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THE UNIVERSITY OF NEWCASTLE

Volume 8
Volume 4
Volume 1

This volume is intended as a reference handbook for students enrolling in courses conducted by the Faculty of Science and Mathematics. The colour band, Amethyst BCC 28, in the center of the cover is the lining colour of the hood of Bachelor of Science and a number of other disciplines can be pursued within the Faculty of Science and Mathematics. Students enrolled in Science and Mathematics degree should be aware that they can apply to take subjects in Computer Science (offered within the Faculty of Engineering) but because of strict quota restrictions on entry to Computer Science 101, may not be successful in gaining a place. Subjects from Statistics, Information Science and a number of other disciplines can be pursued within the various degree programs. In the Bachelor of Science and Bachelor of Mathematics degrees, students may take a sequence of subjects from outside the Faculty, thus combining expertise in basic science and/or mathematics with a wide range of elective areas such as languages and other humanities, accountancy, management, computing and engineering.

Students entering university for the first time will find the system of instruction vastly different from that in secondary schools. The responsibility is placed on the student to extract the maximum benefit from the course. University staff will lecture to you and during that time you are expected to make notes about the material being presented. Some students respond by trying to take down the lecture verbatim but without understanding, others listen and make notes in outline form, copying down quotations or blackboard material, while a minority, overwhelmed by the volume and complexity of the subject matter, simply contemplate their next social engagement, to their own disadvantage. Two issues will be important for your ultimate success. The first is the development of an efficient note taking system and in this you should seek the assistance of the Student Counselling Unit which provides relevant short courses. The second is that, apart from regular tutorials, tests, and final examinations, no one will follow up your comprehension of the lecture material other than yourself. The Faculty expects you to spend at least one hour of your time on private study for every contact hour that you have with University staff. You need to allocate this from the very beginning of your course and if you delay the process you will probably never make up the lost time. A well planned, uniform program of work to support your lectures, tutorials and laboratory classes will allow you to develop your understanding of the subjects and enjoy the many other facets of university life.

The quality of your tertiary education depends upon your ability to make efficient use of the Auchmuty Library. Ensure that you make efficient use of the Auchmuty Library. Ensure that you have risen steeply, you must make the most of your time at University by using its resources to the full. Learn to organise your thoughts, expand your mind, and develop your critical faculties to the utmost in order to provide yourself with qualifications which will lead to a successful career and satisfying life.

B.A. ENGEI, Dean
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**FACULTY INFORMATION**

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

**Transition Arrangements**

This section on transition arrangements applies only to students enrolled before 1991. It should be noted that in the Faculty of Science and Mathematics any candidate who enrolled under Rules prior to 1991 is to meet the requirements of Rules in existence when the candidate commenced the course.

The credit point system which existed in 1990 has been revised.

**Conversion Patterns For 1991**

Transition for current students to the new credit point system requires conversion by the following formulas:

- Part I subjects — 20 credit points
- Part II subjects — 30 credit points
- Part III subjects — 40 credit points

The 1991 Handbook contains programs based on a semester subject being worth 10 credit points. However, due to the credit point system in 1990, any subjects listed in this Handbook which have not been edited to the semester subject value of 10 credit points now follow the 1991 system which now takes precedence.

**Exceptional Circumstances Arising in Transition**

In order to provide for exceptional circumstances arising in particular transition cases the Dean may determine the transition program to be followed.

**General Information for New Undergraduates**

Students embarking on a university course for the first time may find some difficulty in adapting to the new environment. Tertiary education makes a number of demands on students: it requires them to be self-disciplined, organized, self-motivated and moreover, responsible for their own course of study. Hence it is important that students become familiar with the University structure, degree courses offered and service organizations (such as the University Counselling Service & Accommodation Service etc.) which offer assistance with study, personal and housing problems.

Often students on first entering University are not certain of their final field of interest. In fact, it is usually only after the completion of the first year of study that many students finally choose a major at a particular subject. In order to maintain flexibility first year semester subjects (100 level subjects) should be chosen from areas where the student has some previous expertise or interest. At the same time, they should take note of the degree requirements, particularly with regard to compulsory subjects advisory/compulsory prerequisites and corequisites as set out in the appropriate Degree/Diploma Rules in this handbook.

Students should note that degrees must be structured to include a specified number of 300 level semester subjects. For example, a Bachelor of Science degree must include four 300 level semester subjects in one Department, and at least four more 300 level semester subjects chosen from those approved by Faculty Board. Subject to the Dean's permission, a candidate for the degree of Bachelor of Science is, in general, permitted to enrol in an appropriate 300 level course from amongst those offered by another Faculty. Similarly, a candidate for the degree of Bachelor of Science (Psychology) may count up to four semester subjects offered in other degree courses and a candidate for the degree of Bachelor of Education may enrol in up to eight semester subjects from another Faculty.

Time limits are set on the duration of an undergraduate course as indicated in the appropriate Rules. Maximum workloads are also present, since limits are placed on the number of subjects students are permitted to undertake in any one year. For information on these restrictions consult the appropriate degree Rules.

**Undergraduate Admission Requirements**

In order to be considered for admission for any qualification other than a postgraduate qualification an applicant shall be required to:

1. attain such aggregate of marks in approved subjects at the one New South Wales Higher School Certificate examination as may be prescribed by the Senate from time to time; or
2. otherwise satisfy the Admissions & Progression Committee that the applicant has reached a standard of education sufficient to enable the approved course to be pursued.

**Assumed Knowledge for Entry to the Faculty**

There are no prescribed prerequisites for entry to the Faculty of Science and Mathematics; students are advised that lectures will commence on the assumption that all students will have achieved the level indicated.

**Subject** | **Assumed Knowledge**
--- | ---
**Aviation 109-115** | 2-unit, 3-unit or 4-unit Mathematics. Also, 2-unit Physics or 4-unit Science (excluding the Physics 'make-up' electives) with a level of performance placing them in the top 50% of the candidate for these subjects.
**Biology 101** | Higher School Certificate Chemistry or 4-unit Science is appropriate and students are advised to include CHEM101 and CHEM102 in their University program. However, some lectures in background chemistry will be offered by the Department of Community Programs prior to the start of the first semester. Attendance at this preparatory course is optional.
**Chemistry 101** | At least Mathematics (2-unit course), Chemistry (2-unit course), and Physics (2-unit course), with ranking in the top 50% in each case.
**Geology 101** | 2-units of Science (preferably Chemistry) and at least 2-units of Mathematics.
**Mathematics 111** | Mathematics (2-unit course), or higher.
**Mathematics 102** | Mathematics at 3-unit level with a score of at least 120/150 in 3-unit, or have passed Mathematics 111.
**Physics 101** | HSC 2-unit Mathematics with a performance level in the top 30% of the candidate for this subject.
**Physics 102** | HSC 3-unit Mathematics mark of at least 120/150. Physics 2-unit or Science 4-unit with a performance level in the top 50% of candidates for these subjects.

**Enrolment Requirements**

(a) In order to be admitted an applicant shall:
1. satisfy appropriate Diploma/Degree Rules as set out in Section Three;
2. receive approval to enrol;
3. complete the prescribed enrolment procedures; and
4. pay any fees and charges prescribed by the Council.

(b) An applicant may be admitted under such conditions as the Admissions & Progression Committee may determine after considering any advice offered by the Dean of the Faculty.

(c) Except with the approval of the Faculty Board a candidate for a qualification shall not enrol in a subject which does not count towards that qualification.

(d) A candidate for a qualification shall not enrol in a course or part of a course for another qualification unless the candidate has first obtained the consent of the Dean of the Faculty and, if another Faculty is responsible for the course leading to that other qualification, the Dean of that Faculty provided that a student may enrol in a combined degree course approved by the Senate leading to two qualifications.

(e) A candidate for any qualification other than a postgraduate qualification who is enrolled in three quarters or more of a normal full-time program shall be deemed to be a full-time student whereas a candidate enrolled in either a part-time course or less than three-quarters of a full-time program shall be deemed to be a part-time student.

**Enrolment Status**

A candidate for a qualification shall enrol as either a full-time student or a part-time student.

**Combined Degree Courses**

The decision to take a combined degree course is usually taken at the end of a student's first year in his original degree course, in consultation with the Deans of the Faculties responsible for the
two degrees. Permission to embark on a combined degree course will normally require an average of credit points in first year subjects.

**Non-Degree Students**

Notwithstanding anything to the contrary contained in these Rules, the Admissions & Progression Committee may on the recommendation of the Head of a Department offer any part of a course to a person, not being a candidate for a qualification of the University, to enrol in any year in that part of the course on payment of such fees and charges as may be prescribed by the Council. A person so enrolling shall be designated a 'non-degree' student.

**Faculty Policy in Regard to Standing for Courses Completed Elsewhere**
The Faculty Board may grant standing in specified and unspecified semester subjects, aggregating to a maximum of 100 credit points, to a candidate in recognition of work completed in this university or another approved tertiary institution, on conditions determined by the Faculty Board. Such standing to be granted may include no more than 80 points at 100 level, 40 points at 200 level or 20 points at 300 level.

**Additional Information**

**Advisory Services**

Students requiring specific advice on the selection or content of subjects in the course should seek help from members of the Faculty. In particular, students are encouraged to consult from first, second and third year subject co-ordinators in each Department, Heads of Departments, the Sub-Deans or Dean.

Enquiries regarding enrolment, variation to program and general administrative problems should be directed to the Faculty Secretary in the School of Science and Mathematics in the School Office. The Faculty office will move to the new Science Building in 1991.

For personal counselling and study skills training it is suggested that students consult the University Counselling Service.

**Student Participation in University Affairs**

Provision is made for students to be elected as members on Departmental and Faculty Boards as well as to other University bodies. Election of student members usually takes place early in first term and students should watch Departmental notice boards for details of election of student members.

The Faculty Board of the Faculty of Science and Mathematics has provision for the election of four student members.

**Subject Timetable Clashes**

Students are strongly advised to check on possible timetable clashes before enrolment. clashes may force students to take those subjects in different years. Although academic staff are always willing to advise students, it is the student’s responsibility to ensure that chosen subjects may be studied concurrently. Science and Mathematics students taking subjects from other Faculties must examine the timetable to ensure that clashes do not exist in their proposed courses.

Although the timetable for a particular subject may clash with that of another, this may not necessarily mean that this combination cannot be done. Often an arrangement can be made by one or both Departmental representatives to overcome this problem. Therefore, see the Departmental representatives before deciding upon your final subject combinations.

**Workload**

The expected maximum workload for students devoting most of their time to degree studies is four subjects (40 credit points) per semester. In the case of subjects offered over a full year (20 credit points), the work load will be rated at 10 credit points per semester. Enrolment in excess of 40 credit points per semester can only be exceeded in exceptional circumstances by students with a good academic record and requires the permission of the Dean.

Students with external commitments, such as part-time employment, should enrol in fewer subjects. Such commitments cannot be taken into consideration for an extension of time for written work, or failure to attend examinations some of which may be scheduled on Saturday mornings.

**Student Academic Progress**

All students are reminded of the need to maintain satisfactory progress and, in particular, attention is drawn to the Rules Governing Unsatisfactory Progress. The following should be borne in mind:

1. The Faculty Board requires that students shall pass at least 12 academic subjects in their first year of full-time attendance or in their first two years of part-time attendance.
2. The Faculty Board requires that students shall have passed at least eight semester subjects by the end of the first two years of full-time attendance or four years of part-time attendance.
3. The Faculty Board has determined that a student who fails a semester subject twice shall not be permitted to include that subject in the candidate’s future program, and that a student who fails four semester subjects twice shall be excluded from further enrolment in the Faculty, unless the candidate shows cause to the satisfaction of the Faculty Board why the candidate should be permitted to do so.
4. Students should note that a terminating pass can be awarded only at the 100 level or 200 level and that no more than four terminating passes may count in a student’s program (with no more than two at the 200 level).

**Record of Failure**

An applicant who has a record of failure at another tertiary institution shall not be admitted unless that applicant first satisfies:

(a) the Faculty Board or the Doctoral Degree Committee for the Faculty as appropriate, in the case of a postgraduate qualification; or
(b) the Admissions & Progression Committee, in the case of any other qualification;

that there is a reasonable prospect that the applicant will make satisfactory progress.

**Re-enrolment**

A candidate for a qualification shall be required to re-enrol usually during the period of this candidature. Upon receiving approval to re-enrol the candidate shall complete the prescribed procedures and pay the fees and charges determined by the Council not later than the date prescribed for payment.

**Teacher Training Courses**

**Prerequisites for Diploma in Education Units**

Students who intend to proceed to a Diploma in Education should familiarise themselves with the prerequisites for units offered in the course.

The prerequisites are stated in terms of subjects of the University of Newcastle. Applicants whose courses of study have included subjects which are deemed for this purpose to provide an equivalent foundation may be admitted to the Diploma course as special qualifications.

In the Diploma course the Problems in Teaching, and Learning units are grouped as follows:

(a) **Secondary:**

- English
- History
- Social Science (Geography, Commerce, Social Science)
- Mathematics
- Science
- Modern Languages (French, German, Japanese)

(b) **Primary**

**Prerequisites**

For information about prerequisites, students are invited to contact the Faculty Secretary, Faculty of Education, Ext.417, Room W329. This contact should be made in the early stages of a degree course.

**All secondary methods**

- Normally at least 50 credit points (20-100; 30-200 level) of a degree in the main teaching area and 20 credit points (20-100 level) of a degree in any subsidiary area. Modern Languages, Drama, Science and Social Sciences have additional specific requirements.

**Primary method**

- At least 50 credit points (20-100; 30-200 level) of a degree in a specified area and 20-100 level credit points of a degree in each of two others. The specified area is usually a secondary teaching area.

Further details may be obtained from the Faculty Secretary, Faculty of Education, ext.417, Room W329.

**Mathematics Education Subjects**

Candidates for the degree of Bachelor of Mathematics intending a career in teaching may wish to include professional studies related directly to teaching in addition to, and concurrently with, the normal course of study in the second and third years by enrolling in Mathematics Education 211 and 312 and Mathematics Education 311 and 312, the contents of which are set under Extraneous Subjects. (Not offered every year).

**Role of Faculty Board, Faculty of Science and Mathematics**

The role of the Faculty of Science and Mathematics is defined by By-Law 2.4.4, which states:

"Subject to the authority of the Council and the Senate and to any resolution thereof, a Faculty Board shall:"

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

The Australian Institute of Biology Incorporated was inaugurated in 1986. Its objectives are to represent the Biology profession in Australia, to promote education and research in Biology and to improve communication between biologists of different disciplines. The Institute confers on its members a status similar to that for other Australian professional institutes. Membership grades are: Fellow, Member, Associate and Student. Members and Fellows are able to indicate this by the appropriate letters after their qualifications. Fellowship requires distinction in Biology and nomination from the existing membership. Membership requires a first or second class Honours degree in Biology and three years relevant experience, or a pass degree with five years experience, or a Masters degree with two years relevant experience, or a PhD. An Associate requires an appropriate pass degree or contribution to the advancement of Biology.

Chemistry

Graduates holding a Bachelor of Science majoring in Chemistry, may join the Royal Australian Chemical Institute which has several categories of membership according to qualification and experience.

Geology

Graduates holding a Bachelor of Science(Honours) majoring in Geology may join the Geological Society of Australia Inc., the Australian Institute of Geoscientists and The Australasian Institute of Mining & Metallurgy which has several categories of membership according to qualification and experience.

Mathematics

For employment as a Mathematician, graduates should have at least one major in Mathematics. An Honours degree is preferred by many employers. The profession is represented by the Australian Mathematical Society.

Physics

For employment as a physicist, students must have a minimum of an ordinary Bachelor of Science degree with a major in Physics. An Honours degree in Physics or combined Physics/Mathematics would be preferred. Physics as a profession is represented by the Australian Institute of Physics. Membership is limited to graduates with a minimum of a major in Physics. The Australian Institute of Physics has a number of grades of membership which are related to experience as a physicist. There is a grade of membership for students currently working towards a degree. The Institute monitors courses in Physics at tertiary institutions and judges them in terms of suitability for admission to membership of the Australian Institute of Physics. The Institute also responds on behalf of physicists to matters relating to physicists and their role. There are no formal conditions for registration as a physicist.

Psychology

Graduates holding a Bachelor of Science majoring in Psychology or a Bachelor of Science(Psychology) may join the Australian Psychological Society. Membership normally requires a four year degree in psychology. Provision is also made for Student Subscribers and Affiliates.

UNDERGRADUATE DEGREE/DIPLOMA RULES

1. General

These rules prescribe the conditions and requirements relating to the degree of Bachelor of Science, Bachelor of Science (Aviation), Bachelor of Science (Psychology) and Bachelor of Environmental Science as the case may be;

"Dean" means the Dean of the Faculty;
"degree" means the degree of Bachelor of Science, Bachelor of Science (Aviation), Bachelor of Science (Psychology), Bachelor of Mathematics and Bachelor of Environmental Science as the case may be;
"Department" means the department offering a particular semester subject or various combinations thereof and includes any other body so doing;
"Faculty" means the Faculty of Science and Mathematics;
"Faculty Board" means the Faculty Board of the Faculty;
"Schedule" means the Schedule to these Rules relevant to the course in which a person is enrolled or proposing to enrol;
"semester subject" means any program of study which aggregates to a total of 10 (ten) credit points and for which a result may be recorded. For the purpose of this definition two 5 (five) credit point subjects can be equated to one semester subject. Semester subjects shall be classified as 100, 200, 300 or 400 level by the Faculty Board.

