is deemed to be a faculty or board of studies within the meaning of these General Principles of Selection.

The Board has prescribed that these General Principles of Selection shall not apply to entry to the Doctor of Philosophy course.

1. Such dates, if any, may be prescribed in special principles of selection or by notification in the relevant Handbook for the course concerned.
Faculty of Science

*1.5 Eligibility*

Except as otherwise provided in special principles of selection applicants for selection for the first or later years of a postgraduate course must have:

(a) satisfied the University entrance requirements;
(b) satisfied any prerequisite or entry requirements for and the provisions of any regulations applicable to, the course for which selection is sought;
(c) successfully completed, to a standard satisfactory to the appropriate faculty or board of studies, courses of study which, in the opinion of the faculty or board of studies, are equivalent to those for which standing or credit is sought; and
(d) complied with any requirements for eligibility contained in special principles of selection for the course for which selection is sought.

1.6 Level of Entry: (Applicable only to postgraduate courses which are divided into years.)

1.6.1 The selection committee shall consider applicants for selection at the year or level of the course which is determined in accordance with the relevant course regulation and any working rules of the faculty or board of studies.

1.6.2 To the extent necessary to establish the year or level for which an applicant is to be considered for selection, credit to be granted for work done in other courses may be determined in accordance with Regulation 3.3 and any working rules, if the faculty or board of studies has not provided otherwise for such a determination.

1.6.3 Unless the applicant has specified otherwise, any applicant found to be ineligible for selection at a particular level shall be considered for selection at the highest level for which the applicant is eligible.

2. Selection

2.1 Pursuant to the following principles and to any special principles approved by Council, the selection committee shall identify those eligible applicants who are considered most likely to pursue successfully the course concerned. Such applicants shall be ranked by the selection committee and places shall be offered in accordance with such ranking until the places available have been filled.

2.1.1 Selection shall be based primarily on academic merit as judged by reference to the whole academic record of the applicant.

2. Where working rules are used a copy may be obtained from the Assistant Registrar of the faculty or board of studies concerned.

3. Places available shall be determined by Council in accordance with resolutions agreed by Council from time to time and notified in terms of target figures, quotas or sub-quotas of Weighted Student Units attributable to postgraduate students, reserved for each faculty, board of studies or postgraduate course of the University, as the case may be.
2.1.2 In establishing the relative likelihood of success of any applicant, a selection committee may, at its discretion, take into account:

(a) the age of an applicant when completing part of or all of a course of study relied on as qualifying the applicant for admission and the period of time which has passed since completion of those studies;
(b) any illness, war or military service, or serious hardship as a result of which the studies or examination performance of an applicant have, in the opinion of the committee, been adversely affected;
(c) physical handicaps or disabilities;
(d) reports from persons with relevant professional qualifications, where those reports may assist the selection committee in evaluating the effect of factors referred to in paragraph (b) or (c);
(e) the applicant's reasons for wishing to pursue the course;
(f) any work or research experience which, in the opinion of the selection committee, may be relevant to the proposed course of study;

*(g) any other matters specified in the special principles of selection of the course for which selection is sought.*

*2.1.3 A selection committee may conduct interviews to elucidate the matters referred to in section 2.1.2 above or for such purposes as may be provided for in special principles of selection.*

2.1.4 A selection committee shall take into account any relevant written information submitted by an applicant.

*2.1.5 A selection committee may conduct written or other tests for such purposes as may be provided for in special principles of selection.*

*2.1.6 A selection committee may also take into account any special principles of selection or other factors approved by Council on the recommendation of the faculty or board of studies concerned.*

2.2 A selection committee shall select a candidate only if it is satisfied that the faculty or board of studies can arrange for the adequate supervision of the candidate and can provide, or arrange access to, adequate facilities for the support of that candidate.

*3. Conditional Selection

Pursuant to Regulation 3.3, section 1(1), special principles of selection may provide for the imposition of conditions subject to which admission may be granted.

* Makes provision for special principles to be proposed.
BOOK LISTS

PR = Preliminary reading
* = Essential text which all students should possess

BACHELOR OF SCIENCE

516 ANATOMY

201 HISTOLOGY

*Junqueira L C and Carneiro J Basic Histology 4th ed 1983 or later Lange Med Publ
*Wheater P R et al Functional Histology 1979 or later Churchill Livingstone

203 OCULAR ANATOMY (OPTOMETRY)

*Wolff E Eugene Wolff’s Anatomy of the eye and orbit, including the central connections, development and comparative anatomy of the visual apparatus 7th or subsequent ed Lewis

204 HUMAN ANATOMY

*Anderson J E Grant’s Atlas of Anatomy 8th ed Williams & Wilkins
*Sauerland E K Grant’s Dissector 9th ed Williams & Wilkins
*Basmajian J V Grant’s Method of Anatomy 10th ed Williams & Wilkins

302 NEUROANATOMY

Nolte J The Human Brain Mosby

303 NEUROSCIENCE

Kandel E R and Schwartz J H Principles of Neuroscience 2nd ed Elsevier

521 BIOCHEMISTRY

201 BIOCHEMISTRY (LECTURES)


or

*Stryer L Biochemistry 2nd ed 1981 Freeman
Alberts B et al Molecular Biology of the Cell 1983 Garland
301 MOLECULAR ASPECTS OF BIOMEMBRANES AND CELL BIOLOGY
*Alberts B et al Molecular Biology of the Cell 1983 Garland
Nicholls D G Bioenergetics An introduction to the Chemiosmotic Theory 1982 Academic Press

303 GENE STRUCTURE AND EXPRESSION
*Friefelder D Molecular Biology A Comprehensive Introduction to Prokaryotes and Eukaryotes 2nd ed 1987 Jones & Bartlett
or

306 PHOTOSYNTHESIS AND RELATED TOPICS
Goodwin T W and Mercer E I Introduction to Plant Biochemistry 2nd ed 1983 Pergamon

600 BIOLOGY

101 BIOLOGY
Preliminary reading for those without HSC Biology Sections 1 2 3 9 10 and 11 in Biological Science—The Web of Life 3rd ed Aust Acad of Sci (PR)
*Raven P H and Johnson P B Biology 1986 Times-Mirror Mosby

102 CELL BIOLOGY AND GENETICS
*Klug W S and Cummings M R Concepts of Genetics 1983 Merrill
*Villee C A et al General Zoology 6th ed Saunders
or
*Raven P H et al Biology of Plants 4th ed Worth

103 ANIMAL BIOLOGY
*Villee C A et al General Zoology 6th ed Saunders
Luria S E et al A View of Life Benjamin-Cummings

104 PLANT BIOLOGY
*Raven P H et al Biology of Plants 4th ed 1986 Worth

606 BOTANY

201 THE LAND PLANTS
Heywood V H Plant Taxonomy 1976 2nd ed Arnold (PR)
Scagel R F et al Plants an Evolutionary Survey 2nd ed 1984 Wads-worth
*The Families and Genera of Victorian Plants Available from Bookroom
*Debenham C The Language of Botany 1971 2nd ed Soc for Growing Aust Plants
Books—B.Sc.