3. Admission

An applicant for admission to candidature shall satisfy the requirements of the Rules Governing Admission and Enrolment and such other additional requirements as may be specified in the appropriate degree Schedules and Subject Lists.

4. Enrolment

(1) In any semester, a candidate shall enrol only in those semester subjects or their equivalent approved by the Dean or the Dean's nominee.
SECTION THREE

ORDINARY BACHELOR DEGREE RULES

8. Withdrawal
(1) A candidate may withdraw from a subject or the course only by informing the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.
(2) A candidate who withdraws from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty. The relevant date shall be:
(a) in the case of semester subjects offered only in the first semester, the 31 March.
(b) in the case of any semester subject offered only in the second semester, the 31 August.
(c) in the case of two semester subjects offered jointly over the duration of two consecutive semesters, the 31 August.

9. Time Requirements
(1) Except with the permission of the Faculty Board, a candidate shall complete the requirements for the degree or an ordinary degree within eighteen semesters, or for the Bachelor of Science (Psychology) honours degree within twenty two semesters, from the commencement of the course. A candidate who has been granted standing in recognition of work completed elsewhere shall be deemed to have commenced the degree from a date to be determined by the Dean.
(2) Upon request by a candidate, the Faculty Board may grant leave of absence from the course. Such leave shall not be taken into account in calculating the qualifying period for a semester subject or the degree.

Part II — Combined Degree Course Rules

10. A candidate may complete the requirements for the degree in conjunction with another Bachelor's degree by completing a combined course approved by the Dean or the Deans of the two Faculties as the case may be.

11. Admission to a combined degree course —
(a) shall be subject to the approval of the Dean or Deans of the two Faculties as the case may be.
(b) shall be after the successful completion of 80 credit points at credit level or better of their current degree enrolment or by admission at initial enrolment with a scaled aggregate score of greater than 400.
(c) shall be restricted to candidates with an average of at least Credit Grade.

12. The work undertaken by a candidate in a combined degree course shall be no less in quantity and quality than if the two courses were taken separately and shall be certified by the Dean or Deans of the two Faculties as the case may be.

13. To qualify for admission to the two degrees, a candidate shall satisfy the requirements for both degrees except as provided in the Schedule for combined degrees.

SECTION THREE

ORDINARY BACHELOR DEGREE RULES

Part III — Exceptional Circumstances

14. In order to provide for exceptional circumstances arising in a particular case, the Senate on the recommendations of the Faculty Board, may relax any provision of these Rules.

SCHEDULE I — BACHELOR OF SCIENCE

1. To qualify for the ordinary degree of Bachelor of Science, a candidate shall pass at least twenty four (24) semester subjects, approved by the Faculty Board, for a credit point score of at least 240 points.

2. The semester subjects or their equivalent presented for the degree shall consist of:
(a) at least six 100, six 200 and eight 300 level semester subjects chosen from those approved by the Faculty Board. For the purpose of this Rule, two 5 credit point subjects are considered to be the equivalent of a semester subject.
(b) at least two 100 level semester subjects from each of three Departments in the Faculty. Approved semester subjects for the purpose of this Rule shall include:
   - Biology 101/102, Chemistry 101/102, Geography 101/102, Geology 101/102, Mathematics 111/112 or 102/103, Physics 101/102 or 102/103, and Psychology 101/102.
   - and at least two 100 level, three 200 level and four 300 level semester subjects chosen from one Department of the Faculty, chosen from those offered by the Departments of Biological Sciences, Chemistry, Geography, Geology, Physics and Psychology.
   - not more than 160 credit points from any one Department; and
   - 300 level semester subjects from no more than three Departments in the University.

3. A candidate may select no more than nine semester subjects provided in the Schedule for combined degrees.

4. A candidate who has satisfied all the requirements of the admission, except to such extent as the Faculty Board may determine,

5. A candidate may select no more than nine semester subjects provided in the Schedule for combined degrees.

6. A candidate shall complete the requirements or an ordinary degree in recognition of work completed in this university or another approved tertiary institution, on conditions determined by the Faculty Board. Such standing to be granted may include no more than 80 points at 100 level, 40 points at 200 level and 20 points at 300 level.

7. Standing
(1) The Faculty Board may grant standing in specified and unspecified subject areas, aggregating to a maximum of 100 credit points, to a candidate in recognition of work completed in this university or another approved tertiary institution, on conditions determined by the Faculty Board. Such standing to be granted may include no more than 80 points at 100 level, 40 points at 200 level and 20 points at 300 level.

(b) A candidate who may not present for the degree studies which have been counted previously towards a degree or diploma shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty. The relevant date shall be:
(a) in the case of semester subjects offered only in the first semester, the 31 March.
(b) in the case of any semester subject offered only in the second semester, the 31 August.
(c) in the case of two semester subjects offered jointly over the duration of two consecutive semesters, the 31 August.

9. Time Requirements
(1) Except with the permission of the Faculty Board, a candidate shall complete the requirements or an ordinary degree within eighteen semesters, or for the Bachelor of Science (Psychology) honours degree within twenty two semesters, from the commencement of the course. A candidate who has been granted standing in recognition of work completed elsewhere shall be deemed to have commenced the degree from a date to be determined by the Dean.
(2) Upon request by a candidate, the Faculty Board may grant leave of absence from the course. Such leave shall not be taken into account in calculating the qualifying period for a semester subject or the degree.

Part II — Combined Degree Course Rules

10. A candidate may complete the requirements for the degree in conjunction with another Bachelor's degree by completing a combined course approved by the Dean or the Deans of the two Faculties as the case may be.

11. Admission to a combined degree course —
(a) shall be subject to the approval of the Dean or Deans of the two Faculties as the case may be.
(b) shall be after the successful completion of 80 credit points at credit level or better of their current degree enrolment or by admission at initial enrolment with a scaled aggregate score of greater than 400.
(c) shall be restricted to candidates with an average of at least Credit Grade.

12. The work undertaken by a candidate in a combined degree course shall be no less in quantity and quality than if the two courses were taken separately and shall be certified by the Dean or Deans of the two Faculties as the case may be.

13. To qualify for admission to the two degrees, a candidate shall satisfy the requirements for both degrees except as provided in the Schedule for combined degrees.

SCHEDULE 3 — BACHELOR OF SCIENCE (PSYCHOLOGY)

1. The Bachelor of Science (Psychology) may be conferred either as an ordinary degree or as an Honours degree. For the Honours degree there shall be three classes of honours: Class I, Class II and Class III. Class II shall have two divisions, namely Division I and Division II.

2. To qualify for the degree of Bachelor of Science (Psychology), a candidate shall pass at least twenty four (24) level 100 to 500 semester subjects (240 credit points) approved by the Faculty Board, combined with either Psychology 401 and 402 or Psychology 403 and 404 (80 credit points) for a total credit point score of at least 320 points. Of these, 80 points shall come from subjects at the 400 level, at least 80 from subjects at the 500 level, at least 60 from subjects at the 200 level, and at least 60 from subjects at the 100 level.

3. Semester subjects or their equivalent presented for the degree shall include:
(a) 20 credit points from Psychology 101 and 102;
(b) 50 credit points comprising Psychology 201 and four other Psychology subjects at the 200 level;
(c) 60 credit points comprising Psychology 301 and five other Psychology subjects at the 300 level;
(d) 80 credit points from Psychology 401 and 402 or Psychology 403 and 404;
(e) at least 40 credit points from two 100 level semester subjects from each of two other Departments in the Faculty. Approved semester subjects for the purpose of this Rule shall include:
   - Biology 101/102, Chemistry 101/102, Geography 101/102, Geology 101/102, Mathematics 111/112 or 102/103, and Physics 101/102 or 102/103; and
   - (f) at least 20 credit points from other approved semester subjects at the 300 level.

4.(a) Entry to Psychology 401 and 402 requires Credit Grades in each of four 300 level Psychology subjects including PSY301 and PSY302.
(b) Entry to PSYC403 and PSYC404 requires Pass grades at at least six 300 level subjects.

5. A candidate may select up to four semester subjects (40 credit points) from those offered in courses leading to other degrees of the University with the permission of the Dean who shall determine the classification of each semester subject at the 100 or 200 level.
6. The results obtained by a successful candidate shall be in Psychology 403 and 404 — High Distinction, Distinction, Credit, Pass, or Terminating Pass; in Psychology 401 and 402 — Honours Class I, II(1), II(2) or III.

Notes for students interested in the Bachelor of Science (Psychology) degree.
1. The Bachelor of Science degree with Honours in Psychology remains the preferred path for those who wish to complete a four-year Psychology degree.
2. Students will not be permitted to transfer from Psychology 403/404 to Psychology 401/402, although the reverse may be possible.
3. The Department of Psychology retains the right to determine the entry requirements for Psychology 401.

SCHEDULE 4 — BACHELOR OF MATHEMATICS
1. To qualify for the degree of Bachelor of Mathematics, a candidate shall pass at least twenty-four (24) semester subjects, approved by the Faculty Board, for a credit point score of at least 240 points. Of these, at least 70 points shall come from subjects at the 300 level, at least 70 from subjects at the 200 level, and at least 60 from subjects at the 100 level.
2. At least 160 credit points for the degree must satisfy the following requirements. Up to 80 credit points may come from subjects offered elsewhere in the University, if approved.
3. The subjects counted towards the degree must provide:
   (a) 20 credit points from MATH102 and 103;
   (b) 30 credit points from MATH 201, 203, 204, 206, 218 together with one of MATH213, 214, 215.
   (c) at least 30 further credit points from subjects in the 200 level of Categories A and B;
   (d) 40 credit points from subjects at the 300 level of Category A; and
   (e) at least 40 further credit points from subjects in Category A and the 300 level of Category B, of which up to 10 credit points may come from subjects at the 200 level Category A, if approved by the Department of Mathematics.

Level  
Category A  
Category B  
200 All Mathematics 200  
All Computer Science 200  
Statistics 201,202,203,204  
All Physics 200  
300 Statistics 301,302,303,304  
All Physics 300

SCHEDULE 5 — BACHELOR OF ENVIRONMENTAL SCIENCE
Consult Faculty Office for Rules which have yet to be approved (at the time of publication) by the University Council.

SCHEDULE 6 — COMBINED DEGREE COURSES
1. Students qualified to enrol in a combined degree may apply to undertake study in one of the following degree combinations:
   Science/Arts  
   Science/Mathematics  
   Science/Engineering  
   Mathematics/Arts  
   Mathematics/Commerce  
   Mathematics/Engineering  
   Mathematics/Economics  
   Mathematics/Computer Science  
   Mathematics/Surveying
2. Selection of the specific subject content of each combined degree will be prescribed by the Dean or Deans of each Faculty.

Rules Governing the Diploma in Aviation Science in the Faculty of Science and Mathematics
1. General
   These rules prescribe the conditions and requirements relating to the Diploma in Aviation Science of the University of Newcastle and are made in accordance with the powers vested in the Council under By-law 5.2.1.
2. Definitions
   In these Rules and the List attached thereto, unless the context or subject matter otherwise indicates or requires:
   “Board of Studies” means the Board of Studies in Aviation.
   “course” means a group of semester subjects selected in conformity with the conditions prescribed for each degree;
   “the Dean” means the Dean of the Faculty;
   “Department” means the department or departments offering a particular semester subject and includes any other body so doing;
   “Faculty” means the Faculty of Science and Mathematics;
   “Faculty Board” means the Faculty Board of the Faculty;
   “Schedule” means the Schedule to these Rules relevant to the course in which a person is enrolled or proposing to enrol;
   “semester subject” means any program of study which aggregates to a total of 10 (ten) credit points and for which a result may be recorded. For the purpose of this definition two 5 (five) credit point subjects can be equated to one semester subject. Semester subjects shall be classified as 100 and 200 level by the Faculty Board.
3. Admission
   An applicant for admission to candidature shall satisfy the requirements of the Rules Governing Admission and Enrolment and such other additional requirements as may be specified in the Schedule.
4. Enrolment
   (1) In any semester, a candidate shall enrol only in those semester subjects approved by the Dean or the Dean’s nominee.
   (2) Except with the approval of the Dean, given only if the Dean is satisfied that the academic merit of the candidate so warrants, a candidate shall not enrol in more than four semester subjects or their equivalent in any one semester.
   (3) A candidate may not enrol in any semester in any combination of semester subjects which is incompatible with the requirements of the timetable for that semester.
5. Prerequisites and Corequisites
   (1) The Faculty Board, on the recommendation of the Head of Department, may prescribe prerequisites and corequisites for any semester subject offered by that Department.

(2) Except with the approval of the Faculty Board, granted after considering any recommendation made by the Head of the Department, no candidate may enrol in a semester subject unless that candidate has satisfied any prerequisites and has already or concurrently enrolled in or is already enrolled in any semester subject prescribed as its corequisite.

6. Semester Subject
   (1) To complete a semester subject, a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field-work and submit such written or other work as the Department shall require.
   (2) To pass a semester subject, a candidate shall complete it and pass such examinations as the Faculty Board shall require.
   (3) The results obtained by a successful candidate in a semester subject shall be: High Distinction, Distinction, Credit, Pass, or Terminating Pass.

7. Standing
   (1) The Faculty Board may grant standing in specified and unspecified semester subjects to a candidate, on such conditions as it may determine after considering the recommendation of the Board of Studies, in recognition of work completed in this university or another approved tertiary institution.
   (2) A candidate may not present for the degree subjects which have been counted previously towards a degree or diploma to which the candidate has been admitted or is eligible for admission, except to such extent as the Faculty Board may determine.

8. Withdrawal
   (1) A candidate may withdraw from a subject or the course only by informing the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.
   (2) A candidate who withdraws from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty. The relevant date shall be:
      (a) in the case of semester subjects offered only in the first semester, the 31 March;
      (b) in the case of any semester subject offered only in the second semester, the 31 August;
      (c) in the case of two semester subjects offered jointly over the duration of two consecutive semesters, the 31 August.

9. Choice of Subjects
   To qualify for a Diploma in Aviation Science, a candidate shall pass at least sixteen (16) semester subjects or their equivalent, approved by the Faculty Board, for a minimum credit point score of 160 points, in accordance with the following requirements.
SECTION THREE

(a) 80 credit points from AVIA109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122 or other approved* 100 level subjects.
(b) 80 credit points from AVIA207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217 or other approved* 200 level subjects.

* Refers to the list of approved subjects referred to in the Bachelor Degree Schedules 1-6, Faculty of Science and Mathematics.

10. Time Requirements

(1) Except with the permission of the Faculty Board, a candidate shall complete the requirements for the diploma within twelve semesters from the commencement of the course. A candidate who has been granted standing in recognition of work completed elsewhere shall be deemed to have commenced the diploma course from a date to be determined by the Dean.

(2) Upon request by a candidate, the Faculty Board may grant leave of absence from the course. Such leave shall not be taken into account in calculating the qualifying period for a semester or the degree.

11. Award of Diploma

The Diploma shall be awarded in two grades, namely:

(a) Diploma in Aviation Science; and
(b) in cases where a candidate's performance has reached a level determined by the Faculty Board, on the recommendation of the Board of Studies, Diploma in Aviation Science with Merit.

12. Relaxing Provision

In order to provide for exceptional circumstances arising in a particular case, the Senate on the Recommendation of the Faculty Board, may relax any provision of these Rules.

SECTION FOUR

APPROVED SUBJECTS FOR
THE BACHELOR DEGREES AND
THE DIPLOMA IN AVIATION SCIENCE

List of approved subjects referred to in Bachelor Degree Schedules 1 to 6 and the Diploma in Aviation science

<table>
<thead>
<tr>
<th>Number</th>
<th>Subject</th>
<th>Points</th>
<th>When</th>
<th>H/W</th>
<th>Prerequisites</th>
<th>Corequisites</th>
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<td>Introductory Meteorology</td>
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<td>5</td>
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<td>AVIA114</td>
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<td>AVIA115</td>
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<td>AVIA116</td>
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<td>S2</td>
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<td>Navigation</td>
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<td>S2</td>
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<td>Aerodynamics</td>
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<td>3</td>
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¹ Students should note that GEOG101 and GEOG102 are prerequisites for a major study in Geography, and for admission to Geography Honours GEOG401.

**GEOLOGY**

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² Students should note that MATH111 and MATH112 are prerequisites for a major study in Mathematics, and for admission to Mathematics Honours MATH401.

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*Advisory entry requirement - HSC 2 unit Mathematics with a performance in the top 30% of candidates.

7 Advisory entry requirement - HSC 3 unit Mathematics with a mark of at least 110/150 and Physics 2 unit or Science 4 unit with a performance in the top 50% of candidates for these subjects.

8 Students achieving a credit level or better in PHYS101 and PHYS102 may be admitted with approval of the Head of Department.

SECTION FOUR

LIST OF OTHER APPROVED SUBJECTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Subject</th>
<th>Points</th>
<th>When</th>
<th>H/W</th>
<th>Prerequisites</th>
<th>Corequisites</th>
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<tr>
<td>COMP101</td>
<td>Computer Science 1</td>
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<td>S1</td>
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<td>COMP203</td>
<td>Assembly Language</td>
<td>5</td>
<td>S1</td>
<td>5</td>
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<td>COMP204</td>
<td>Programming Language Semantics</td>
<td>5</td>
<td>S2</td>
<td>5</td>
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<tr>
<td>COMP205</td>
<td>Programming in C</td>
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<td>S1</td>
<td>5</td>
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<td>COMP206</td>
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<td>S1</td>
<td>10</td>
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<td>Artificial Intelligence</td>
<td>10</td>
<td>S2</td>
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<td>COMP202</td>
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<td>S2</td>
<td>10</td>
<td>COMP201</td>
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<tr>
<td>COMP305</td>
<td>Design &amp; Analysis of Algorithms</td>
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<td>S1</td>
<td>10</td>
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<tr>
<td>COMP306</td>
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<td>S2</td>
<td>10</td>
<td>COMP201, 205,</td>
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<tr>
<td>COMP307</td>
<td>Software Engineering Principles</td>
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<td>F</td>
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<td>COMP201</td>
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<tr>
<td>COMP308</td>
<td>Operating Systems</td>
<td>10</td>
<td>S2</td>
<td>10</td>
<td>COMP201, 202</td>
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*COMPS306 may not be offered in 1991

INFO101 | Introduction to Information Systems | 10     | S1   | 5   |  

PHILOSOPHY

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STATISTICS

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<td>S1</td>
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<td>STAT201</td>
<td>Mathematical Statistics</td>
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<td>S1</td>
<td>4</td>
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<td>S2</td>
<td>4</td>
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<td>STAT204 for Bsc Degree</td>
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*Entry to PSYC401 and PSYC402 in the Bachelor of Science (Psychology) degree requires at least a credit in each of four 300 level subjects including PSYC301 and PSYC302. Additional conditions apply, see the Department for details.
<table>
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<td>STAT201 or STAT201 &amp; MATH102 (or equivalent)</td>
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<td>STAT203 for BSc Degree</td>
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<td>STAT205</td>
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<td>STAT201, 202</td>
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<td>3</td>
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LIST OF EXTRANEOUS SUBJECTS

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UNDERGRADUATE DEGREE SUBJECT DESCRIPTIONS

Guide to Undergraduate Subject Entries

Subject outlines and reading lists are set out in a standard format to facilitate easy reference.

An explanation is given below of some of the technical terms used in this Handbook.

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

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

3. Under examination rules "examination" includes mid-year examinations, assignments, tests or any other work by which the final grade of a candidate in a subject is assessed. Some attempts have been made to indicate for each subject how assessment is determined. See particularly the general statement in the Department of Mathematics section headed "Progressive Assessment" referring to Mathematics subjects.

4. **Texts** are books recommended for purchase.

5. **References** are books relevant to the subject or topic which need not be purchased.

Aviation Subject Descriptions

**100 Level Aviation Syllabus**

In 1991, first year students enter the new teaching program for the Diploma in Aviation Science and the Bachelor of Science (Aviation).

Previously enrolled students will continue with their pre-existing programs. They will continue to study under the regulations in force when they first enrolled; see previous relevant Faculty of Science and Mathematics Handbook.

The new Aviation subjects (AVIA109 to AVIA122, inclusive) cannot be equated with the 1990 first year subjects of AVIA101 to AVIA108, inclusive.

Students with Commercial Pilot and Airline Transport Pilot Licences will be required to enrol in all subjects, but will be exempted from sections which they have already completed. These exemptions will be decided by the course lecturer.

**AVIA109 INTRODUCTORY METEOROLOGY** 5cp

*Hours*: 3 hours per week for one semester

*Examination*: Progressive assessment based on assignments and tutorials plus a 2 hour final examination

*Content*

Introduction to atmospheric and horizontal pressure, wind, humidity, thermodynamics, cloud, precipitation and icing; Structure of the atmosphere; Introduction to Aviation forecasts and meteorological reports.

*Texts*

Bureau of Meteorology

*Manual of Meteorology - General Meteorology Part 1 (AGPS 1975)*
Bureau of Meteorology  
 VISUAL FLIGHT GUIDE (CAA)  
 AERONAUTICAL INFORMATION PUBLICATION (CAA)  

AVIA110 INTRODUCTORY NAVIGATION 5cp  
 Hours 3 hours per week for one semester  
 Examination Progressive assessment based on assignments and tutorials plus a 2 hour final examination  
 Content The fundamentals of Navigation, including: The form of the earth; Map projections, conformality, scale and scale variation;  
 Navigational astronomy; The vector triangle; Introduction to the use of maps.  
 Visual Navigation: Principles and Techniques; An introduction to flight planning.  
 An introduction to Pressure and Gyroscopic Instruments: The International Standard Atmosphere; Altimetry; Principles,  
 Construction, errors and use.  
 An introduction to the Compass: Earth’s magnetism; The direct-reading magnetic compass, principles, construction, errors and use.  
 An Introduction to the introduction to the flight computer.  
 Texts  
 AERONAUTICAL INFORMATION PUBLICATION (CAA)  
 VISUAL FLIGHT GUIDE (CAA)  
 ENROUTE SUPPLEMENT - AUSTRALIA (CAA)  
 AERODROME DIAGRAMS (CAA)  
 MAPS - WAC, VTC, VEC, FISCOM (CAA)  
 Reference  

AVIA111 INTRODUCTORY AERODYNAMICS 5cp  
 Hours 3 hours per week for one semester  
 Examination Progressive assessment based on assignments plus end of semester examination.  
 Content  
 Basic fluid mechanics: conservation of mass, momentum and energy for an incompressible flow, Bernoulli’s equation; static and dynamic pressures. The generation of lift, drag, induced drag, tension and lift, augmentation devices, downwash and vorticity. Aerodynamics stall, Reynolds number, Aerodynamic factors influencing aircraft performance; drug index. Configuration effects: empenage, canards, aspect ratio, sweep, taper and washout.  
 References  
 ANDERSON, J.D.  
 Houghton, E.L. & CARNUTHS, N.B.  
 Aerodynamics for Engineering Students 3rd edn (Arnold, 1989)  

AVIA112 INTRODUCTORY HUMAN FACTORS 10cp  
 IN AVIATION  
 Hours 4 hours per week for one semester  
 Examination Progressive assessment based on class texts, seminars, assignments and a 2 hour examination  
 Content  
 Vision/Visual Illusions; Balance/Spatial Illusions; Memory Learning and Skill Acquisition; Attention, workload and fatigue.  
 Text  
 Wiener, E.L. & NAGEL, D.C. (Eds)  
 HUMAN FACTORS IN AVIATION (Academic Press, 1988)  

AVIA113 AIRCRAFT PERFORMANCE AND SYSTEMS 5cp  
 Hours 3 hours per week for one semester  
 Examination Progressive assessment plus a final examination.  
 Content  
 (a) Principles of operation of aircraft fuel, hydraulic and electrical systems, undercarriage and flight controls. The application of mechanical linkages, and electrical circuits to those systems. Basic circuit theory, antenna, radio and wave propagation.  
 (b) Aircraft Weight and Balance, Centre of Gravity, Aerodynamic reasons for CG limitations, use of aircraft loading systems, regulatory requirements.  
 Texts  
 Civil Aviation Regulations (CAA)  
 Civil Aviation Orders 20-99, 100, 101, 103, 108 (CAA)  

AVIA114 FLIGHT RULES AND PROCEDURES 5cp  
 Hours 2 hours per week for one semester  
 Examination Progressive assessment plus a final examination.  
 Content  
 Overview of International aviation regulation. Australian Civil Aviation Regulations and Orders governing aircrew procedures and the airworthiness of aircraft and their design standards.  
 Aircrew licensing requirements, Air Traffic Control procedures and pilot’s airworthiness responsibilities including the Maintenance Release. The course introduces CAA requirements to the level of the Private Pilot Licence.  
 Texts  
 Civil Aviation Regulations  
 Civil Aviation Orders 20-99, 100, 101, 103, 108 (CAA)  
 ENROUTE SUPPLEMENT - AUSTRALIA (CAA)  
 AERONAUTICAL INFORMATION PUBLICATION (CAA)  
 AERODROME DIAGRAMS (CAA)  
 MAPS - WAC, VTC, VEC, FISCOM (CAA)  
 Reference  
 Air Navigation (H.O. Publication 216) (US Govt Printer)  

AVIA115 RECIPROCATING ENGINES 5cp  
 Hours 2 hours per week for one semester  
 Examination Progressive assessment based on assignments plus end of semester examination.  
 Content  
 Air standard thermodynamic cycles, two and four stroke cycles, petrol and diesel engines, construction features, induction,  
 Fabrication and cooling, engine instrumentation, effect of mixture on combustion, power output, aircraft engine operation.  
 Texts  
 BENT, R.D., & MCKINLEY, J.L.  
 Aircraft Performance 5th edn (McGraw-Hill, 1985)  
 AVIA116 COMMERCIAL METEOROLOGY 5cp  
 Prerequisite AVIA109  
 Hours 4 hours per week for one semester  
 Examination Progressive assessment based on assignments, tutorials, seminars, and a 2 hour final examination  
 Content  
 Atmospheric and horizontal pressure; Wind, Humidity and Thermodynamics; Cloud, precipitation and icing; Orographic effects; Thunderstorms, Tropical meteorology, Synoptic situations and fronts; Jet streams.  
 Hazardous weather; wind shear, microbursts and macrobursts.  
 Texts  
 SHETHEL, R.S.  
 AVIA117 NAVIGATION 5cp  
 Prerequisite AVIA110  
 Hours 3 hours per week for one semester  
 Examination Progressive assessment based on assignments, tutorials, seminars, and a 2 hour final examination  
 Content  
 Mercator projection. Rhumb line, tracks and distances. Position Lines and Fixes; Air Plot and Track Plot Techniques Single-pilot visual navigation; The 1 in 60 rule, Elements of Flight Planning.  
 The Point of No Return and Critical Point. Radio Aids as an aid to pilot navigation. Fuel requirements.  
 Advanced use of Maps.  
 Radio Aids - ADF/NDV/VOR. Basic principles, signal propagation, use, errors. The remote reading compass.  
 Texts  
 VISUAL FLIGHT GUIDE (CAA)  
 ENROUTE SUPPLEMENT - AUSTRALIA (CAA)  
 AERONAUTICAL INFORMATION PUBLICATION (CAA)  
 AERODROME DIAGRAMS (CAA)  
 MAPS - WAC, VTC, VEC, FISCOM (CAA)  
 Reference  
 AIR NAVIGATION (H.O. PUBLICATION 216) (US GOVT PRINTERS)  

AVIA118 AERODYNAMICS 5cp  
 Prerequisite AVIA111  
 Hours 3 hours per week for one semester  
 Examination Progressive assessment plus a final examination.  
 Content  
 Aircraft stability and control; longitudinal and lateral stability, stick fixed and free conditions, CG effects on stability, neutral point, spiral divergence, Dutch Roll; effect of aircraft configuration on stability, wing sweep, dihedral, canards.  
 Aerodynamic characteristics. Boundary layer - laminar and turbulent and transition. Wind tunnel experiments. Incompressible fluid dynamics.  
 Propeller analysis: blade element and disc theories, propeller efficiency and sizing.  
 References  
 SHEVELL, R.S.  
 Houghton, E.L. & CARNUTHS, N.B.  
 Aerodynamics for Engineering Students 3rd edn (ARNO LD, 1989)  

AVIA119 AVIATION PSYCHOLOGY AND MEDICINE 5cp  
 Prerequisite AVIA112  
 Hours 3 hours per week for one semester  
 Examination Progressive assessment based on class texts, assignments, tutorials and a 2 hour examination.  
 Content  
 Stress, anxiety and arousal; Judgement and decision-making: Personality, attitudes, Intelligence; Leadership; Emotion; Flight phobia; Displays and controls; Communication, Hypoxia, oxygen systems, decompression sickness and hyperventilation. Effects of trapped gases.  
 Acceleration: -- Short duration, Vibration, Crash worthiness, escape.  
 Acceleration: -- Medium duration, Disorientation, Motion, sickness.  
 Acceleration: -- Long term, Circadian dysrhythmia (Jet-Lag), Rest + Work Vision.  
 Hypothermia/Hyperthermia: -- Survival  
 Performance: -- Effect of toxic substances  
 Texts  
 HAWKINS, E.H.  
 HUMAN FACTORS IN FLIGHT (GOWER TECHNICAL PRESS, 1987)  
 Reference  
 ROSCOE, S.N.  
 AERONAUTICAL INFORMATION PUBLICATION (CAA)  

AVIA120 AERONAUTICAL INFORMATION PUBLICATION (CAA)  

AERONAUTICAL INFORMATION PUBLICATION (CAA)
### SECTION FIVE

#### AVIA120 AVIATION LAW, COMMERCIAL LAW 10cp

**FLIGHT RULES & PROCEDURES**

**Prerequisite:** AVIA114

**Hours:** 4 hours per week for one semester

**Examination:** Progressive assessment based on assignments and tutorials plus a 2 hour final examination

**Content:**
- The origins of Law in Australia; Legal Institutions in Australia; Constitution; Tort (Negligence); Criminal Law; Deregulation of the Aviation Industry; International Conventions; Administrative Law; Australian Civil Aviation Regulations and Orders governing aircrew licensing and procedures to the level of Commercial Pilot License.

**Texts**
- Civil Aviation Regulations (CAA)
- Civil Aviation Orders 20-99, 100,101,104 (CAA)

**References**
- Other regulatory data provided.

#### AVIA121 AIRCRAFT SYSTEMS AND PROPULSION 5cp

**Prerequisites:** AVIA113, AVIA115

**Hours:** 3 hours per week for one semester

**Examination:** Assessment plus a final examination

**Content:**
- Electrical, hydraulic and mechanical systems on aircraft, air conditioning and pressurisation including thermodynamics, ice protection and fire systems, engine thermodynamic efficiency, turbo/supercars, vibration and balancing. The role of electronics and computers in aircraft systems control, Boeing logic. Introduction to computer hardware and software.

**Text**

#### AVIA122 INDUSTRIAL PRACTICUM 5cp

**Prerequisites:** AVIA113, AVIA115

**Hours:** 2 hours per week for one semester

**Examination:** Work experience report.

**Content:**
- Each student will undertake a practicum at a location appropriate to the development of professional and industrial experience. Arrangements for the practicum and report will be undertaken in conjunction with the Institute's co-ordination.

#### AVIA201 AVIATION METEOROLOGY 5cp

**Prerequisite:** AVIA116

**Hours:** 3 hours per week for one semester

**Examination:** Progressive assessment plus a 2 hour final examination

**Content:**
- Upper level forecasting and flying; Northern Hemispheric climatology; Local forecasting; Aviation map analysis.

**Texts**
- Aeronautical Information Publication (CAA)

### SECTION FIVE

#### AVIA210 INSTRUMENT NAVIGATION 5cp

**Prerequisite:** AVIA117

**Hours:** 3 hours per week for one semester

**Examination:** Progressive assessment plus a 2 hour final examination

**Content:**
- Radio Navigation Systems and Aids; Radio Navigation techniques using conventional aids; ADS/NOR, VOR, DME, ILS, Flight Director, Radar; Principles and errors of radio and radar aids.
- Instrument Flight Procedures, Airspace, and Air Traffic Control; Departure Procedures; Enroute Procedures; Holding Procedures; Instrument Approach Procedures; Emergency Procedures; IFR Flight Planning

**Texts**
- Enroute Charts (CAA)
- Departure and Approach Procedures (CAA)
- Terminal Area Charts (SID)

#### AVIA209 LONG RANGE NAVIGATION 5cp

**Prerequisite:** AVIA117

**Hours:** 3 hours per week for one semester

**Examination:** Progressive assessment plus a final examination

**Content:**
- Chart projections suitable for long range navigation; The calculation of Great Circle Tracks and Distances Grid Navigation; Navigation in Polar Regions; Navigation on the climb and descent; High speed/high altitude navigation; The use of radio aids; Weather radar; Inertial navigation systems; Operational problems including the use of off track alternates; Mach number and advanced instruments.