202 BOTANY: PLANT FORM AND FUNCTION
* Salisbury F B and Ross C W  *Plant Physiology* 2nd ed 1978 Wadsworth
* Esau K  *Anatomy of Seed Plants* 2nd ed 1977 Wiley

203 BOTANY: ALGAE AND FUNGI
* Ingold C T  *The Biology of Fungi* 5th ed Hutchison

204 BOTANY: ECOLOGY
Anderson E  *Plants Man and Life* 1964 Little Brown (PR)
Clarke G L  *Elements of Ecology* 1967 Wiley (PR)
Fitzpatrick E A  *An Introduction to Soil Science* 1974 Oliver & Brown (PR)
Daubenmire R F  *Plants and Environment: A Textbook of Plant Autecology* 1959 Wiley
Daubenmire R R  *Plant Communities: A Textbook of Plant Synecology* 1968 Harper & Row
* Etherington J R  *Environment and Plant Ecology* 1975 Wiley

208 BOTANY: MARINE BOTANY
Clayton M N and King R J  *Marine Botany: An Australasian Perspective* 2nd ed Longman Cheshire

301 BOTANY: COMMUNITY AND ECOSYSTEM ECOLOGY
Specht R L  *The Vegetation of South Australia* 2nd ed 1972 Govt Printer SA
Leeper G W  *Introduction to Soil Science* 1957 MUP
Groves R H ed  *Australian Vegetation* 1981 CUP
* Attiwill P M and Leeper G W  *Forest Soils and Nutrient Cycles* MUP

303 BOTANY: ENVIRONMENTAL PLANT PHYSIOLOGY
Nobel P S  *Biophysical Plant Physiology* 1974 2nd ed Freeman

309 BOTANY: MYCOLOGY AND PLANT PATHOLOGY
* Kendrick B  *The Fifth Kingdom* 1985 Mycologue

610 CHEMISTRY

101 CHEMISTRY
McTigue P T ed  *Chemistry Key to the Earth* 1st ed 1979 MUP (PR)
* Allinger N L et al  *Organic Chemistry* 2nd ed Worth
or
* McTigue P T  *Physical Chemistry* depart publicn
* Molecular Model Set for Organic Chemistry Allyn & Bacon
201, 202, 203 PHYSICAL CHEMISTRY I, II AND III

*Atkins P W Physical Chemistry 3rd ed 1986 OUP

220, 221, 222, 223 ORGANIC CHEMISTRY


*Allinger N L et al Organic Chemistry 2nd ed Worth

*Molecular Model Set for Organic Chemistry Allyn & Bacon

240, 241, 242, 243 INORGANIC CHEMISTRY

Gray H B Electrons and Chemical Bonding 1st ed Benjamin

*Cotton F A and Wilkinson G Basic Inorganic Chemistry Wiley

*Marsden C J Introduction to Bonding Chem Sch

260 ANALYTICAL CHEMISTRY

*Skoog D A and West D M Analytical Chemistry 1979 Holt, Rinehart & Winston

295 MARINE CHEMISTRY


320 SPECTROSCOPIC METHODS


335 ORGANIC PRACTICAL WORK 1


336 ORGANIC PRACTICAL WORK 2

*As for 335.

CHEMISTRY OF d— AND f— TRANSITION ELEMENTS

Topics (ii), (v), (viii) of 340, 341, 342 and 343

Cotton F A and Wilkinson G Advanced Inorganic Chemistry 3rd ed Interscience

INORGANIC REACTION MECHANISM

Topic (vi) of 340, 341, 342 and 343

*Tobe M L Reaction Mechanisms Nelson

INORGANIC STRUCTURAL AND CRYSTAL CHEMISTRY

Topic (iii) of 340, 341, 342 and 343

Adams D M Inorganic Solids Wiley

CHEMICAL APPLICATIONS OF GROUP THEORY

Topic (iv) of 340, 341, 342 and 343

*Cotton F A Chemical Applications of Group Theory 2nd ed Wiley

*Or

*Bishop D M Group Theory and Chemistry OUP

263
Books—B.Sc.

622 COMPUTER SCIENCE

113 COMPUTER PROGRAMMING FUNDAMENTALS
   * Grogono P, Programming in Pascal 2nd ed 1984 Addison Wesley

214 STRUCTURE OF COMPUTERS

250 COMPUTER SYSTEMS

312 DATA STRUCTURES AND ALGORITHMS
   * Horowitz E and Sahni S, Fundamentals of Data Structures in Pascal 2nd ed 1986 Pitman

332 OPERATING SYSTEMS
   * Peterson Z and Silberschatz A, Operating Systems Concepts 1983 Addison-Wesley

341 SOFTWARE ENGINEERING
   * Sommerville I, Software Engineering 2nd ed 1985 Addison-Wesley

351 DATABASE SYSTEMS
   Grant J, Logical Introduction to Databases 1987 Harcourt Brace Jovanovich

353 NETWORKS AND COMMUNICATIONS
   * Tanenbaum A S, Computer Networks 1982 Prentice-Hall

380 GRAPHICS

431 ELECTRICAL ENGINEERING

380 DIGITAL CIRCUITS
   Mano M M, Digital Design 1984 Prentice-Hall

400 ENGINEERING

102 INTRODUCTION TO ENGINEERING (SCIENCE COURSE)
   Slaby S M, Engineering Descriptive Geometry Barnes & Noble
   * Inst of Engs Aust, Australian Engineering Drawing Handbook Basic Principles and Techniques AS CZ1 pt 1
   * Lewis W P, Three-Dimensional Geometry in Engineering Thinking MUP
   Nilsson J W, Electric Circuits 2nd ed 1986 Addison-Wesley