#### AVIA211 JET ENGINES 5cp

**Prerequisite:** AVIA121

**Hours:** 2 hours per week for one semester

**Examination:** Progressive assessment plus a final examination

**Content:**

**Reference**
- Rolls, The Jet Engine 4th edn (Darby, Rolls Royce, 1986)

#### AVIA212 HUMAN FACTORS 10cp

**Prerequisite:** AVIA119

**Hours:** 4 hours per week for one semester

**Examination:** Progressive assessment plus a 2 hour final examination

**Content:**
- Personality and attitudes; Judgement and decision making; Cockpit design; Workload, fatigue and vigilance; Leadership; Accident investigation and safety; Recruitment and pilot selection

**Texts**

**References**
- Jensen, R.S. (Ed) Aviation Psychology (Gower, 1989)
- O'Hare, D. & Roscoe, S. Flightdeck Performance - The Human Factor (Iowa U.P., 1990)

#### AVIA213 AIRCRAFT STRUCTURES AND MATERIALS 5cp

**Prerequisite:** AVIA121

**Hours:** 3 hours per week for one semester

**Examination:** Progressive assessment plus a final examination

**Content:**
- Introduction to stress and strain, properties of materials commonly used in aircraft construction and typical fabrication methods. Reaction of aircraft structural loads. Environmental degradation of materials, forms of corrosion and methods employed in protection. The mechanism of fatigue, the "Aging Aircraft Problem" and Structural Inspection Programs. Trends in material development, including composites and alloys.

**Texts**
- Shigley, J.E. Mechanical Engineering Design Metric edn (McGraw-Hill, 1985)

**Reference**
- O'Hare, D. and Roscoe, S. Flightdeck Performance: The Human Factor (Iowa U.P., 1990)

#### AVIA214 AIRCRAFT FLIGHT PLANNING 10cp

**Prerequisites:** AVIA208, AVIA209

**Hours:** 4 hours per week for one semester

**Examination:** Progressive assessment and a 2 hour final examination

**Content:**

**Texts**
- B727 Performance Manual (CAA)

#### AVIA215 HUMAN FACTORS IN MULTI-CREW OPERATIONS 10cp

**Prerequisite:** AVIA212

**Hours:** 5 hours per week for one semester

**Examination:** Progressive assessment based on seminars, exercises (including demonstrated instruction), assignments and a 1 hour final examination

**Content:**
- Responsibility and authority, Coordination Training; Cockpit Resource Management Programs. Line oriented flight training.

**Text**
- O'Hare, D. and Roscoe, S. Flightdeck Performance: The Human Factor (Iowa U.P., 1990)
Content

References
Civil Aviation Orders 100 and 104 (CAA) Civil Aviation Regulations (CAA) International Civil Aviation Organization Annex 8 (ICAO)

AVIA217 ELECTRONICS AND COMPUTERS IN AVIATION
Prerequisite AVIA211
Hours 4 hours per week for one semester
Examination Progressive assessment plus a final examination

Content

Tests
Smith, R.J.
Electronics Circuits and Devices 2nd edn (Wiley, 1987)
Reference
Lancaster, D.
TTL Cookbook (Howard Sams, 1989)

AVIA301 ADVANCED AVIATION ENGINEERING AND STRUCTURES
Prerequisite Diploma of Aviation Science including AVIA205
Hours 6 hours per week for one semester
Examination Progressive assessment

Content
Helicopter aerodynamics including aerelasticity and other dynamic-aerodynamic interactions. Experiments on propellers, rotors and stalling aerofoils. Student project in advanced aerodynamics. Introduction to structures and properties of materials for aircraft application.

Tests
Houghton, E.L. & Carnuths, N.B.
Aerodynamics for Engineering Students 3rd edn (Arnold, 1989)
Smith, R.J.
Shigley, J.E.
Mechanical Engineering Design Metric edn (McGraw-Hill, 1986)

AVIA302 ADVANCED AIRCRAFT OPERATIONS AND METEOROLOGY
Prerequisite Diploma of Aviation Science including AVIA205
Hours 6 hours per week for one semester
Examination Progressive assessment and a 2 hour final examination

Content
Comparative flight planning. Investigative study of aircraft performance, operational economics, route structure and flight planning. Climates of the world and implications for international aviation.

References
Worthington, G.D.P.
Flight Planning (Pitman, 1982)
B747 Performance Manual (Quotas, 1985)

Other Performance Manuals and Flight Planning Data available.

AVIA303 AVIATION ENGINEERING AND SUPERSONIC AERODYNAMICS
Prerequisite Diploma of Aviation Science including AVIA205
Hours 6 hours per week for one semester
Examination Progressive assessment

Content
Mathematical approaches to aerodynamics.
Supersonic aerodynamics.
Materials in aircraft structures: aluminium alloys; steel alloys; composites.
Aerelasticity and "flutter".
Problems of fatigue, degradation and age.

Tests
Houghton, E.L. & Carnuths, N.B.
Aerodynamics for Engineering Students 3rd edn (Arnold, 1989)
Smith, R.J.
Shigley, J.E.
Mechanical Engineering Design Metric edn (McGraw-Hill, 1986)

AVIA304 ADVANCED NAVIGATION AND METEOROLOGY
Prerequisite Diploma of Aviation Science including AVIA302
Hours 6 hours per week for one semester
Examination Progressive assessment plus a 2 hour final examination

Content
Comparative climatology. Implication for international flight planning and flying. Localised hazardous climates: Europe, the Atlantic routes; polar routes; Asia and the Pacific. Investigative study of advanced navigation systems, present and projected. Inertial, Omega, VLF, RNav, Loran, Satellite Systems. Principles, accuracy, economics, use.

AVIA305 AIRCRAFT DESIGN
Prerequisite AVIA213
Hours 2 hours per week for one semester
Examination Progressive assessment

Content
Parametric design of aircraft, performance estimation, power requirements, control surface sizing, configuration, construction techniques. International design standards. The course will take the form of a conceptual design project and construction of an aircraft component.

Tests
Shigley, J.
Mechanical Engineering Design Metric edn (McGraw-Hill, 1986)

AVIA313 AIRCRAFT STRUCTURES
Prerequisite AVIA302
Hours 2 hours per week
Examination Progressive assessment

Content
International aircraft structural design requirements; Safe Life, Fatigue and Damage Tolerant Design. Causes of Structural failures, column and sheet instabilities. Structural evaluation of semi-monocoque stiffened panels, torque cells, multilayer and composite construction. Parametric material selection. Fatigue management; load spectra, test articles, damage tolerance ratings and structural inspection programs, non-destructive test procedures.

Tests
Shigley, J.
Mechanical Engineering Design Metric edn (McGraw-Hill, 1986)

References
Worthington, G.D.P.
The Design of the Aeroplane (Collins, 1985)
Elkin, B.
Dynamics of Flight: Stability and Control (Wiley, 1982)
Houghton, E.L. & Carnuths, N.B.
Aerodynamics for Engineering Students 3rd edn (Arnold, 1989)
Smith, R.J.
Electronics: Circuits and Devices (Wiley, 1987)

AVIA314 APPLIED AERODYNAMICS
Prerequisite AVIA305
Hours 2 hours a week for one semester
Examination Progressive assessment plus final examination

Content
Aircraft stability and control, control derivatives, effect of flight control arrangements on stability, sizing of flap controls, stability and control emulation by analogue and digital circuits, stability augmentation through flight control computers, simulator fidelity. Flutter and aeroelasticity.

References
Shigley, J.
Mechanical Engineering Design Metric edn (McGraw-Hill, 1986)

AVIA315 NAVIGATION
Prerequisite AVIA302
Hours 2 hours per week
Examination Progressive assessment

Content

Tests
Shigley, J.
Mechanical Engineering Design Metric edn (McGraw-Hill, 1986)

AVIA316 MATERIALS
Prerequisite AVIA302
Hours 2 hours per week
Examination Progressive assessment

Content
Selection and Use of Materials in Engineering (Butterworths, 1984)

References
Carruthers, N.B.
Performance Manual for Pilots (Collins, 1985)


Electronics: Circuits and Devices (Wiley, 1987)

References
Worthington, G.D.P.
The Design of the Aeroplane (Collins, 1985)
Elkin, B.
Dynamics of Flight: Stability and Control (Wiley, 1982)
Houghton, E.L. & Carnuths, N.B.
Aerodynamics for Engineering Students 3rd edn (Arnold, 1989)
Smith, R.J.
Electronics: Circuits and Devices (Wiley, 1987)
Biological Sciences Subject Descriptions

BIOL101 PLANT & ANIMAL BIOLOGY 10cp
Prerequisites Nil — see notes on BIOL101 under "Assumed Knowledge for Entry to the Faculty"
Hours 6 hours per week for one semester
Examination One 3 hour paper

Content
The course is organised into 2 units:
Unit 1
Plant Diversity — Form and Function
Theme: Structural specialization to facilitate efficient functional capacity.
Topics

Unit 2
Animal Diversity — Form and Function
Theme: The variety of structural and functional adaptations which have allowed animals to exploit the wide range of available environments.
Topics

Text
OR
Curtis, H. Biology 4th edn (Worth, 1983)

Reference

BIOL102 CELL BIOLOGY, GENETICS AND EVOLUTION
Prerequisite Nil — see notes on BIOL101 under "Assumed Knowledge for Entry to the Faculty"
Hours 6 hours per week for one semester. A compulsory 2 day excursion will be held in the mid-year break.
Examination One 3 hour paper

Content
Cell Biology Theme: The evolution and functional organization of cells

Topics
Biological molecules - the structure of proteins, carbohydrates and lipids.
Cell organization - emphasis on organelle ultrastructure and principal function, evolution of cells.
Biological energy processes - photosynthesis, cellular respiration.
Genetics

Text
OR
Curtis, H. Biology 4th edn (Worth, 1983)

Reference

BIOL201 BIOCHEMISTRY
Prerequisite BIOL101 and BIOL102
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Physical and biological factors influencing the abundance and distribution of organisms. Theories of population and control.

Text

References
Krebs, C.J. A Natural Legacy (Pergamon Press, 1979)

Biological Sciences Subject Descriptions

BIOL202 ANIMAL PHYSIOLOGY
Prerequisite BIOL101 and BIOL102
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Consideration of the processes involved in the transport of oxygen to the tissues and emphasizing the relationship between structure and function. The course examines the transport of nutrients and respiratory gases. The relationship between the transport of nutrients and respiratory gases and the physiological systems is examined. Biological energy processes - photosynthesis, cellular respiration. These include the respiratory, cardiovascular, and nervous systems. The physiological systems are examined.

Text

BIOL205 MOLECULAR GENETICS
Prerequisite BIOL101 and BIOL102
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content

Text
Strickberger, M.W. Genetics 3rd edn (Macmillan/Collier, 1985)

References

BIOL206 PLANT PHYSIOLOGY
Prerequisite BIOL101 and BIOL102
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Fundamental processes peculiar to plant cells are examined. These include cell water relations, membrane transport of solutes, fixation of atmospheric nitrogen, and photosynthesis. Cellular Role of the processes is emphasized.

Text
Salisbury, F.B. and Ross, C.W. Plant Physiology 3rd edn (Wadsworth, 1985)

BIOL301 CELL PROCESSES
Prerequisite BIOL201 and one further BIOL200
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Biological and cellular aspects of mammalian hormones will be considered together with their role in homeostasis. The biochemistry of blood and the digestion and absorption of foodstuffs will also be major topics for consideration.
References
Lehninger, A.L.
Principles of Biochemistry (Worth, 1982)
Smith, E.L., Hill, R.L. et al
Principles of Biochemistry, Mammalian Biochemistry 7th edn (McGraw-Hill, 1983)

BIOLOGICAL SCIENCES SUBJECT DESCRIPTIONS

BIOL302 REPRODUCTIVE PHYSIOLOGY 10cp
Prerequisites Two BIOL200
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Biological reproduction with particular emphasis on sexual differentiation and gamete physiology.

References
Johnson, M.H. & Everitt, B.J.
Essential Reproduction (Blackwell, 1988)
Torrey, T.W. & Federicia, A.
Morphogenesis of the Vertebrates 4th edn (Wiley, 1979)
Bloom, W. & Fawcett, D.W.
A Textbook of Histology 10th edn (Saunders, 1973)
McGivney, R.W.

BIOL303 ENVIRONMENTAL PLANT PHYSIOLOGY 10cp
Prerequisites Two BIOL200
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Environmental impacts on whole plant growth are interpreted in terms of the responses of susceptible components of key physiological processes. The processes examined include whole plant water relations, photosynthesis, mineral ion acquisition and nutrient transport.

References
Milthorpe, F.L. & Moorty, J.
Salisbury, P.B. & Ross, C.W.
Plant Physiology 3rd edn (Wadsworth, 1985)

BIOL304 WHOLE PLANT DEVELOPMENT 10cp
Prerequisites Two BIOL200
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Development of the structural organization and functional capacity of plant organs from meristems. Rule of developmental patterns by hormones and environmental parameters. Introduction to the concepts of determination, polarity and positional control of plant development.

References
Burgess, I.
An Introduction to Plant Cell Development (Cambridge U.P., 1985)
Haus, K.
Anatomy of Seed Plants (Wiley, 1960)
Steeves, T.A. and Sussex, I.M.

BIOL305 IMMUNOLOGY 10cp
Prerequisites Two BIOL200
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Molecular and cellular aspects of the function of the immune system including phylogeny, reproductive and tumour immunology.

Text
Roitt, I.M.
Essential Immunology, 6th edn (Blackwell, 1988)

BIOL306 ECOLOGY & EVOLUTION 10cp
Prerequisites BIOL203 and one other BIOL200
Hours 2 hours per week and two 3 day excursions and two day excursions
Examination One 2 hour paper

Content
Structure and dynamics of biological communities. Populations genetics and evolutionary ecology. The majority of the practical component of the topic will be undertaken on two excursions.

Text
Krebs, C.J.
Ecology 3rd edn (Harper & Row, 1985)

Reference
Krebs, J.R. & Davies, N.B.
Behavioural Ecology (Blackwell, 1978)

BIOL307 MOLECULAR BIOLOGY OF PLANT DEVELOPMENT 10cp
Prerequisites Two BIOL200 including one of BIOL201 or BIOL205
Hours 6 hours per week for one semester
Examination One 2 hour paper

Content
Rule of plant growth and development by three intersecting genetic systems, hormones and environment. Cell culture, somatic hybridisation and genetic engineering. Emphasis on genetic manipulation for plant improvement and the study of Gene M.

References
Cano, R.I. & Colomer, J.S.
Microbiology, (West, 1986)
Brock, T.D. & Madigan
Microbiology of Micro-organisms (Prentice-Hall, 1988)
Albers, B. et al
**Advisory Section**

Students who have not studied Chemistry previously are strongly advised to study General Chemistry (approximately 12 lectures) and Physics (2 unit course) in each case before commencement of the academic year.

### Content

**CHEM101 CHEMISTRY 101**

#### Hours

3 lecture hours, 1 hour of tutorial and 2 hours of laboratory classes per week for one semester.

#### Examination

One 3 hour paper. The laboratory work will count for 10% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Text

Brown, T.L. & LeMay, H.E.

Chemistry — The Central Science 4th edn (Prentice-Hall, 1988)

**CHEM211 ANALYTICAL CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- Evaluation and manipulation of analytical data, titrimetric methods of analysis, methods of detection and estimation, complex formation and oxidation — reduction titrations.
- Selected instrumental methods of analysis, atomic spectroscopy, absorption spectrophotometry, potentiometric techniques, gas chromatography.

**CHEM212 INORGANIC CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- Main group chemistry and transition metal chemistry.
- Coordination complexes and metal ion-ligand interactions; ion bonding; symmetry and structure.
- Introduction to reactions and mechanisms, synthesis, spectroscopic methods, bonding and ligand field theory.

**CHEM221 ORGANIC CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- Analysis of the structure of organic compounds and their reactions.
- Selection of instrumental methods of analysis, atomic spectroscopy.
- Absorption spectrophotometry, potentiometric techniques, gas chromatography.

**CHEM222 APPLIED CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- OR
- Morrison, R.T., Boyd, R.N.
  - Organic Chemistry 5th edn (Allyn & Bacon, 1987)

#### Text

Brown, T.L.

Chemistry — The Central Science 4th edn (Prentice-Hall, 1988)

### Chemistry Subject Descriptions

**CHEMISTRY SUBJECT DESCRIPTIONS**

**CHEM101 CHEMISTRY 101**

10cp

Students who have not studied Chemistry previously are strongly advised to study General Chemistry (approximately 24 lectures) and Physics (2 unit course) in each case before commencement of the academic year.

#### Hours

3 lecture hours, 1 hour of tutorial and 2 hours of laboratory classes per week for one semester.

#### Examination

One 3 hour paper. The laboratory work will count for 10% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Text

Brown, T.L. & LeMay, H.E.

Chemistry — The Central Science 4th edn (Prentice-Hall, 1988)

**CHEM211 ANALYTICAL CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- Spectroscopic methods of structure determination (infra-red, proton magnetic resonance, mass spectrometry).
- Spectroscopic methods of structure determination (infra-red, proton magnetic resonance, mass spectrometry).
- Symmetry and structure.
- Selected instrumental methods of analysis, atomic spectroscopy.
- Absorption spectrophotometry, potentiometric techniques, gas chromatography.

**CHEM212 INORGANIC CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- Main group chemistry and transition metal chemistry.
- Coordination complexes and metal ion-ligand interactions; ion bonding; symmetry and structure.
- Introduction to reactions and mechanisms, synthesis, spectroscopic methods, bonding and ligand field theory.

**CHEM221 ORGANIC CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- Analysis of the structure of organic compounds and their reactions.
- Selection of instrumental methods of analysis, atomic spectroscopy.
- Absorption spectrophotometry, potentiometric techniques, gas chromatography.

**CHEM222 APPLIED CHEMISTRY**

#### Prerequisite

CHEM102

#### Hours

2 hours of lectures, 1 hour of tutorials/workshops and 1 hour of laboratory work each week for one semester.

#### Examination

One 2 hour paper. The laboratory work will count for 15% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

#### Content

- OR
- Morrison, R.T., Boyd, R.N.
  - Organic Chemistry 5th edn (Allyn & Bacon, 1987)

#### Text

Brown, T.L.

Chemistry — The Central Science 4th edn (Prentice-Hall, 1988)
### CHEMISTRY SUBJECT DESCRIPTIONS


**Water Chemistry and Treatment** — the hydrological cycle. Composition of and impurities in natural and processed waters, hydrolysis, and redox. Natural trace components and their significance. Water purification.

**Chemical Toxicology** — interactions of organic compounds with biological systems. Selective toxicity. Biotransformations of organic compounds, especially those introduced into the environment.

No formal texts; material to be advised.

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisite</th>
<th>Hours</th>
<th>Examination</th>
<th>Content</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM313</td>
<td>INDUSTRIAL CHEMICAL ANALYSIS</td>
<td>CHEM201</td>
<td>5cp</td>
<td>2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for one semester</td>
<td>A survey of selected techniques for specialized or high volume analysis used in areas as diverse as industrial, R &amp; D, hospital and nuclear chemistry. Topics include electronic analytical signal processing; automated analysis (flow analyzers, batch analyzers, samplers); applications of computers and robots; X-ray/electron microprobe analysis; radiochemical analysis; kinetic and enzymatic methods of analysis.</td>
<td>No formal text; material to be advised.</td>
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<tr>
<td>CHEM314</td>
<td>TRACE ANALYSIS IN ENVIRONMENTAL SYSTEMS</td>
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<tr>
<td>CHEM321</td>
<td>CHEMOMETRICS</td>
<td>CHEM201, MATH102</td>
<td>5cp</td>
<td>2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for one semester</td>
<td>Examination of the role of analytical chemistry in studying inorganic species distributions in environmental systems. Course includes discussion of sampling theory and problems associated with trace analysis and speciation.</td>
<td>No formal text; material to be advised.</td>
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<tr>
<td>CHEM322</td>
<td>METAL-METAL BONDING AND CLUSTER CHEMISTRY</td>
<td>CHEM202</td>
<td>5cp</td>
<td>2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for one semester</td>
<td>Examination of metal-metal bonding and cluster chemistry. Topics include: Synthesis of complexes of multidentate and macrocyclic ligands; metal-directed reactions and stereoselectivity; metalloproteins and metallocarbenes; bioelectrochemistry and redox proteins.</td>
<td>No formal text; material to be advised.</td>
</tr>
<tr>
<td>CHEM323</td>
<td>BIOINORGANIC COORDINATION CHEMISTRY</td>
<td>CHEM202</td>
<td>5cp</td>
<td>2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for one semester</td>
<td>Examination of the role of analytical chemistry in studying inorganic species distributions in environmental systems. Course includes discussion of sampling theory and problems associated with trace analysis and speciation.</td>
<td>No formal text; material to be advised.</td>
</tr>
<tr>
<td>CHEM332</td>
<td>ORGANIC REACTION MECHANISM</td>
<td>CHEM203</td>
<td>5cp</td>
<td>2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for one semester</td>
<td>Examination of the role of analytical chemistry in studying inorganic species distributions in environmental systems. Course includes discussion of sampling theory and problems associated with trace analysis and speciation.</td>
<td>No formal text; material to be advised.</td>
</tr>
</tbody>
</table>
Prerequisites

Content

Schrödinger for laboratory/assignment work is a prerequisite for a pass in the introduction to corrosion.

CHEM34 MOLECULAR SPECTROSCOPY 5cp

Prerequisites CHEM204
Prerequisites 1992 CHEM241

Hours 2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for half a semester

Examination One 1 hour paper. The laboratory/assignment work will count for 20% of the final assessment but a pass in the laboratory/assignment work is a prerequisite for a pass in the subject.

Content

A course covering the occurrence, importance, reactions and synthesis of biologically important molecules including nucleic acids, antibiotics, anti-cancer agents, insecticides and plant growth regulators.

Text No formal text; material to be advised.

CHEM34 BIOLGICALLY IMPORTANT MOLECULES 5cp

Prerequisites CHEM203
Prerequisites 1992 CHEM231

Hours 2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for half a semester

Examination One 1 hour paper. The laboratory/assignment work will count for 20% of the final assessment but a pass in the laboratory/assignment work is a prerequisite for a pass in the subject.

Content

A course covering the occurrence, importance, reactions and synthesis of biologically important molecules including nucleic acids, antibiotics, anti-cancer agents, insecticides and plant growth regulators.

Text No formal text; material to be advised.

CHEM31 PHYSICAL CHEMISTRY 10cp

Prerequisites CHEM204, MATH1102
Prerequisites 1992 CHEM241

Hours 2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for one semester

Examination One 2 hour paper. The laboratory work will count for 20% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

Content

Electrodes — the metal solution interface and structure of the double layer, rates of charge transfer reactions; determination of charge transfer reaction mechanisms; electrochemical techniques; introduction to corrosion.

Molecular and Electronic Structure — the use of quantum mechanics and molecular group theory in chemistry; matter waves; free electron and particle in a box; atomic and molecular Schrödinger equation and solutions thereof; symmetry elements and point groups of molecules; symmetry adapted linear combination of atomic orbitals; Hückel molecular orbital theory.

Text No formal text; material to be advised.

CHEM32 ELECTROCHEMICAL SOLAR ENERGY CONVERSION 5cp

Prerequisites CHEM204, MATH1102
Prerequisites 1992 CHEM241, MATH1102

Hours 2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for half a semester

Examination One 1 hour paper. The laboratory/assignment work will count for 20% of the final assessment but a pass in the laboratory/assignment work is a prerequisite for a pass in the subject.

Content

Electrodes — the metal solution interface and structure of the double layer, rates of charge transfer reactions; determination of charge transfer reaction mechanisms; electrochemical techniques; introduction to corrosion.

Molecular and Electronic Structure — the use of quantum mechanics and molecular group theory in chemistry; matter waves; free electron and particle in a box; atomic and molecular Schrödinger equation and solutions thereof; symmetry elements and point groups of molecules; symmetry adapted linear combination of atomic orbitals; Hückel molecular orbital theory.

Text No formal text; material to be advised.

CHEM33 BIOLOGICALLY IMPORTANT MOLECULES 5cp

Prerequisites CHEM203
Prerequisites 1992 CHEM231

Hours 2 hours of lectures, 1 hour of tutorials/workshops and 3 hours of laboratory work/assignments each week for half a semester

Examination One 1 hour paper. The laboratory/assignment work will count for 20% of the final assessment but a pass in the laboratory/assignment work is a prerequisite for a pass in the subject.

Content

A course covering the occurrence, importance, reactions and synthesis of biologically important molecules including nucleic acids, antibiotics, anti-cancer agents, insecticides and plant growth regulators.

Text No formal text; material to be advised.
GEOG205 CONTEMPORARY AUSTRALIA AND EAST ASIA
Prerequisite GEOG102
Hours 4 hours per week for one semester; 2 days fieldwork
Examination Progressive assessment and one 2 hour paper at the end of the semester
Content
Since World War II, there have been rapid changes in Australia's economy, society and political life: this course will consider some geographical aspects of these changes, emphasising the interaction of people and environment. The influence of geography on an examination of events occurring during the course is a special focus.

GEOG206 SOCIO-ECONOMIC GEOGRAPHY
Prerequisite GEOG102
Hours 4 hours per week for one semester; up to 4 days fieldwork
Examination Progressive assessment and one 2 hour paper at the end of the semester
Content
An introductory course in socio-economic geography with specific reference to issues in agricultural, industrial location and development geography.

GEOG301 ADVANCED METHODS IN PHYSICAL GEOGRAPHY
Prerequisites GEOG101 & GEOG201
Hours 4 hours per week for one semester. This course contains a 5 day field excursion (i.e. 40 hours of the 56 hour course)
Examination Progressive assessment
Content
Includes a five day field trip on aspects of climatology, geomorphology, and biogeography where field methods are emphasised. Twelve hours of advanced statistics are included as support to field measurements. The field trip will be scheduled between semesters or in the second semester break.

GEOG302 ADVANCED METHODS IN HUMAN GEOGRAPHY
Prerequisites GEOG102 & GEOG202
Hours 4 hours per week for one semester
Examination Progressive assessment
Content
Advanced methods appropriate to Human Geography. Methods include survey design, questionnaire construction, social analysis, multivariate techniques, computer aided mapping and geographic information systems.

GEOG303 GEOGRAPHY OF ABORIGINAL AUSTRALIA
Prerequisite GEOG102
Hours 4 hours per week for one semester; 2 days fieldwork
Examination Progressive assessment and one 2 hour paper at the end of the semester
Content
This course examines Aboriginal environments from the geographical evidence for settlement through two hundred years of European settlement to the present, and stresses issues such as basic Aboriginal needs and land rights.

GEOG304 THE BIOSPHERE AND CONSERVATION
Prerequisite GEOG203
Hours 4 hours per week for one semester; 4 days fieldwork
Examination Progressive assessment and one 2 hour paper at the end of the semester
Content
Biogeography: Emphasis on plant geography, with examination of both the ecological and historical aspects of the subject. A seminar presentation and a small herbarium collection are required of each student.

GEOG305 CLIMATIC PROBLEMS
Prerequisite GEOG203 or permission of Head of Department
Hours 4 hours per week for one semester; 1 day fieldwork
Examination Progressive assessment and one 2 hour paper at the end of the semester
Content
Introduces methods of establishing palaeoclimates in the Pleistocene and Holocene, and the reasons behind climate change over those periods. Describes anthropogenic impacts on climate through air pollution, on local, regional and global scales. Evaluates near-future possible climate variations over the next century.

Recommended Reading
- Baldwin, H.A. Global Air Pollution: Problems for the 1990s pbk (Belhaven Press, 1990)
- Bradley, R.S. Quaternary Paleoclimatology (Allen & Unwin, 1985)

GEOG306 GEOGRAPHY OF AUSTRALIA: AN HISTORIC PERSPECTIVE
Prerequisite GEOG102
Hours 4 hours per week for one semester; 2 days fieldwork
Examination Progressive assessment and one 2 hour paper at the end of the semester
Content
Selected aspects of the population, settlement and land use patterns of Australia. Topics to be studied include: exploratory images, image-makers and distorters, and visions of Australia before 1900; migration to the New World; population of Australia 1788-1981; urbanisation in Australia; agricultural land use 1788-1914.

GEOG307 THE HYDROSPHERE
Prerequisite GEOG101
Hours 4 hours per week for one semester; 2 days fieldwork
Examination Progressive assessment and one 2 hour paper at the end of the semester
Content
The course examines the distribution of water in the environment. After brief consideration of snow, ice and the oceans, most attention will be given to atmospheric moisture, the hydrologic cycle, catchments, runoff, sediment and solute transport and soil water.

Text

GEOG309 SUBJECT IN HUMAN GEOGRAPHY
Title to be advised
Prerequisite GEOG102
Details to be advised.
GEOL101 THE ENVIRONMENT 10cp

Hours 6 hours per week for one semester, including lectures, practicals and field excursions. The course is repeated in both semesters.

Examination One 3 hour paper, assignments and laboratory practicals.

Content
A lecture, field and practical course which examines in the widest context the evolution of our planet and man's environment. Specific topics are the Earth in space; evolution and dynamics of the planet Earth; evolution of the atmosphere, hydrosphere, biosphere and man; the impact of climatic change; mineral resources and society.

Texts Consult lecturers concerned.

GEOL102 EARTH MATERIALS 10cp

Prerequisite/corequisite GEOL101 The Environment

Hours 6 hours per week for one semester, including lectures, practicals and excursions.

Examination One 3 hour paper, assignments and practical examinations.

Content
A course integrating geological materials and processes within a plate tectonic framework. Magmatism, depositional environments and surficial processes are discussed in terms of modern and ancient environments. Modification by burial, metamorphism and uplift, patterns of life in the past and mineral and energy resources are presented.

Texts
Press, F. & Siver, R. Earth 4th edn (Freeman, 1986)

GEOL211 OPTICAL MINERALOGY 5cp

Prerequisite GEOL102

Not to count for credit with GEOL201

Hours 3 hours per week for one semester, including lectures, practicals and class assignments.

Examination One 2 hour paper and practical examinations.

Content
A basic course in crystallography, optical mineralogy and rock-forming minerals.

Texts

GEOL212 INTRODUCTORY PETROLOGY 10cp

Prerequisite GEOL211

Advisory prerequisite CHEM102

Not to count for credit with GEOL202

Hours 6 hours per week for one semester, including lectures and practicals.

Examinations One 3 hour paper, class assignments and practical examinations.

Content
An introduction to the petrography and petrology of igneous and sedimentary rocks.

Text

GEOL213 ANCIENT ENVIRONMENTS AND ORGANISMS 10cp

Prerequisite GEOL212

Not to count for credit with GEOL203

Hours 6 hours per week for one semester, including lectures, practicals and field excursions.

Examination One 3 hour paper, class assignments and practical examinations.

Content
A course integrating ancient sedimentary environments with the evolution and morphology of ancient life, stratigraphic relationships and time. The course will be supported by field excursions in the local area.

Texts Consult lecturers concerned.

GEOL214 GEOLOGICAL STRUCTURES AND RESOURCES 10cp

Prerequisite GEOL212

Not to count for credit with GEOL204

Hours 6 hours per week for one semester.

Examination One 3 hour paper, class assignments, practical examination.

Content
An integrated introduction to geological structures, principles of geological mapping, tectonics and economic resources.

Texts
Park, R.G. Foundations of Structural Geology 2nd edn (Blackie, 1988)

GEOL215 GEOLOGY FIELD COURSE 10cp

Prerequisite GEOL212

Not to count for credit with GEOL205, GEOL206

Hours 14 days field work in two 7 day sessions for one semester.

Examination By report.

Content
(i) Analysis of the southern margin of the Sydney Basin, igneous and metamorphic rocks of the Southern Lachlan Fold Belt and mapping of a composite platoon. Preparation of reports and supporting tutorials.
(ii) Mapping of metamorphosed shelf and trench sequences of the Southern Lachlan Fold Belt, integration and presentation in a report.

Texts

GEOL216 GEOL216 GEOLOGY FIELD COURSE 5cp

Prerequisite GEOL215

Corequisite GEOL214

Not to count for credit with GEOL207

Hours 7 days field work for one semester (September).

Examination By report.

Content
Mapping and data integration in the Cobar Trough; structural and stratigraphic interpretation, relationship of sulphide rocks to structure and stratigraphy; presentation of results and interpretation in report.

Texts

GEOL301 IGNEOUS PETROLOGY AND CRUSTAL EVOLUTION 10cp

Prerequisite GEOL202

Prerequisite GEOL212

Not to count for credit with GEOL301, GEOL306

Hours 6 hours per week for one semester.

Examination One 3 hour paper and class assignments.

Content
Petrology of igneous rocks in relation to the tectonic environment. Changes in igneous petrogenesis throughout time.

Crustal Evolution
Geological evolution of selected Archaean and Proterozoic terrains in Australia: comparisons and contrasts with modern tectonic environments to assess the processes of continental growth throughout geological time.

Texts
Park, R.G. Foundations of Structural Geology 2nd edn (Blackie, 1988)
Mathematics Subject Descriptions
LEVEL 100 MATHEMATICS SEMESTER SUBJECTS

The usual route for study of Mathematics beyond first year – for example, to obtain a "Major in Mathematics" starts with MATH102 in first semester, followed by MATH103 in second semester. However, entry at this point requires an adequate level of knowledge and skill. At the time of writing, the minimum level is indicated by a mark of at least 120 out of 150 in 3-unit Mathematics at the New South Wales H.S.C. examination.

Any student with less than this level of knowledge or skill has available MATH111, followed by MATH112. This combination allows entry to seven of the seventeen level-200 subjects in Mathematics. Such a student could take MATH103 in a later year to meet the prerequisites for further Mathematics subjects.

Note that MATH111 is not appropriate for a student who has performed substantially above the minimum level for entry to MATH102/103.

MATHH11 MATHEMATICS 111

Prerequisite 2U mathematics at HSC level or equivalent
Not to count for credit with MATHH01
Hours 4 lecture hours and 2 tutorial hours per week for one semester.
The subject is repeated in each semester.
Examination One 3 hour paper plus progressive assessment
Content

Text
University of Newcastle
Mathematics 111 Tutorial Notes (1991)

References
Ayres, F.
Calculus (Schaum, 1974)

Calculus and Analytical Geometry (Prentice-Hall, 1982)

Anton, H.
Elementary Linear Algebra 5th edn (Wiley, 1987)

Farrand, S. & Pouton, N.J.
Calculus (Harcourt Brace Jovanovich, 1984)

Stein, S.K.