264
652 GENETICS

201, 202 GENETICS
* Suzuki et al. An Introduction to Genetic Analysis 3rd ed. Freeman

302, 303 GENETICS

121 GEOGRAPHY (SCIENCE COURSE)
Please consult the department direct.

626 GEOLOGY

101 GEOLOGY
* Press F and Siever R. Earth 4th ed. 1986 Freeman
* Battey M H. Mineralogy for Students 2nd ed. 1981 Longman
* Black R M. The Elements of Palaeontology. 1970 CUP
* Hills E S. Physiography of Victoria. 1975 Whitcombe & Tombs
Clark I F and Cook B J. Geological Science Perspectives of the Earth. 1983 AAS (PR)

111 THE DYNAMIC EARTH
* Press F and Siever R. Earth 4th ed. 1986 Freeman
Hills E S. Physiography of Victoria. 1975 Whitcombe & Tombs
Clark I F and Cook B J. Geological Science Perspectives of the Earth. 1983 AAS

201 MINERALOGY AND PETROLOGY
* Battey M H. Mineralogy for Students 2nd ed. Longman
Nockolds S R et al. Petrology for Students. 1978 CUP
Best M G. Igneous and Metamorphic Petrology. 1982 Freeman

202 SEDIMENTOLOGY AND STRUCTURAL GEOLOGY
* Selley R C. An Introduction to Sedimentology 2nd ed. 1982 Academic
* Davis G H. Structural Geology of Rocks and Regions. 1984 Wiley

203 PALAEONTOLOGY AND STRATIGRAPHY
Clarkson E N K. Invertebrate Palaeontology and Evolution. latest ed. Allen & Unwin
Raup D M and Stanley S M. Principles of Paleontology. latest ed. Freeman

301 PETROLOGY AND GEOCHEMISTRY
Best M G. Igneous and Metamorphic Petrology. 1982 Freeman
303 ECONOMIC GEOLOGY
*Evans A M *An Introduction to Ore Geology* 1980 Blackwell Scientific
*Skinner B J ed *Economic Geology 75th Anniv Vol* 1981 Econ Geol Publ
McDivitt J F and Manners G *Minerals and Men* 1974 Johns Hopkins Univ
Stanton R L *Ore Petrology* 1972 McGraw-Hill

332 INTRODUCTION TO GEOPHYSICAL EXPLORATION

371 GEOPHYSICAL EXPLORATION A
372 GEOPHYSICAL EXPLORATION B
*Telford W M et al *Applied Geophysics PB ed CUP

136 HISTORY AND PHILOSOPHY OF SCIENCE

101 HISTORY OF ASTRONOMY
*Kuhn T S *The Copernican Revolution* pb Harvard
*Koestler A *The Sleepwalkers* pb Penguin
or
*Koestler A *The Watershed* Paperback Harvard
*Lloyd G E R *Early Greek Science: Thales to Aristotle* Paperback Chatto & Windus
Toulmin S and Goodfield J *The Fabric of the Heavens* cheapest available (PR)
Kearney H *Science and Change 1500-1700* 1971 paperback Weidenfeld & Nicholson (PR)
Dreyer J L E *A History of Astronomy from Thales to Kepler* Dover
A reading guide will be issued.

103 UPHEAVALS IN SCIENTIFIC THOUGHT
Takeuchi H S et al *Debate About the Earth* Freeman Cooper
*Chalmers A F *What Is This Thing Called Science?* 2nd ed QUP
*Kuhn T S *The Structure of Scientific Revolutions* Chicago UP

202 SCIENCE REASON AND POWER
*Chalmers A F *What is this Thing called Science?* 2nd ed QUP (PR)
Mulkay M *Science and the Sociology of Knowledge* Allen & Unwin (PR)
Foucault M *The History of Sexuality* vol I Penguin (PR)
A Reading List is available from the Department.

203 SCIENCE, LIFE AND MIND
Maynard-Smith J *The Problems of Biology* 1986 OUP

222 ISSUES IN MODERN LIFE SCIENCES
Books—B.Sc.

*Broad W and Wade N  Betrayers of the Truth 1982 Simon & Schuster
Sapp J  Beyond the Gene 1987 OUP (PR)
Gould S J  The Mismeasure of Man 1984 Pelican Books

223 DARWINISM
*Young R  Darwin's Metaphor 1985 CUP
*Darwin C  The Origin of Species 1972 Pelican
Eiseley L  Darwin's Century (PR)
Darwin C  The Voyage of the Beagle (PR)
Oldroyd D  Darwinian Impacts (PR)
Sapp J  Beyond the Gene 1987 OUP (PR)

224 THE SCIENTIFIC REVOLUTION
*Descartes Discourse on Method and Meditations pb Penguin
Kearney H  Science and Change 1500-1700 Weidenfeld & Nicholson (PR)
Kuhn T  The Copernican Revolution (PR)
Lewis C S  The Discarded Image
A reading guide will be issued.

225 SOCIAL HISTORY OF MEDICINE
*Ackerknecht E  A Short History of Medicine Johns Hopkins
*Altman D  AIDS and the New Puritanism Pluto
Doyal L  The Political Economy of Health Pluto
Fleck L  Genesis and Development of a Scientific Fact Chicago
Foucault M  The Birth of the Clinic Tavistock
McKeown T  The Role of Medicine Princeton
Rosenberg C  The Cholera Years Chicago
Shorter E  Bedside Manners Penguin (forthcoming)
Oakley A  The Captured Womb Blackwell
A reading guide will be issued.

226 SCIENCE, TECHNOLOGY AND SOCIETY
Dyson F  Weapons and Hope Harper Colophon
Easley B  Fathering the Unthinkable Pluto
*Jungk R  Brighter than a Thousand Suns Penguin
*Kaldor M  Baroque Arsenal
Kidder T  The Soul of a New Machine Penguin
McNeill W H  The Pursuit of Power Chicago
McDougall W A  The Heavens and the Earth Basic Books
Noble D F  America by Design OUP
Noble D F  Forces of Production Knopf or pb.
Pringle P and Spigelman J  The Nuclear Barons Sphere
Thompson E P ed  Star Wars
A reading guide will be issued.