MATHH02 MATHEMATICS 102

Prerequisites Either a satisfactory performance in 3U Mathematics at the NSW HSC (see notes above) or equivalent for MATHH02.

Hours 4 lecture hours and 2 tutorial hours per week for one semester.
Examination One 3 hour paper
Content

Text
University of Newcastle
Tutorial Notes for MATHH02 (1991)

Walters, FR.F & Wehrhahn, K.
Calculus 2nd edn (Cleal, 1989)

References
Ayres, F.
Calculus (Schaum, 1974)

Calculus and Analytical Geometry (Prentice-Hall, 1982)

Anton, H.
Elementary Linear Algebra 5th edn (Wiley, 1987)

Farrand, S. & Pouton, N.J.
Calculus (Harcourt Brace Jovanovich, 1984)

Stein, S.K.

MATHH03 MATHEMATICS 103

Prerequisites Either a satisfactory performance in 3 unit Mathematics at the NSW Higher School Certificate (see notes above) or equivalent for MATHH02 or MATHH11 and MATHH12.

Hours 4 lecture hours and 2 tutorial hours per week for one semester.
Examination One 3 hour paper
Content

Text
University of Newcastle
Tutorial Notes for MATHH12 (1991)

References
Ash, C. & Ash, R.B.
The Calculus Tutoring Book (IEEE Press, 1987)

Stein, S.K.
SECTION FIVE

MATH201 MULTIVARIABLE CALCULUS 5cp
Prerequisite Both MATH101 and MATH102, or both MATH102 and MATH103 or MATH202 and MATH203 or MATH204.

MATH202 PARTIAL DIFFERENTIAL EQUATIONS I 5cp
Prerequisite Both MATH101 and MATH102 or both MATH102 and MATH103.

MATH203 ORDINARY DIFFERENTIAL EQUATIONS I 5cp
Prerequisite Both MATH101 and MATH102 or both MATH102 and MATH103.

References:
- Kreyszig, E. Differential Equations (Dover, 1988).

Text:

Elements of Newcastle
- Calculus of Several Variables (Addison-Wesley, 1987).
- Advanced Engineering Mathematics (Dover, 1989).

MATH204 REAL ANALYSIS 5cp
Prerequisite MATH102 and MATH103.

Hours: 2 hours per week for one semester.

Examination: One 2 hour paper.

Content:
- Study of an axiomatic way of the properties of the real number system and functions defined on the real numbers and on the Euclidean plane.
- Properties of the real number system: the supremum axiom, completeness, and compactness.
- Convergence of sequences and series in the Euclidean plane.
- Limits of functions and algebra of limits, continuity and algebra of continuous functions.
- Properties of continuous functions: connectedness, compactness, and uniform continuity.
- Properties of differentiable functions: Mean Value Theorems and Taylor polynomial approximation for functions on the real numbers and the Euclidean plane.
- The theory of Riemann integration for functions on the real numbers and the Euclidean plane.
- The Fundamental Theorem of Calculus for functions on the real numbers relating differential and integral calculus.

Text:
- Giles, J.R. Introduction to the Analysis of Metric Spaces (CUP, 1999).

MATH205 ANALYSIS OF METRIC SPACES 5cp
Prerequisite MATH202 and MATH203.

Hours: 2 hours per week for one semester.

Examination: One 2 hour paper.

Content:
- Study of an axiomatic way of the analysis of more abstract spaces: metric and normed linear spaces.
- Convergence of sequences and series in $\mathbb{R}^n$ with Euclidean and other norms.
- Convergence of sequences and series in function spaces with uniform and integral norms, the three fundamental theorems on uniform convergence involving continuity, integration, and differentiation and application to power series.
- Completeness, connectedness, and compactness in metric spaces.
- Banach Fixed Point Theorem and its application to functions on the real line and to the solution of integral equations.
- Local and global continuity of mappings on metric spaces and topological characterisations.
- Sequences of continuous functions and application in approximation theory.

Text:
- Giles, J.R. Introduction to the Analysis of Metric Spaces (CUP, 1999).
- The Elements of Real Analysis (Wiley, 1976).
- Advanced Engineering Mathematics (Dover, 1989).

MATH206 COMPLEX ANALYSIS I 5cp
Prerequisite MATH102.

Hours: 2 hours per week for one semester.

Examination: One 2 hour paper.

Content:
- Complex numbers, Cauchy-Riemann equations, geometry of the complex plane, solutions of polynomial equations. Complex analysis.
### MATH307 COMPLEX ANALYSIS II

**Prerequisite:** MATH207, MATH102, MATH103, and MATH101

- **Credits:** 5cp
- **Corequisite:** MATH102, MATH103, and MATH101
- **Hours:** 2 hours per week for one semester
- **Examination:** One 2 hour paper
- **Content:**
  - Cauchy-Riemann Theorem
  - Elementary functions, exponential, logarithmic, trigonometric and hyperbolic functions.
  - Integration, the Cauchy-Goursat Theorem.
  - Residue theory.
  - Taylor and Laurent series, analytic continuation.
  - Applications. Further examination of multivalued functions.
  - The Gauss and Weingarten Maps.
  - Curvature of surfaces.

### MATH221 DISCRETE MATHEMATICS

- **Prerequisites:** MATH102 and MATH103 or MATH101 and permission of Head of Department
- **Credits:** 5cp
- **Examination:** One 2 hour paper
- **Content:**
  - An introduction to various aspects of discrete mathematics of current interest: Graphs, trees, relations, elements of set theory and logic; induction, counting and recurrence equations; basic combinatorics.

### MATH231 MATHEMATICAL MODELLING

- **Prerequisites:** MATH102 and MATH103
- **Credits:** 5cp
- **Examination:** One 2 hour paper
- **Content:**
  - This topic is designed to introduce students to the idea of a mathematical model. Several realistic situations will be treated beginning with an analysis of the non-mathematical origin of the problem, the formulation of the mathematical model, solution of the mathematical problem and interpretation of the theoretical results. The use of computers as an integral part of this subject.

### MATH232 OPERATIONS RESEARCH

- **Prerequisites:** MATH102 and MATH103 or MATH101
- **Credits:** 5cp
- **Examination:** One 2 hour paper
- **Content:**
  - This topic is designed to introduce students to the idea of a mathematical model. Several realistic situations will be treated beginning with an analysis of the non-mathematical origin of the problem, the formulation of the mathematical model, solution of the mathematical problem and interpretation of the theoretical results. The use of computers as an integral part of this subject.
SECTION FIVE

MATHEMATICS SUBJECT DESCRIPTIONS

Difference equations. Inter product spaces, Gram-Schmidt process. Orthogonal, unitary, hermitian and normal matrices.

References
Anton, H. Elementary Linear Algebra 5th edn (Wiley, 1987)
Bloom, D.M. Linear Algebra and Geometry (Cambridge, 1979)
Britten, W. A Basis for Linear Algebra (Wiley, 1973)
Johnson, R. & Vinson, T. Elementary Linear Algebra (Harcourt Brace, 1987)
Lipschutz, S. Linear Algebra (Schaum, 1974)
Roman, S. An Introduction to Linear Algebra (Saunders, 1985)

MATH301 LOGIC AND SET THEORY

10cp

Prerequisites MATH102 or MATH111 and MATH112

Hours 3 hours per week for one semester

Examination One 2 hour paper

Content
(An essay: see note at the end of the listing for 300 level subjects) Covariant and contravariant vectors, general systems of coordinates. Covariant differentiation, differential operators in general coordinates, Riemannian geometry, metric, curvature, geodesics. Applications of the tensor calculus to the theory of elasticity, dynamics, electromagnetic field theory and Einstein's theory of gravitation.

References
Abram, I. Tensor Calculus through Differential Geometry (Butterworths, 1965)
Lichtenewicz, A. Elements of Tensor Calculus (Methuen, 1962)
Tyltldley, J.R. An Introduction to Tensor Analysis (Longman, 1975)

MATH303 VARIATIONAL METHODS AND INTEGRAL EQUATIONS

10cp

Prerequisites MATH101, MATH203 and MATH204

Hours 3 hours per week for one semester

Examination One 2 hour paper

Content
(An essay: see note at the end of the listing for 300 level subjects) Problems with fixed boundaries: Euler's equation, other governing equations and their solutions; parametric representation. Problems with movable boundaries: transversality condition; natural boundary conditions; corner conditions. Problems with constraints. Isoperimetric problems: Direct methods, Fredholm's equation; Volterra's equation; existence and uniqueness theorems; method of successive approximations; other methods of solution. Fredholm's equation with degenerate kernels and its solutions.

References
Arthurs, A.M. Complementary Variational Principles (Pergamon, 1964)
Elsgolc, L.E. Calculus of Variations (Pergamon, 1963)
Karwaw, R.P. Linear Integral Equations (Academic, 1971)
MATH104 ORDINARY DIFFERENTIAL EQUATIONS 2
Prerequisites MATH201, MATH203, MATH204 and MATH218 (MAT1208, 1990)
Hours 3 hours per week for one semester
Examination One 2 hour paper

Content
(An essay: see note at the end of the listing for 300 level subjects)
Existence and Uniqueness of solutions of first order equations, vector fields, integral curves. Lie groups, infinitesimal transformations, invariant functions and path curves. Invariance of equations under a given group and reduction to quadratures. Construction of all equations which admit a given group. Second and higher order equations, reduction of order and integration.

References
Bluman, G.W. & Cole, J.D. 
Similarity Methods for Differential Equations (Springer, 1974)
Hill, J.M.
Solutions of Differential equations by Means of One-parameter Groups (Pitman, 1982)

MATH305 PARTIAL DIFFERENTIAL EQUATIONS 2
Not offered in 1991
Prerequisites MATH201, MATH203, MATH204 and MATH206
Hours 3 hours per week for one semester
Examination One 3 hour paper

Content
(An essay: see note at the end of the listing for 300 level subjects)
Basic concepts: continuum, pressure, viscosity. Derivation of the equations of motion for a real incompressible fluid; Poisson’s and Stokes’ boundary layer flow. Dynamical similarity and the Reynolds number. Flow at high Reynolds number, ideal (non-viscous) fluid; simplification of the equations of motion; Bernoulli equations; the case of rotational flow; Kelvin’s circulation theorem. Investigation of simple rotational inviscid flows; two-dimensional flows; circulation; axisymmetric flow around a sphere; virtual mass. Generation of vorticity at solid boundaries; boundary layers and their growth in flows which are initially inviscid.

References
Batchelor, G.K.
An Introduction to Fluid Dynamics (Cambridge, 1967)
Chirgwin, B.H. & Plumpton, C.
Elementary Classical Hydrodynamics (Wiley, 1961)
Curtis, N. & Davies, H.J.
Modern Fluid Dynamics Vols I & II (Van Nostrand, 1988, 1971)
Goldstein, S. (ed).
Modern Developments in Fluid Dynamics Vols I & II (Doover, 1965)
Milne-Thomson, L.M.
Theoretical Hydrodynamics (Macmillan, 1963)
Panton, R.
Incompressible Flow (Wiley, 1984)
Paterson, A.R.
A First Course in Fluid Dynamics (Cambridge, 1963)
Roberson, J.H.
Hydrodynamics in Theory and Application (Prentice-Hall, 1965)

Ilack, W. & Wendland, W.
Lectures on Partial and Parabolic Differential Equations (Pergamon, 1972)
Smith, M.G.
Sneddon, I.N.

MATH306 FLUID MECHANICS
10cp
Not offered in 1991
Prerequisites MATH201, MATH203, MATH204 and MATH206
Advisory Pre/Corequisites MATH207
Hours 3 hours per week for one semester
Examination One 2 hour paper

Content
(An essay: see note at the end of the listing for 300 level subjects)
Means of first order equations, reduction of order and integration.

References
Chirgwin, B.H. & Plumpton, C.
Elementary Classical Hydrodynamics (Wiley, 1961)
Goldstein, S. (ed).
Modern Developments in Fluid Dynamics Vols I & II (Doover, 1965)
Milne-Thomson, L.M.
Theoretical Hydrodynamics (Macmillan, 1963)
Panton, R.
Incompressible Flow (Wiley, 1984)
Paterson, A.R.
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Lectures on Partial and Parabolic Differential Equations (Pergamon, 1972)
Smith, M.G.
Sneddon, I.N.

30 Monday 25th March
30 Monday 15th April
30 Monday 13th May
25 Monday 4th June
19 Monday 17th July
15 Monday 19th October
15 Monday 15th November
29 Monday 29th November
15 Monday 15th December

January
3 Tuesday 1st January — New Year’s Day
4 Friday Last day for return of Investment Application
4 Monday 7th January — Combining Students
February
8 Friday New students accept UAC main round offers
6 Saturday Re-enrolment Approval
TO
14 Thursday
25 Monday First Semester begins
March
31 Friday Good Friday — Easter Recreare commences
April
8 Monday Lectures resume
25 Thursday Public Holiday — Anzac-Day
June
7 Friday First Semester concludes
10 Monday Public Holiday — Queen’s Birthday
11 Tuesday Examinations begin
July
21 Monday Second Semester begins
August
31 Last day for a) variation of program in relation to HSC’s Liability for Semester I, b) withdrawal without academic penalty from Semester I Subjects.

NOTES
Semester One consists of Block One (10 weeks) and 7 weeks of Block Two. Semester Two consists of the remaining 3 weeks of Black Two and all of Black Three (10 weeks).

Date to be finalized
STUDENTS WITH SPECIAL NEEDS

The University of Newcastle has a policy to provide equal opportunity to students with Special Needs. If you have a disability of any form and feel you need some additional assistance, please do not hesitate to contact one of the following:

Academic Advisers
- Peter Summers
- Malcolm Brooks
- Tony Serpell
- Sue Woods

Admissions
- 02/2647 1122

Computing Services
- 02/2647 1122

Library
- 02/2647 1122

Medical Services
- 02/2647 1122

Student Services
- 02/2647 1122

Finance and Administrative Services
- 02/2647 1122

Enrolment Services
- 02/2647 1122

Admissions Centre
- Locked Bag 1921, Callaghan, NSW 2308

The re-enrolment kits issued to re-enrolling students includes a Fees and Charges Notice. The 1991 General Service Charge must be paid at any Westpac Bank branch before 8 March 1991. The Westpac Bank will only accept payments up until and including 8 March 1991.

Thereafter enrolment will be cancelled if charges remain unpaid by 31 March 1991.

LATE PAYMENT

The Final date for payment of the General Service Charge is 8 March 1991, payments made after this date must be made direct to the University Cashier and will incur a $50 late fee.

ADVICE AND INFORMATION

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LATE PAYMENT

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Enrolment Approval

All re-enrolling students are required to attend at the Great Hall on a specific date and time during the period 6 to 14 February 1991. Enrolment Approval dates are on posters on University Noticeboards and are included in the enrolment kits issued to students in October.

When attending for Enrolment Approval students will collect their 1991 Confirmation of program and student card. Any variations to the proposed program require approval. Enrolment in tutorial or laboratory laboratories may be arranged, and Staff from academic Departments will be available to answer enquiries.

Payment of Coursedue Applications

The re-enrolment kit issued to re-enrolling students includes a Fees and Charges Notice. The 1991 General Service Charge must be paid at any Westpac Bank branch before 8 March 1991. The Westpac Bank will only accept payments up until and including 8 March 1991.

Thereafter enrolment will be cancelled if charges remain unpaid by 31 March 1991.

STUDENT CARDS

When attending for Enrolment Approval, students will be given their Confirmation of Program and Student card. The Student Card should be carried by all students when attending University buildings as evidence of enrolment. The Student Card has machine readable features for use when borrowing books from the University Library, and contains the student's interim password for access to facilities of the Computing Centre. Please note that the Student Card will not be activated until the General Service Charge has been paid.

Students are urged to take good care of their Student Card. If the card is lost or destroyed, there is a service charge of $5 payable before the card will be replaced.

A student who withdraws completely from studies should return the Student Card to the Student Division Office.

Exercise: September 20, 1991

Enrolment Approval
All re-enrolling students are required to attend at the Great Hall on a specific date and time during the period 6 to 14 February 1991. Enrolment Approval dates are on posters on University Noticeboards and are included in the enrolment kits issued to students in October. When attending for Enrolment Approval students will collect their 1991 confirmation of program and student card. Any variations to the proposed program requires approval. Enrolment in tutorial or laboratory laboratories may be arranged, and Staff from academic Departments will be available to answer enquiries.

Payment of Course due Applications
The re-enrolment kit issued to re-enrolling students includes a Fees and Charges Notice. The 1991 General Service Charge must be paid at any Westpac Bank branch before 8 March 1991. The Westpac Bank will only accept payments up until and including 8 March 1991.

Students are urged to take good care of their Student Card. If the card is lost or destroyed, there is a service charge of $5 payable before the card will be replaced.

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Students are urged to take good care of their Student Card. If the card is lost or destroyed, there is a service charge of $5 payable before the card will be replaced.

A student who withdraws completely from studies should return the Student Card to the Student Division Office.
EXAMINATIONS

Tests and assessments may be held in any subject from time to time. In the assessment of a student, marks in university course, consideration will be given to laboratory work, tutorials and assignments and to any tests or other tests conducted throughout the year. The results of such assessments and class work may be incorporated with those of formal written examinations.

EXAMINATION PERIODS

Written examinations take place on prescribed dates within the following period:

<table>
<thead>
<tr>
<th>Mid Year</th>
<th>End of Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 28 June, 1991</td>
<td>4 to 22 November, 1991</td>
</tr>
</tbody>
</table>

Timetables showing the time and place at which individual examinations will be held will be posted on the examination notice boards in the months preceding Semester 2 (October) and Semester 3 (May) in the Great Hall. Consideration is currently being given to location of other official noticeboards on the campus.

Miscoding of the timetable will not under any circumstances be accepted as an excuse for failure to attend an examination.

SITTING FOR EXAMINATIONS

Written examinations, where prescribed, are compulsory. Students should consult the final timetable in advance to find out the date, time and place of examinations and should allow themselves plenty of time to get to the examination room so that they can take advantage of the 10 minutes reading time that is allowed before the examination commences. Normally entry into the examination room will be permitted from 15 minutes before the actual commencement of the examination writing time. This is to allow the candidate time to locate the allocated seat and complete the necessary admission slip and any related advisory registration details before the commencement of reading time. During reading time no writing will be permitted. The seat allocation list for examinations will be placed on the Noticeboard of the Department running the subject, and students must make their way to the examination room so that they can take advantage of the 10 minutes reading time.

A complete day timetable will also be displayed in the Great Hall foyer. Students should be aware of any writing instruments, drawing equipment or eraser. Logographic aids may not be taken in: they will be available from the supervisor if needed. Calculators are only allowed if specified as a permitted aid. They must be hand held, battery operated and non-programmable and students should note that no concession will be granted:

(a) to a student who is prevented from bringing into a room a programmable calculator;
(b) to a student who uses a calculator incorrectly;
(c) because of battery failure.

RULES FOR FORMAL EXAMINATIONS

Regulation 15 of the Examination Regulations sets out the rules for formal examinations, as follows:

(a) candidates shall comply with any instructions given by a supervisor relating to the conduct of the examination;
(b) before the examination begins candidates shall not read the examination paper until granted permission by the supervisor which shall be given ten minutes before the start of the examination;
(c) no candidate shall enter the examination room after thirty minutes from the time the examination has begun;
(d) no candidate shall leave the examination room during the first thirty minutes or the last ten minutes of the examination;
(e) no candidate shall leave the examination room before leaving it during the full period of the examination;
(f) a candidate shall not bring into the examination room any bag, book, diary, written or printed matter, device, or other thing, whether or not as such may be specified for the particular examination;
(g) a candidate shall not by any means obtain or endeavour to obtain improper assistance with writing, give or receive any assistance to any other candidate, or commit any breach of order; and
(h) a candidate shall not take from the examination room any examination answer book, graph paper, drawing paper or other material issued for the examination;
(i) no candidate may mock in the examination room.

Any infringement of these rules constitutes an offence against discipline.

EXAMINATION RESULTS

End of year examination results will be mailed out by mid December. Examination results for Semester 1 subjects will be mailed out by the Friday before Semester 2 begins.

No results will be given by telephone.

After the release of both Semester and end of year examination results a student may apply to have a result reviewed. There is a charge for a subject, which is refundable in the event of an error being discovered. However, in accordance with Academic Policy, results released after careful assessment of students' performances and that, amongst other things, marginal failures are reviewed before results are released.

SPECIAL CONSIDERATION

All applications for special consideration should be made on the Application for Special Consideration form. Relevant evidence should be attached to the application (see Regulation 17(2) of the Examination Regulations, Calendar Volume 1). Also refer to Faculty Policy. Application forms for Special Consideration are available from Academic and Examinations Office, Examinations and Services Office and the University Health Services. Before a student's application for special consideration will be considered on the ground of personal illness, students should give a Medical Certificate or be furnished in the form set out on the Application.

If a student is affected by illness during an examination and wishes to ask for special consideration, he or she must report to the supervisor in charge of the examination and make written application to the Academic Registrar within three days of the examination (see Regulation 12(3) of the Examination Regulations, Calendar Volume 1). Also refer to Faculty Policy.

Applicants for special consideration should note that the University does not have a formal special examination period, any further assessment required will be determined and organised by the Department offering the subject concerned. The evidence presented should state the reason why the applicant was unable to attend an examination or how preparation for an examination was disrupted. Where a medical certificate the Doctor should state the nature of the disability and specify that the applicant was unfit to attend an examination or a particular subject would stand but that the performance of the applicant would be affected by the disability. If the period of disability extends beyond one day the period should be stated.

\[a\] A programmable calculator may be permitted if prescribed, provided that program cards and devices are not taken into the examination room and that the Head of Department approves.
UNSATISFACTORY PROGRESS

TRANSCRIPTS OF ACADEMIC RECORD

If you wish to be issued with a transcript of your academic record, you must complete the appropriate application form and lodge it with the University Cashier along with the appropriate fee. The transcript will be mailed out as soon as it becomes available, to the nominated address. Applicants should allow adequate time for this to occur. Computer produced transcripts can normally be mailed within a week. Transcripts involving the 1988 examination result should be expected to take longer to produce. Indeed applicants must clear their debt before transcripts can be issued.

UNSATISFACTORY PROGRESS

The University has adopted Regulations Governing Unsatisfactory Progress which are set out below.

Students who become liable for action under the Regulations will be informed accordingly by mail after the release of the End of Year examination results and will be informed of the procedure to be followed if they wish to "show cause".

Appeals against exclusion must be lodged together with Enrolment Application Forms by Friday 4 January 1991.

The Faculty's progress requirements are set out elsewhere in this volume.

Regulations Governing Unsatisfactory Progress

1.1 These Regulations are made in accordance with the powers vested in the Council under By-law 5.1.2.

1.2 These Regulations apply to all students of the University except students whose enrolment is regulated by these Regulations.

1.3 In these Regulations, unless the context or subject matter otherwise indicates or requires:

"Admissions Committee" means the Admissions Committee of the Senate constituted under By-law 2.3.5.

"Dean" means the Dean of a Faculty in which a student is enrolled.

"Faculty Board" means the Faculty Board of a Faculty in which a student is enrolled.

2.1 A student's enrolment in a subject may be terminated by the Head of the Department offering the subject if the student does not maintain a rate of progress considered satisfactory by the Head of Department. In determining whether a student is failing to maintain satisfactory progress the Head of Department may take into consideration such factors as:

(a) unsatisfactory attendance at lectures, tutorials, seminars, laboratory classes or field work;
(b) failure to complete laboratory work;
(c) failure to complete written work or other assignments; and
(d) failure to complete field work.

2.2 The enrolment of a student in a subject shall not be terminated pursuant to regulation 2.1 if the student has been given prior written notice of the intention to consider the matter with brief particulars of the grounds for so doing, and has also been given a reasonable opportunity to make representations either in person or in writing or both.

2.3 A student whose enrolment in a subject is terminated under regulation 2.1 of these regulations may appeal to the Faculty Board which shall determine the matter.

3.(1) A Faculty Board may review the academic performance of a student who does not maintain a rate of progress considered satisfactory by the Faculty Board and may determine:

(a) that the student be permitted to continue the course;
(b) that the student be permitted to continue the course subject to such conditions as the Faculty Board may decide;
(c) that the student be excluded from further enrolment:
(i) in the course;
(ii) in the course and any other course offered in the Faculty;
(iii) in the Faculty;

(d) if the Faculty Board considers its powers to deal with the case inadequate, that reference be referred to the Admissions Committee together with a recommendation for such action as the Faculty Board considers appropriate.

(2) Before a decision is made under regulation 3 (1) (b) or (c) of these Regulations the student shall be given an opportunity to make representations with respect to the matter either in person or in writing or both.

(3) A student may appeal against any decision made under regulation 3 (1) (b) or (c) of these Regulations to the Admissions Committee which shall determine the matter.

4. Where the progress of a student who is enrolled in a combined course or who has previously been excluded from enrolment in another course or Faculty is considered by the Council or the Faculty to be unsatisfactory, the Faculty Board shall refer the matter to the Admissions Committee together with a recommendation for such action as the Faculty Board considers appropriate.

5.(1) A Faculty Board may review the academic performance of a student who has previously been excluded from enrolment in another course or Faculty is considered by the Faculty Board and may determine:

(a) that the student be permitted to continue the course;
(b) that the student be permitted to continue the course subject to such conditions as the Faculty Board may decide;
(c) that the student be excluded from further enrolment:
(i) in the course;
(ii) in the course and any other course offered in the Faculty;
(iii) in the Faculty;

(d) if the Faculty Board considers its powers to deal with the case inadequate, that reference be referred to the Admissions Committee together with a recommendation for such action as the Faculty Board considers appropriate.

(2) Before a decision is made under regulation 5 (1) (b) or (c) of these Regulations the student shall be given an opportunity to make representations either in person or in writing or both.

(3) A student may appeal against any decision made under regulation 5 (1) (b) or (c) of these Regulations to the Admissions Committee which shall determine the matter.

6.(1) A student who has been excluded from further enrolment in a Faculty and is enrolled in another Faculty only with the permission of the Faculty Board of that Faculty and on such conditions as it may determine after considering any advice from the Dean of the Faculty from which the student was excluded.

(2) A student who has been excluded from further enrolment in any course, Faculty or from the University under these Regulations may apply for permission to enrol therein again provided that in no case shall such re-enrolment commence before the expiration of two academic years from the date of the exclusion. A decision on such application shall be made:

(a) by the Faculty Board, where the student has been excluded from a single course or a single Faculty;
(b) by the Admissions Committee, in any other case.

7.(1) A student whose application to enrol pursuant to Regulation 8 (1) or (2) of these Regulations is rejected by a Faculty Board may appeal to the Admissions Committee.

(2) A student whose application to enrol pursuant to Regulation 8 (2) (b) of these Regulations is rejected by the Admissions Committee may appeal to the Vice-Chancellor.

CHARGES

The General Services Charge (details below) is payable by all students. New undergraduate students are required to pay all charges when they seek to enrol.

Re-enrolling students receive in October each year, as part of their re-enrolment notice, a form for the General Services Charge. Students are expected to pay their General Services Charge in advance of re-enrolment at any Wesley Bank. The last date for payment of charges with the Wesley Bank is 8 March 1991.

1. General Services Charge

(a) Students Progressing to a Degree or Diploma $243
(b) Plan Students joining Newcastle University Union for the first time $35
(c) Non-Degree Students $35
(d) External Students $37

2. Late Charges

The exact amount must be paid in full by the prescribed date.

3. Other Charges

(a) Examination fees ($15 per paper)
(b) Review of examination results, per subject $25

(c) Replacement of Re-enrolment Kit $10
(d) Replacement of Student Card $5
(e) Statement of Matriculation Status for non-member of the University $10
(f) Academic Transcripts, minimum 2 copies $10
(g) Each additional copy $1

Note:

(i) Graduands will be provided with two copies of their transcript free upon notification of eligibility to graduate.

(ii) Transcripts will be issued free to other institutions or employers nominated by the student.

4. Indebted Students

All charges, including debts outstanding to the University, must be paid before or upon enrolment — part payment of total amount due will not be accepted.

METHOD OF PAYMENT

Students are requested to pay charges due at any Wesley Bank up to and including 8 March 1991. After 8 March 1991 payments of charges will incur a $50 late fee and should be paid direct to the University Cashier. The Cashier's Office is located on 1st Floor McMullin Building and on A Level, Haste Building.

HIGHER EDUCATION CONTRIBUTION SCHEME (HECS)

The Higher Education Contribution Scheme (HECS) was introduced in 1989 by the Federal Government to supplement the funding of higher education in Australia. It requires contributions to be made by students towards the cost of their higher education undertaken from the start of 1990 and onwards.

All students, apart from some exceptions, enrolled in institutions of higher education from 1989 are liable under the HECS.

Exemption from payment of the Higher Education Contribution (HECS) applies to:

- a fee-paying student in a "frees-sponsored postgraduate award course"
- a student in a "basic nurse education course"
- a "full-fee-paying overseas student"
- a student who has paid the Overseas Student Charge
- a "fully sponsored overseas student"
- a student in an "enabling course"
- a student in a "non award award" course
- a student who has been awarded a HECS postgraduate scholarship

The amount each student contributes depends upon the subjects undertaken during the semester census dates, in March 31 in Semester 1 and August 31 in Semester 2. If a student withdraws from a subject after one of the above dates, the liability for that subject will end at that semester.

In 1990 the HECS charge for a standard full time load was $1,982 for the year $941 for a semester. This amount will be indexed each year in accordance with the consumer price index.

HECS is administered as part of the enrolment process. Students must select one of three options on the HECS Payments Options Form.

Enrolment fees vary according to the following:

(a) Elective courses less than 20 credit points or equivalent which would require payment of 50% of the contribution for the semester, with the balance to be paid by the Commonwealth.

Students electing to pay for Semester 2 will be billed to such a commencement of Semester 2 or
b) Defer their HEC and elect to pay through the taxation system, in which case they must either provide a tax file number or apply for a tax file number support of their enrolment. Institutions are required to ensure that the information given by students on their tax file number application is the same as that on their enrolment form.

Students electing to defer their HEC and pay through the taxation system are not required to make a payment towards their contribution until their taxable income reaches a minimum threshold level. For the 1990-91 income year the minimum threshold is $25,469. This amount will be increased in line with the consumer price index each year.

c) Provide evidence of exemption from the HEC and be enrolled with details of their exemption being recorded by the institution for subsequent reporting to the Department of Employment, Education and Training.

All enrolment students must complete a Payment Options form selecting one of the above three options. Re-enrolling students will automatically maintain their elected payment option. Students must complete a new Payment Options form if they change courses or wish to change their payment option.

**SCHOLARSHIP HOLDERS AND SPONSORED STUDENTS**

Students holding scholarships or receiving other forms of financial assistance must lodge with the Cashier their Fees and Charges Notice paid by the sponsor. Sponsors must provide a separate voucher warrant a loan from their bank, building society, credit union or other financial institution for subsequent reporting to the Department of Employment, Education and Training.

**LOANS**

Students who do not have sufficient funds to pay charges should seek a loan from their bank, building society, credit union or other financial institution. Applications for a loan from the Student Loan Fund should be made to Mr. Andy Lang. Student Services. An assessment should be made in advance to avoid the risk of a late charge.

**REFUND OF CHARGES**

A refund of the General Services Charge paid on enrolment or part thereof will be made when the student notifies the Student Division of a complete withdrawal from studies by the following dates (as to be determined):

- A refund cheque will be mailed to a student if applicable a sponsor. Any change of address must be advised.
- A refund will not be made before 31 March 1991.

**CAMPUS TRAFFIC AND PARKING**

Persons wishing to bring motor vehicles (including motor cycles) on to the campus are required to complete a parking registration form for each vehicle. Completed forms may be lodged either with the Attendant (Patrol) Office located in the foyer of the Great Hall or with the Property Services Office located in the Hunter Building. All persons must comply with the University’s Traffic and Parking Regulations including parking in approved parking areas, complying with road signs and not exceeding 35 kph on the campus.

If the Director (Property Services), after affording the person a period of fourteen days in which to submit a written statement is satisfied that any person is in breach of Regulations, he may:

- Warn the person against committing any further breach;
- Impose a fine; or
- Refer the matter to the Vice-Chancellor.

The range of fines which may be imposed in respect of various categories of breach includes:

- A student failing to notify the registered number of a vehicle brought on to the campus
- Parking in areas not set aside for parking
- Parking in special designated parking areas without a permit for that area
- Failing to stop when signalled to do so by an Attendant (Patrol)
- Refusing to give information to an Attendant (Patrol)

The Traffic and Parking Regulations are stated in full in the Calendar, Volume 1.

The University Conservatory of Music, located at the corner of Gibson and Auckland Streets in the centre of Newcastle, has no parking facilities, however, there is a Council car-park in Gibson Street.

**BANKING**

i) Commonwealth Bank

The University of Newcastle branch of the Commonwealth Bank is located adjacent to the McMillan Building. An automatic teller machine is located outside.

**HOURS OF OPENING:**

<table>
<thead>
<tr>
<th>Monday to Thursday</th>
<th>9.30am - 4.00pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday</td>
<td>9.30am - 12.00pm</td>
</tr>
</tbody>
</table>

An agency of this bank is located on the first floor of the Hunter Building.

**ii) Westpac Banking Corporation**

An agency of the Hamilton Branch of Westpac is located outside the Students Union. It offers normal banking facilities and services.