301 PHILOSOPHY OF MATHEMATICS
*Benacerraf P and Putnam H  Philosophy of Mathematics Prentice-Hall
Fraenkel A A  Foundations of Set Theory
Van Heijenoort  From Frege to Gödel: a Source Book in Mathematics
Dummett M  Elements of Intuitionism

267
Books—B.Sc.

303 PHILOSOPHY OF SCIENCE
Salmon W C Scientific Explanation and the Causal Structure of the World 1984 Princeton UP

320 APPROACHES TO THE HISTORY OF SCIENCE
Available from department at beginning of term.

600 MARINE SCIENCE

202 MARINE CHEMISTRY
* Riley J P and Chester R Introduction to Marine Chemistry Academic (PR)
* Broecker W S Chemical Oceanography Harcourt-Brace (PR)

617 MATHEMATICAL SCIENCES

111 MATHEMATICAL SCIENCES 1A
* Holton D A and Lloyd J W Algebra and Geometry 1978 Babbage Res Cent
* Salas S L and Hille E Calculus One and Several Variables 4th ed Wiley
* Grogono P Programming in Pascal 2nd ed 1984 Addison-Wesley

110 MATHEMATICAL SCIENCES 1B
* Holton D A and Lloyd J W Algebra and Geometry 1978 Babbage Res Centre
* Thomas G B and Finney R L Calculus and Analytic Geometry 6th ed Addison-Wesley
* Grogono P Programming in Pascal 2nd ed 1984, Addison-Wesley

120 MATHEMATICAL SCIENCES 1C
Meissner L P and Organick E I Fortran 77 Featuring Structured Programming 1980 Addison-Wesley
* Zill D G A First Course in Differential Equations with Applications 2nd ed 1984 Int ed Wadsworth
* Grogono P Programming in Pascal 2nd ed 1984 Addison-Wesley
* Poole P C and Poole N Using UNIX by Example 1986 Addison-Wesley

130 MATHEMATICAL SCIENCES 1D
Moffat D V Common Algorithms in Pascal 1984 Prentice-Hall
Tenebaum A M and Augenstien M J Data Structures using Pascal 2nd ed 1986 Prentice-Hall
* Grogono P Programming in Pascal 2nd ed 1984 Addison-Wesley

268
140 MATHEMATICAL SCIENCES 1E
*Grogono P Programming in Pascal 2nd ed 1984 Addison-Wesley
*Goldman R N and Weinberg J S Statistics An Introduction 1985
Prentice-Hall
*Thomas G B and Finney R L Calculus and Analytic Geometry 1983
Addison-Wesley

150 MATHEMATICAL SCIENCES 1F
Dowling E T Mathematics for Economists Schaum’s Outline Series
McGraw-Hill
*Goldman R N and Weinberg J S Statistics An Introduction 1985
Prentice-Hall
*Grogono P Programming in Pascal 2nd ed 1984 Addison-Wesley

631 METEOROLOGY
ALL METEOROLOGY UNITS
Preliminary texts available from Meteorology Department Library on re­
quest.
There are no prescribed textbooks in any unit.

526 MICROBIOLOGY
201 GENERAL MICROBIOLOGY (LECTURES)
*Tortora G J et al Microbiology Benjamin/Cummings
or

202 GENERAL MICROBIOLOGY (PRACTICAL WORK)
*Experimental Techniques in Microbiology MUP

203 MICROBIOLOGY (OPTOMETRY)
Vaughan D and Asbury T General Ophthalmology 11th ed 1986 Lange
Jawetz E et al Review of Medical Microbiology 17th ed 1986 Lange
Tortora G F et al Microbiology An Introduction Benjamin/Cummings
Gardner J F and Peel M M Introduction to Sterilization and Disin­
fection 1986 Churchill Livingstone

301 PATHOGENESIS AND EPIDEMIOLOGY
*Mims C A The Pathogenesis of Infectious Disease 1982 AP
*Barker D J P Practical Epidemiology 3rd ed 1982 Churchill Living­
stone

302 PRACTICAL MICROBIOLOGY
*Experimental Techniques in Microbiology 1982 MUP
*Notes of Medical Microbiology 1982 MUP
Microbiology 3rd ed American Society for Microbiology
Books—B.Sc.

303 VIROLOGY (LECTURES)
*White D O and Fenner F *Medical Virology* 3rd ed Academic

305 PRINCIPLES OF IMMUNOLOGY
*Roitt I *Essential Immunology* 5th ed 1984 Blackwell
or
*Benacerraf B and Unanue E R *Textbook of Immunology* 2nd ed Williams & Wilkins

307 INDUSTRIAL MICROBIOLOGY
Pirt S J *Principles of Microbe and Cell Cultivation* 1975 Blackwell (PR)
Millis N F and Pittard A J *Microbial Physiology and Genetics of Industrial Processes* 1982 U of M
Krumphanz V et al eds *Overproduction of Microbial Products* 1982 Academic
Peppler H J and Perlman D *Microbial Technology* 1979 Academic (PR)
Crueger W and Crueger A *Biotechnology: A Textbook of Industrial Microbiology* Sinauer

309 MICROBIAL GENETICS (LECTURES)
Glass R E *Gene Function* 1982 Croom Helm

311 MICROBIOLOGY: MICROBIAL PHYSIOLOGY (LECTURES)
Dawes I W and Sutherland I W *Microbial Physiology* 1976 Blackwell (PR)

531 PATHOLOGY

301, 302, 303, 304 and 305 PATHOLOGY
Hurley J V *Acute Inflammation* 2nd ed Churchill-Livingstone
*Anderson J R *Muir’s Textbook of Pathology* 12th ed Arnold
or
*Robbins S L et al *Pathologic Basis of Disease* 3rd ed Saunders
Louis C J *Tumours* 1st ed Churchill-Livingstone

306 PATHOLOGY
As for 301
and
Hildemann W H et al *Comprehensive Immunogenetics* Blackwell Scientific 1981

307 GENERAL PATHOLOGY (OPTOMETRY)
*Walter J B *An Introduction to the Principles of Disease* 1st ed Saunders 1977
or
*Robbins S L and Kumar V *Basic Pathology* 4th ed Saunders 1987
308 IMMUNOPATHOLOGY
Stites D P et al Basic and Clinical Immunology 5th ed Lange Medical

534 PHARMACOLOGY

201 PHARMACOLOGY
Goodman L S and Gilman A The Pharmacological Basis of Therapeutics 7th ed 1986 Macmillan (PR)
Craig C R and Stitzel R E Modern Pharmacology 2nd ed 1986 Little Brown (PR)

301 MOLECULAR PHARMACOLOGY
Goldstein A Aronov L and Kalman S M Principles of Drug Action the Basis of Pharmacology 2nd ed Wiley (PR)
*Yamamura H I et al Neurotransmitter Receptor Binding 2nd ed 1985 Raven

302 AUTOPHARMACOLOGY
Kruk Z L and Pycock C J Neurotransmitters and Drugs 2nd ed 1983 Biddles (PR)

or
*Goodman L S and Gilman A The Pharmacological Basis of Therapeutics 7th ed 1986 Macmillan

or
*Craig C R and Stitzel R E Modern Pharmacology 2nd ed 1986 Little Brown (PR)

303 PHARMACOKINETICS
Creasey W A Drug Disposition in Humans: The Basis of Clin Pharmacology 1979 OUP (PR)

or
*Goldstein A Aronov L and Kalman S M The Principles of Drug Action the Basis of Pharmacology 2nd ed Wiley (PR)

304 PHARMACOLOGY OF THERAPEUTIC SUBSTANCES 1
*Goodman L S and Gilman A The Pharmacological Basis of Therapeutics 7th ed 1986 Macmillan

or

or
*Craig C R and Stitzel R E Modern Pharmacology 2nd ed 1986 Little Brown (PR)
Books—B.Sc.

305 PHARMACOLOGY OF THERAPEUTIC SUBSTANCES 2
As for Unit 304.

306 OCULAR PHARMACOLOGY
Bowman W C and Rand M J  *Textbook of Pharmacology* 2nd ed 1980
Blackwell

or
Ellis P P  *Ocular Therapeutics and Pharmacology* 6th ed 1981 Mosby
Havenner W H  *Ocular Pharmacology* 4th ed 1978 Mosby
*O’Connor Davies P H  *The Actions and Uses of Ophthalmic Drugs* 2nd ed 1981 Butterworth

307 TOXICOLOGY
Doull J et al eds  *Casarett and Doull’s Toxicology The Basic Science of Poisons* 2nd ed 1980 Macmillan
Hayes A W ed  *Principles and Methods of Toxicology* 1984 Raven

640 PHYSICS
Students of most Physics courses will find that the possession of a small book of physical and mathematical data a great convenience. The following is suitable:
*Tennant R M ed  *Science Data Book* Oliver & Boyd

120 PHYSICS (ADVANCED)
*Ohanian H C  *Physics* 1985 W W Norton & Co
*Anderson E E  *Introduction to Modern Physics* 1982 Saunders
*Physics 1 A4 Practical Notebook
*Physics 1 Experimental Physics Laboratory Notes MUP

140 PHYSICS (STANDARD)
*Halliday D and Resnick R  *Physics* pts 1, 2 3rd ed Wiley
*Weidner R T and Sells R L  *Elementary Modern Physics* 3rd ed Allyn & Bacon
*Physics 1 A4 Practical Notebook
*Physics 1 Experimental Physics Laboratory Notes MUP

160 PHYSICS (TERMlNAL)
*Giancoli D C  *Physics Principles with Applications* 1980 Prentice-Hall
Kane J W and Sternheim M M  *Physics* 2nd ed 1983 Wiley
Physics 1 A4 Practical Note Book
Physics 1 Experimental Physics Laboratory Notes MUP

170 PHYSICS: ASTRONOMY
Marlin D  *The Colour of Stars* CUP

211 PHYSICS: ENERGY AND ENVIRONMENT
*Wilson J B  *Solar Energy* 1979 Wykeham
*Hunt S E  *Fission Fusion and the Energy Crisis* 1974 Pergamon
Stauss W and Mainwaring J J  *Air Pollution* 1984 Arnold
Connell D W  *Water Pollution and Causes and Effects in Australia* 1974 QUP

222 PHYSICS: OPTICS AND RELATIVITY (ADVANCED)
*French A P  *Special Relativity* Nelson
*Hecht E and Zajac A  *Optics* Addison-Wesley

223 PHYSICS: QUANTUM MECHANICS (ADVANCED)
*Gasiorowicz  *The Structure of Matter A Survey of Modern Physics* 1st ed Addison-Wesley

224 PHYSICS: CLASSICAL MECHANICS (ADVANCED)
*Goldstein H  *Classical Mechanics* Addison-Wesley

225 PHYSICS: ELECTROMAGNETISM (ADVANCED)
*Lorrain P and Corson D R  *Electromagnetic Fields and Waves* 2nd ed Freeman

226 PHYSICS: THERMAL PHYSICS (ADVANCED)
*Sears F W and Salinger G L  *Thermodynamics Kinetic Theory and Statistical Mechanics* 3rd ed Addison Wesley

227 PHYSICS: OPTICS (ADVANCED)
*Hecht E and Zajac A  *Optics* Addison-Wesley

241 PHYSICS: AC CIRCUITS AND ELECTRONICS
Brophy J J  *Basic Electronics for Scientists* 3rd ed McGraw-Hill
School of Physics  *Laboratory Notes* School of Physics

242 PHYSICS: OPTICS AND RELATIVITY
*French A P  *Special Relativity* Nelson
*Hecht E and Zajac A  *Optics* Addison-Wesley

243 PHYSICS: QUANTUM MECHANICS
French A P and Taylor E F  *An Introduction to Quantum Physics* Nelson-Norton

244 PHYSICS: CLASSICAL MECHANICS
Fowles G R  *Analytical Mechanics* 4th ed Saunders

245 PHYSICS: ELECTROMAGNETISM
*Cheng D K  *Field and Wave Electromagnetics* 1983 Addison-Wesley

246 PHYSICS: THERMAL PHYSICS
*Sears F W and Salinger G L  *Thermodynamics Kinetic Theory and Statistical Mechanics* 3rd ed Addison Wesley

273
Books—B.Sc.

247 PHYSICS: OPTICS
*Hecht E and Zajac A  Optics Addison-Wesley

320 PHYSICS: QUANTUM MECHANICS (ADVANCED)
*Messiah A  Quantum Mechanics Vols 1 and 2 North-Holland

321 PHYSICS: THERMAL PHYSICS (ADVANCED)
*Reif F  Statistical and Thermal Physics McGraw-Hill
Kittel C and Kroemer H  Thermal Physics 2nd ed Freeman
Mandl F  Statistical Physics Wiley
Landsberg P T  Thermodynamics and Statistical Mechanics QUP

322 NUCLEAR PHYSICS (ADVANCED)
*Enge H A  Introduction to Nuclear Physics Addison-Wesley

323 PHYSICS: SOLID STATE PHYSICS (ADVANCED)
Kittel C  Introduction to Solid State Physics 6th ed Wiley
or
Ashcroft N W and Mermin N D  Solid State Physics Holt Rinehart and Winston

324 PHYSICS: ELECTRODYNAMICS (ADVANCED)
Jackson J D  Classical Electrodynamics 2nd ed Wiley

340 PHYSICS: QUANTUM MECHANICS
Merzbacher E  Quantum Mechanics 2nd ed Wiley

341 PHYSICS: THERMAL PHYSICS
As for 321.

342 PHYSICS: NUCLEAR PHYSICS
*Enge H A  Introduction to Nuclear Physics Addison-Wesley

343 PHYSICS: SOLID STATE PHYSICS
Kittel C  Introduction to Solid State Physics 6th ed Wiley
or
Ashcroft N W and Mermin  Solid State Physics Holt Rinehart and Winston

344 PHYSICS: ELECTRODYNAMICS
*Jackson J D  Classical Electrodynamics 2nd ed Wiley

360 PHYSICS: ATOMIC AND MOLECULAR PHYSICS
*Bransden B H and Joacham C J  Physics of Atoms and Molecules
Longman

361 PHYSICS: MODERN OPTICS AND DIFFRACTION
Cowley J M  Diffraction Physics 2nd ed North-Holland
Lipson S G and Lipson H  Optical Physics 2nd ed 1981 CUP
362 PHYSICS: ELECTRONICS
Edminister J A  Electric Circuits Schaum
Henry E W  Electronic Systems & Instrumentation Wiley
Diefenderfer A J  Principles of Electronic Instrumentation Holt-Saunders

363 PHYSICS: ASTRONOMY
Zeilik M and Smith E V P  Introductory Astronomy and Astrophysics
2nd ed Saunders College Pub
Roy A E and Clarke D  Astronomy Structure of the Universe 2nd ed Hilger
Roy A E and Clarke D  Astronomy Principles and Practice 2nd ed Hilger

365 PHYSICS: ASTROPHYSICS
Zeilik M and Smith E V P  Introductory Astronomy and Astrophysics
2nd ed Saunders College Pub
Chandrasekhar S  An Introduction to the Study of Stellar Structure Dover

366 PHYSICS: DIGITAL SYSTEMS
Tocci R L  Digital Systems Principles and Applications 1980 Prentice-Hall

375 PHYSICS: PARTICLE PHYSICS
Perkins D H  Introduction to High Energy Physics 2nd ed Addison-Wesley
Hughes I S  Elementary Particles 2nd ed CUP

405 PHYSICS: DIFFRACTION
*Cowley J M  Diffraction Physics 2nd ed North Holland
*Warren B E  X-Ray Diffraction Addison-Wesley

408 PHYSICS: STATISTICAL MECHANICS
*Huang K  Statistical Mechanics Wiley

410 PHYSICS: QUANTUM FIELD THEORY
Bjorken J and Drell S  Relativistic Quantum Mechanics McGraw-Hill

411 PHYSICS: PARTICLE PHYSICS I (EXPERIMENTAL)
Perkins D H  Introduction to High Energy Physics 3rd ed 1987 Addison-Wesley

412 PHYSICS: PARTICLE PHYSICS II (THEORY)
*Close F E  An Introduction to Quarks and Partons Academic

413 PHYSICS: ASTRONOMY
*Swihart T L  Astrophysics and Stellar Astronomy Wiley
Books—B.Sc.

536 PHYSIOLOGY

201, 202 and 205 PHYSIOLOGY


*Berne R M and Levy M N *Physiology* 1983 Mosby

*Schmidt R F and Thews G *Human Physiology* 20th ed 1982 Springer-Verlag


311 THE BRAIN, PERCEPTION AND BEHAVIOUR

*Kandel E R and Schwartz J H *Principles of Neural Science* 2nd ed 1984 Elsevier

*Kuffler S W et al *From Neuron to Brain* 2nd ed 1984 Sinauer

*Shepherd G *Neurobiology* 1983 OUP NY

Carpenter M B *Core Text Neuroanatomy* 3rd ed in press 1985 Williams & Wilkins

*Heimer L *The Human Brain and Spinal Cord* 1983 Springer-Verlag

Seminar papers Physiol dept

313 PHYSIOLOGICAL ASPECTS OF NUTRITION AND METABOLISM

Davenport H W *Physiology of the Digestive Tract* 4th ed 1977 Year Book

315 MAMMALIAN RENAL FUNCTION

Reading guides will be issued in the course.


316 CIRCULATORY AND RESPIRATORY PHYSIOLOGY

*Folkow B and Neil E Circulation* 1975

*Ruch and Patton *Physiology and Biophysics* Vol 2 20th ed 1974

*West *Respiratory Physiology the Essentials* 2nd ed 1979

*Mines A H Respiratory Physiology* 1981 Raven

*Mountcastle *Medical Physiology* vol 2 14th ed 1980

321 WORK, EXERCISE AND SPORTS SCIENCE


322 & 323 BRAIN IN ACTION: MOVEMENT, MOTIVATION
AND MEMORY
Blakemore C  *Mechanics of the Mind* 1st ed CUP (PR)
Rose S P  *The Conscious Brain* 2nd ed Pelican (PR)
*Carpenter M B  Core text of Neuroanatomy* 2nd ed W & Wilkins
or
or
*Shepherd G M  Neurobiology* 1982 OUP
Additional references will be issued in the course.

171 PSYCHOLOGY

101 PSYCHOLOGY
Chaplin J P  *Dictionary of Psychology* 6th ed Dell Pub
*Kimble G A et al  Principles of Psychology* Wiley
Moore D S  *Statistics, Concepts & Controversions* 2nd ed W H Freeman & Co
Watson R  *Quantitative Methods* (published by Author)

201 PSYCHOLOGY
Refer to Arts Faculty Handbook.

301 PSYCHOLOGY
CORE SECTION:
Introduction to Psychological Measurement
Anastasi A  *Psychological Testing* 5th ed Macmillan
OPTIONS:
Psychopathology
Methodology in Psychosocial Research
Reading to be advised.
Topics in Neuropsychology
Reading to be advised.
Introduction to Sports Psychology
Reading to be advised.
Topics in Cognitive Science
Reading to be advised.
Psychology of Adjustment
Reading to be advised.
Psychosocial Interaction
Cohen E K  *Deviance and Control* Prentice-Hall
Further reading to be advised.
Books—B.Sc.

Topics in Life Span Psychology
Reading to be advised.

Topics in Applied Psychology
Reading to be advised.

Personality Integration
Singer J L The Human Personality 1984 Harcourt, Brace & Jovanovich (PR)

or

Hall C and Lindzey G Theories of Personality any ed Wiley (PR)

or

Monte C F Beneath the Mask: An Introduction to Theories of Personality 1987 or earlier Holt, Rinehart & Winston (PR)

Bateson G Steps to an Ecology of Mind 1973 Paladin

Harre R ed Personality 1976 Blackwell

Holland R Self and Social Context 1977 Macmillan


Shotter J Images of Man in Psychological Research 1975 Methuen

Storr A The Integrity of Personality 1960 Penguin

302 PSYCHOLOGY

Quantitative Methods C
Printed lecture notes will be made available during the course.

Harris R J A Primer of Multivariate Statistics 2nd ed 1985 Academic Press

Child D The Essentials of Factor Analysis 1970 Holt Rinehart & Winston

Cooley W and Lohes P Multivariate Data Analysis 1971 Wiley

Draper N and Smith H Applied Regression Analysis 1966 Wiley

Kerlinger F and Padhazar E Multiple Regression in Behavioural Research 1973 Holt Rinehart & Winston

Tatsuoka M Selected Topics in Advanced Statistics: an Elementary Approach. Booklets 4, 5, 6 1971 IPAT


*Tabachnick B G and Fidell L S Using Multivariate Statistics Harper & Row


Assessment
Standards for Educational and Psychological Tests 1985 American Psychological Assoc


Theory in Psychology A

Braithwaite R B Scientific Explanation 1953 CUP

Outhwaite W Understanding Social Life: The Method called Verstehen 1975 Allen & Unwin


Rudner R S Philosophy of Social Science 1966 Prentice-Hall pb
Feigl H and Broadbeck M eds  *Readings in the Philosophy of Science* 1953 Appleton-Century-Crofts
Kuhn T S  *The Structure of Scientific Revolutions* 2nd ed 1970 Foundations of the Unit of Science Chicago UP
Whyte L L  *The Unconscious before Freud* 1967 Tavistock Publications
Lakatos I and Musgrave A eds  *Criticism and the Growth of Knowledge* 1970 CUP
Szasz T S  *The Myth of Mental Illness* 1961 Delta Books
Harre R and Secord P F  *The Explanation of Social Behaviour* Basil Blackwell
Tudor A  *Beyond Empiricism* 1982 Kegan Paul

**Research Methodology Seminar**
*SPSS Inc  *SPSS Users Guide* McGraw-Hill
*Robinson I and Campbell J  *Introduction to SPSS on the VAX Computer* Centre U of Melb
Cook T D and Campbell D T  *Quasi-Experimentation* 1979 Rand McNally
Kidder L  *Research Methods in Social Relations* 5th ed Holt Sanders

**Professional Skills**

**Perception**
*Sekuler R and Blake R  *Perception* 1985 Knopf

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**401 PSYCHOLOGY**

**COMPULSORY UNIT:**

**Theory in Psychology B**
Barnes B  *T S Kuhn and Social Science* 1982 Macmillan
Bleicher J  *The Hermeneutic Imagination* 1982 Routledge
Bloor D  *Wittgenstein: A Social History of Knowledge* Macmillan
Brown S C  *Philosophy of Psychology* 1974 Macmillan
Carrol J  *Puritan, Paranoiac and Remissive* Routledge & Kegan Paul
Cuddihy M J  *The Ordeal of Civility* Basic Books
Fine R  *History of Psychoanalysis* 1979 Col UP
Gellner E  *The Psychoanalytic Movement* 1986 Paladin
Kuhn T S  *The Structure of Scientific Revolution* 2nd ed Chicago UP
Lakatos I and Musgrave A  *Criticism and the Growth of Knowledge* CUP
Outhwaite W  *Understanding Social Life: the Method called Verstehen* Allen & Unwin
Popper K R  *Objective Knowledge* Clarendon P
Ryan A  *The Philosophy of the Social Sciences* Macmillan
Szasz T S  *The Ethic of Psychoanalysis* Routledge
Szasz T S  *Schizophrenia: The Sacred Symbol of Psychiatry* OUP
Szasz T S  *The Myth of Psychotherapy* OUP
Wittgenstein  *Remarks on the Philosophy of Psychology* Beachwell Oxford
Books—B.Sc.

**OPTIONAL UNITS**

**Interaction in Groups**
- Bion W R *Experiences in Groups* 1959 Basic Books
- Kreeger L ed *The large group: Dynamics and Therapy* 1975 Constable
- Cooper C L ed *Theories of Group Processes* 1975 Wiley

**Cognitive Processes**
Not available in 1988.

**Information Processing C**
Not available in 1988.

**Cognitive Development B**
- *Gittings R* *John Keats* 1968
- *Vygotsky L S* *Thought and Language* 1962 MIT Press

**Applied Personality Theory**
Not available in 1988.

**Psychology of Language A**
- Garnham A *Psycholinguistics: Central Topics* 1985 Methuen

**Perception B**
- *Sekuler R* and *Blake R* *Perception* 1985 Knopf
- Breitmeier B J *Visual Masking* 1984 OUP

**Neuropsychology B**
- *Romanes J G ed* *Cunningham's Manual of Practical Anatomy Vol III The Head* OUP

**Introduction to Simulation**
Not available in 1988.

**Introduction to Occupational Psychology**
No prescribed text
- Warr P B ed *Psychology at Work* 2nd ed 1978 Penguin

**Social Indicators and Public Policy**
Reading Guide to be announced.

**The Analysis of Categorical Data**
Probably not available in 1988.

**Communication and Specific Learning Disorders**
Reading Guide to be announced.

**Psychology of Language B**
Not available in 1988.

**Human Performance**
Reading Guide to be announced.

**Models of Data in the Social Sciences**
May not be available in 1988.
The Child and its Family
Not available in 1988.

Psychopathology
Reading Guide to be announced.

Applied Psychological Measurement
Everitt B S and Dunn G Advanced Methods of Data Exploration and Modelling Heinemann
Reading Guide to be announced.

Psychology of Politics
Reading Guide to be announced.

Neuropsychology C
Walsh K W Understanding Brain Damage: An Introduction to Clinical Evaluation 1985 Churchill Livingstone

Sex, Gender and Behaviour
Stockard J and Johnson M M Sex Roles 1980 Prentice-Hall
Reading Guide to be announced.

Psychology of Adolescence
Reading Guide to be announced.

619 STATISTICS

210, 220 STATISTICS
Watson R K Elementary Mathematical Statistics Vaba Publ

230 OPERATIONS RESEARCH
Taha H A Operations Research 3rd ed Collier Macmillan

301, 302 STATISTICS
Rao C R Linear Statistical Inference and Its Applications 2nd ed Wiley
Heathcote C R Probability Elements of Mathematical Theory Unwin (for Units 301 and 302 only)

313 STATISTICS
Rao C R Linear Statistical Inference and Its Applications 2nd ed Wiley

311 STATISTICAL INference

314 EXPERIMENTAL DESIGN AND DATA ANALYSIS
Cox D R Planning of Experiments Wiley (PR)

315 DISTRIBUTION-FREE METHODS

316 SAMPLE SURVEYS
Cochran W G Sampling Techniques 3rd ed Wiley
Books—B.Sc.

317 TIME SERIES ANALYSIS
   *Chatfield C  The Analysis of Time Series Chapman & Hall

361 OPERATIONS RESEARCH MODELLING ANALYSIS AND SIMULATION
   *Taha H A  Operations Research 3rd ed Collier Macmillan

451 SURVEYING

210 SURVEYING A
   Whyte W  Revision Notes on Plane Surveying Butterworth
   or
   Bannister A and Raymond S  Surveying 5th ed Pitman

211 SURVEYING (FORESTRY COURSE)
   *Bannister A and Raymond S  Surveying 5th ed Pitman
   or
   *Whyte W  Revision Notes on Plane Surveying Butterworth

312 SURVEYING (ENGINEERING COURSE)
   *Bannister A and Raymond S  Surveying 5th ed Pitman
   or
   *Whyte W  Revision Notes on Plane Surveying Butterworth

301 SURVEYING 2
   *Clark D  Plane and Geodetic Surveying for Engineers Vol 2 6th ed 1973 Constable
   *Star Almanac for Land Surveyors HM Stationery Office

654 ZOOLOGY

201 INVERTEBRATE ZOOLOGY
   Meglitsch P A  Invertebrate Zoology 2nd ed OUP
   Barnes R D  Invertebrate Zoology 3rd or 4th ed Saunders
   Miller R H  Freshwater Invertebrates Gould League

202 VERTEBRATE ZOOLOGY
   *Romer A S and Parsons T S  The Vertebrate Body 6th ed 1986 Saunders
   Kent G C  Comparative Anatomy of the Vertebrates 6th ed Times Mirror/Mosby
   Colbert E H  Evolution of the Vertebrates 3rd ed Wiley

203 ZOO PHYSIOLOGY
   Schmidt-Nielsen K  Animal Physiology Adaptation and Environment latest ed CUP (PR)

204 ECOLOGY
   *Begon M et al  Ecology: Individuals, Populations and Communities Blackwell
301 ANIMAL BEHAVIOUR
Slater P J B  
*An Introduction to Ethology*  CUP

302 ZOOPHYSIOLOGY
Gordon M S et al  
*Animal Physiology: Principles and Adaptations*
latest ed  Collier Macmillan

303 MARINE ECOLOGY
Cushing D H  
*Marine Ecology and Fisheries*  CUP (PR)
*Begon M et al  
*Ecology: Individuals, Populations and Communities*
Blackwell
Parsons T R et al  
*Biological Oceanographic Processes*  2nd ed  Pergamon (PR)

BACHELOR OF SCIENCE IN OPTOMETRY

655 OPTOMETRY

210 APPLIED OPTICS
Welford W T  
*Optics*  1976  OUP (PR)
Fincham W H A and Freeman M H  
*Optics*  9th ed  1980  Butterworths
Hecht E and Zajac A  
*Optics*  1974  Addison-Wesley
Longhurst R S  
*Geometrical and Physical Optics*  3rd ed  1973  Longmans

220 PHYSIOLOGICAL OPTICS
Davson H ed  
*The Eye*  Vols 1b 2a 2b 3 and 4  1962-1984  Academic
*Moses R A ed  
*Adler’s Physiology of the Eye—Clinical Applications*
7th ed  1981  Mosby
*Davson H  
*Physiology of the Eye*  4th ed  1980  Churchill Livingstone

310 APPLIED OPTICS

*Introduction to the VAX*  1987  MU Comp Centre

330 OPTOMETRY: FUNCTIONAL DISORDERS OF VISION
Von Noorden G K  
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The University is not just a set of buildings and a group of students, teachers and researchers, together for a few years.

ALUMNI (former students and staff) remain members of the University for life. Many continue to take an interest in its welfare and in the welfare of its students by advising them on career choices, helping to improve facilities, providing scholarships and so on.

Graduates elect ten members of the University Council and participate in other governing bodies. The Alumni Office sends them a special magazine, the University Gazette, four times a year to help them keep in touch. It also encourages them to use the facilities of the University, such as continuing education courses, the libraries and the sports union, and to keep in contact with each other, through reunions and branches interstate and overseas.

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Graduates are a mobile group of people (especially younger ones) and, sadly, we have lost contact with some of our alumni. Have any members of your family or their friends studied here for a time? If so, they should be receiving the Gazette. Why not ask them if it is getting through? Since you too are a Melbourne student they no doubt have an interest in hearing news of activities here.

Please help us keep in touch by sending in their names and addresses.
Thanks and good luck for a great year.

Name of Student..................................................................................................................................................
Address........................................................................................................ Postcode............................
Lost Alumni
Surname.............................................. Given Names..........................................
Address........................................................................................................ Postcode............................

Relationship to Student..................................................................................................................................
(mother, friend, etc.)
Surname.............................................. Given Names..........................................
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Send to The Alumni Office, The University of Melbourne, Parkville, Vic. 3052.
Or phone (03) 344 7469 or drop in to the office at 216 Leicester Street (near the front entrance to the University).