**HOURS OF OPENING:**

<table>
<thead>
<tr>
<th>Monday to Thursday</th>
<th>10.00am - 11.30am</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday to Thursday</td>
<td>12.30pm - 3.00pm</td>
</tr>
<tr>
<td>Monday to Thursday</td>
<td>10.00am - 11.30am</td>
</tr>
<tr>
<td>Monday to Thursday</td>
<td>12.30pm - 4.00pm</td>
</tr>
</tbody>
</table>

Closed over the Christmas period.

Above hours extend through mid-semester break.

**iii) Credit Union**

The main branch of the University Credit Union is located on the Student Union on the former University side of the campus.

**HOURS OF OPENING:**

Monday to Friday
9.00am - 4.00pm

An agency is located in the Hunter Union Building.

<table>
<thead>
<tr>
<th>(a) Pay week</th>
<th>Tuesday to Thursday 10.30am - 2.00pm*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) Off pay week</td>
<td>Thursday to Friday 10.30am - 2.00pm*</td>
</tr>
</tbody>
</table>

*Liability to alteration before 1990.

**LAW CLINIC**

An agency of this branch is located adjacent to the McMullin Building. An automatic teller machine is located outside.

**CHARGES**

Students holding scholarships or receiving other forms of financial assistance must lodge with the Cashier their Fees and Charges Notice paid by the sponsor. Sponsors must provide a separate voucher warrant a loan from their bank, building society, credit union or other financial institution for subsequent reporting to the Department of Employment, Education and Training.

An agency is located in the Hunter Union.

**CASHIER**

There are two cashiers' offices on campus.

i) Located on First Floor, McMillan Building.

**HOURS OF OPENING:**

(a) During Semester 10.00am - 4.00pm (Open during lunch break)

(b) Vacation Period 10.00am - 12.30pm - 2.00pm - 4.00pm

ii) Located inside entrance of Hunter Building.

**HOURS OF OPENING:**

All year except for one week during Christmas break.
9.00am - 11.00am - 1.30pm - 3.30pm

**STUDENT SERVICES**

First two weeks of semester 8.30am - 7.00pm
An agency is located in the Hunter Union.

**HOURS OF OPENING:**

(a) During Semester Monday to Thursday 10.00am - 3.00pm
(b) During Teacher Training Monday to Thursday 10.00am - 2.00pm
First two weeks of semester 9.00am - 5.00pm

**L O S T P R O P E R T Y**

Lost property may be collected from, or deposited at two locations on campus:

(a) Patrol Office, Great Hill between 9.00am - 4.30pm
(b) Property Services, City 110, between 9.00am - 4.00pm

It is suggested that you telephone in advance.

**NOTICEBOARDS**

Students wishing to post notices within the glass-fronted locked noticeboards should contact Mr. D. Heggan, Property Services in the Hunter Building.

**POST OFFICE**

Offers all normal postal services EXCEPT interviews for passports.

**HOURS OF OPENING:**

Monday to Friday 9.00am - 5.00pm

**P U B L I C T R A N S P O R T**

The State Transit Authority provides a comprehensive bus service to the University from the following locations:

Newcastle (Parnell Place), Newcastle Regional Museum, The Junction, Tighes Hill, Broughted, Adamstown, Lambton, Mayfield, Warrata, Jesmond, WallSEND, Rakin Park, Cardiff, Charlestown, Belmont.

Bus Timetables are available from the enquiry counter at Students Services.

**STUDENT INSURANCE COVER**

StudentUnifim Insurance is an accident policy which is administered by the Student Union on behalf of American Insurance Underwriters (A.I.U.). This policy provides benefits for death, disability, hospitalization, loss of wages and medical expenses (these are restricted to items sustained whilst engaged in campus activities). The injury must be the result of a 'fortuitous act' (i.e. due to chance). It does not cover disability arising from sickness or disease. There is a $25.00 excess applying to each accident, not each claim. This excess is deducted from the first part claim only.

Student Union can cover:

- Students who are members of the Sports Union (this does not include students who have deferred study)
- Active life and active associate members of the Issued organisation;
- Staff of the Sports Union and staff of the University.

For further information, please telephone the Sports Union office during business hours.

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**CHAPLAINCY SERVICE**

The Chaplain's office is located in the demonstrable buildings at the rear of the Hunter Building on the former University side, and in C69 in the Hunter Building.

Pastoral care is available at both the University and the Conservatorium of Music from the following denominations:

- Anglican
- Catholic
- Baptist
- Presbyterian
- Uniting Church
- Assembly of God

**HOURS OF OPENING FOR BOTH CHAPLAINS:**

Monday to Friday 8.30am - 5.00pm

**COMMUNITY PROGRAMMES**

The Department of Community Programmes offers bridging courses for students in its summer programmes January and February as well as courses for people who do not have to be formally accepted at University students.

Students interested in bridging courses should call at the Department's office in Room V31, Ground Floor of the Mathematics building. Contact, workshops and seminars for the public can be virtually any subject area, and those interested should telephone for further details.

**CONVOCATION**

All students of the University of Newcastle become members of Convocation upon graduating. Convocation is the graduate body of the University of Newcastle and, under the provisions of the University of Newcastle Act, is one of the constituent parts of the University. By virtue of the Act and the University By-Laws, Convocation has a voice in the government of the University through its right to elect members of Council and the Standing Committee's right to direct communication with the Council and the Senate. Through its membership of the Australian University Graduate Conference, Convocation also co-operates with its counterparts in other universities to give effective expression of opinion on matters of concern to graduates.

**CO-OP BOOKSHOP**

There are two branches of the Co-op Bookshop on the campus. Each branch offers discounts to Co-op members.

The main branch is located within the Student Union. It stocks textbooks, general publications, computer discs and other software, audio-visual cassettes.

**HOURS OF OPENING:**

Monday, Wednesday and Friday
9.00am - 5.00pm
Tuesday and Thursday
9.00am - 6.00pm
UNIVERSITY COMPUTING SERVICES

The University of Newcastle has made use of computers in research and teaching and for administrative purposes since the first computer was installed in October 1963. All students will become familiar with the University Libraries' use of computers in providing the services they require. The facilities available are managed by the University Computing Services in publicly available locations.

Computers are used in teaching wherever this is appropriate. Some of the locations include the Academic and Commerce, Education, Engineering, Medicine, Science, and Mathematics. It holds an extensive range of government publications and a Rare Book Collection. Specialist services in Biomedicine, Government Publications and Law are provided.

The Biomedical Library

Houses monographs, serials, pamphlets and reference material in Biological Sciences and Medicine; i.e. within the classification ranges 061-17-06165 and 370-619. Collections of resources are also maintained in six country centre hospitals, Tamworth, Gosford, Maitland, Orange and Lithgow for the use of students in clinical training stages.

There is a formal agreement between the University and the Area Health Board on the operation of the Biomedical Library. Service based at the Royal Newcastle Hospital, under which registered users of the Auchmuty and Gardiner Libraries enjoy complete reciprocity.

Borrowers may have access to the Short Loan Collection for restricted periods.

Further information and assistance can be obtained at the Auchmuty Library, Huxley Library or at the following resource points:

Archives

ANU Library Services

AV Services

Online Searching

Biomedical Library

Reference Desk

Government Publications

Loan Short Loan Collection

Borrowing Rights

The following loan conditions apply at the Auchmuty and Huxley Libraries:

- Undergraduates: 12 books overall for 2 weeks
- Graduate Diploma/Postgraduate Diploma (Pass or Honours): 12 books overall for 2 weeks
- Postgraduate Qualifying/Bachelor Honours/Masters by coursework: 12 books overall for 2 weeks and 2 journals for 1 week
- Staff/Higher Doctorate/PhD and Masters by research: 50 books overall for 12 weeks
- 6 journals for 1 week

* Some heavy demand material will be available on 1 day loan only for all staff and students.

Hours of Opening (Auchmuty Library Only)

1. Term Hours
- Monday to Friday: 8.30am to 7.00pm
- Saturday & Sunday: 9.00am to 1.00pm
2. Semester Breaks
- Monday to Friday: 8.30am to 7.00pm
- Saturday & Sunday: 9.00am to 1.00pm
The Newcastle Conservatorium of Music Library

This Library is located on the second floor of the old section of the Conservatorium of Music, corner of Gibson and Auckland Streets. Limited on-street parking is available. Off-street parking is available in the King Street Council Car Park, and Conservatorium students may obtain parking concessions from the Information Centre, Shortland Union Building.

Borrowing Rights

Students and staff of the Conservatorium of Music can borrow from this Library. This includes full-time and part-time Music Education students. They are entitled to have three books for loan at any one time, and seven books for restricted use. Music recordings are available for loan. However, compact disc, record and cassette players are available for loan within the library. Access to the collection by other categories of users can be arranged by contacting the Librarian on 29 4133.

Limited facilities for disabled persons can be arranged if prior arrangements are made.

Hours of Opening

Monday to Friday 9.00am to 1.00pm
Closed for four weeks over Christmas/New Year vacation period.

Further information and assistance can be obtained at the Huxley Library Reference Desk or at the following service points:

A/V Services
Loan
Short Loan
Reference Desk
Online Searching
Inter-Library Services
Essential Studies Librarian

Borrowing Rights

Refer to borrowing rights for Auchmuty Library.

Hours of Opening

i) Term Hours
Monday to Thursday 8.30am to 9.00pm
Tuesday to Friday 8.30am to 5.00pm

ii) Semester Breaks
Wednesday
9.00am to 9.00pm

iii) Long Vacation
Monday to Friday 9.00am to 5.00pm

iv) Library Closed
All public holidays

MATH307 QUANTUM AND STATISTICAL MECHANICS

Prerequisites: MATH211, MATH203 and MATH206

Hours: 3 hours per week for one semester

Examination: One 2 hour paper

Content

(An essay: see note at the end of the listing for 300 level subjects)

Classical Lagrangian and Hamiltonian mechanics, Liouville theorem. Statistical Mechanics: basic postulate; microcanonical ensemble; equilibrium; classical ideal gas; canonical ensemble; energy fluctuations; grand canonical ensemble; density fluctuations; quantum statistical mechanics; density matrix, ideal Bose gas; ideal Fermi gas; white dwarf stars; Bose-Einstein condensation; superconductivity.

Quantum mechanics: the wave-particle duality, concept of probability; development, solution and interpretation of Schrodinger's equations in one, two and three dimensions; degeneracy; Heisenberg uncertainty; molecular structure.

References

Croton, C.A.

Introductory Eigenequations (Wiley, 1975)

Fong, P.

Elementary Quantum Mechanics (Addison-Wesley, 1969)

Huang, K.

Statistical Mechanics (Wiley, 1963)

Lindt, L.D.& Lifshitz, I.M.

Statistical Physics (Pergamon, 1968)

MATH308 GEOMETRY 2

Prerequisites: MATH211 and MATH218 (MATH208, 1990)

Hours: 3 hours per week for one semester

Examination: One 2 hour paper

Content

(An essay: see note at the end of the listing for 300 level subjects)

Euclidean geometry: axiomatic and analytic approach, transformations, isometries, decomposition into plane reflections, inversions, quadratic geometry. Geometry of incidence: the real projective plane, inversion, projective transformation, conics, finite projective spaces.

References

Blumenthal, L.M.

Studies in Geometry (Freeman, 1970)

Brower, H.

A Survey of Geometry (Allyn & Bacon, 1972)

Gardner, R.

An Outline of Projective Geometry (North Holland, 1981)

Greenberg, M.J.

Euclidean and Non-Euclidean Geometries 2nd edn (Freeman, 1980)

MATH309 COMBINATORICS

Prerequisites: MATH211, MATH203 and MATH206

Hours: 3 hours per week for one semester

Examination: One 2 hour paper

Content

(An essay: see note at the end of the listing for 300 level subjects)


References

Li, C.L.

Introduction to Combinatorial Mathematics (McGraw-Hill, 1984)

Kristenmuth, V.

Combinatorics: Theory and Applications (Wiley, 1985)

Brouder, R.

Introductory Combinatorics (North Holland, 1977)

Bogart, K.P.

Introductory Combinatorics (Pitman, 1983)

Tucker, A.

Applied Combinatorics (Wiley, 1984)

Street, A.P. & Wallis, W.D.

Combinatorics: A First Course (Charles Babbage Research Centre, 1982)

MATH310 FUNCTIONAL ANALYSIS

Prerequisites: MATH215

Hours: 3 hours per week for one semester

Examination: One 2 hour paper

Content

(An essay: see note at the end of the listing for 300 level subjects)

Normed linear spaces, finite dimensional spaces, inner product spaces. Linear mappings, continuity, and topological and isometric isomorphisms. Dual spaces, the Hahn-Banach theorem and reflexivity. Conjugate mappings, operators on Hilbert space, adjoint operators and projection operators.

Texts

Giles, J.R.

Introduction to Analysis of Metric Spaces (CUP, 1987)

Giles, J.R.

Introduction to Analysis of Normed Linear Spaces (Univ. Newcastle Lecture Notes, 1984)

References

Bachman, G. & Narici, L.

Functional Analysis (Academic, 1966)

Banach, S.

Therorie des Operations Lineaires 2nd edn (Chelsea, 1988)
SECTION FIVE

MATHEMATICS SUBJECT DESCRIPTIONS

Jameston, G.J.O., Topology and Normed Spaces (Chapman-Hall, 1974)


Simmons, G.F., Introduction to Topology and Modern Analysis (McGraw-Hill, 1960)


Wilenisky, A. & Holmes, R.B., Mathematical Biology (Prentice-Hall, 1980)
Young, N., An introduction to Hilbert space (CUP, 1988)

MATH31 MEASURE THEORY & INTEGRATION 10cp
Not offered in 1991
Prerequisite MATH205

Hours: 3 hours per week for one semester
Examination: One 2 hour paper

Content (An essay: see note at the end of the listing for 300 level subjects)


References
de Barra, G., Measure Theory and Integration (Ellis Horwood, 1981)
Cameron, A.M. et al., Introduction to Measure and Integration (Prentice-Hall, 1970)

MATH32 ALGEBRA 10cp
Not offered in 1991
Prerequisites: MATH218(MATH208, 1990) and at least one of MATH209, MATH210 or MATH211

Hours: 3 hours per week for one semester
Examination: One 2 hour paper

Content (An essay: see note at the end of the listing for 300 level subjects)

In this topic the solution of polynomial equations and their relationships with classical geometrical problems such as duplication of the cube and trisection of angles will be studied. It will further examine the relations between the roots and coefficients of equations, relations which gave rise to Galois theory and the theory of extension fields. Why equations of degree 5 and higher cannot be solved by radicals will be investigated.

References
Birkhoff, G.D. & MacLane, S., A Survey of Modern Algebra (Macmillan, 1953)
Edwards, H.M., Galois Theory (Springer, 1984)
Herstein, I.N., Topics in Algebra (Wiley, 1975)
Kaplansky, I., Fields and Rings (Chicago, 1969)
Stewart, I., Galois Theory (Chapman & Hall, 1973)

MATH33 NUMERICAL ANALYSIS (THEORY) 10cp
Prerequisite MATH201, MATH203, MATH204 and MATH218(MATH208, 1990). Programming ability (high level language) is assumed

Hours: 3 hours per week for one semester
Examination: One 2 hour paper

Content (An essay: see note at the end of the listing for 300 level subjects)

Solution of linear systems of algebraic equations by direct and linear iterative methods; particular attention will be given to the influence of various types of errors on the numerical result, to the general theory of convergence of the latter class of methods and to the concept of "condition" of a system. Solution by both one step and multistep methods of initial value problems involving ordinary differential equations. Investigation of stability of linear searching schemes. Boundary value problems. Finite-difference (and finite-element methods) of solution of partial differential equations. If time permits, other numerical analysis such as integration, solution of non-linear equations etc. will be treated.

Text

References
Atkinson, K.E., An Introduction to Numerical Analysis (Wiley, 1978)

MATH34 OPTIMIZATION 10cp
Prerequisites: MATH201, MATH203 and MATH213

Hours: 3 hours per week for one semester
Examination: One 2 hour paper

Content (An essay: see note at the end of the listing for 300 level subjects)

Many situations in Economics, Engineering, Experimental and Pure Science are reducible to questions of Optimization. The theory of linear programming, including Bland's anticycling rule and duality, is examined. Constrained nonlinear optimization in both the convex and the smooth case are developed from a general theory of convergence of the latter class of methods and to the one dimensional Fibonacci search for roots. Ekeland's variational principle, descent methods and the one dimensional Fibonacci search for unconstrained problems form the final section of the course.

Text

MATH35 INDUSTRIAL MODELLING 10cp
Prerequisites: MATH201, MATH203, MATH213, MATH216 and permission of the Head of Department.

Hours: 3 hours per week for one semester
Examination: One 2 hour paper

Content (An essay: see note at the end of the listing for 300 level subjects)

Several 'industrial' models will be examined, each commencing with the problem in non-rigorous verbal form, proceeding to a mathematical formulation, solving the latter and terminating
with a discussion of the 'industrial' interpretation of the mathematical results. Here, 'industrial' is meant in the widest possible sense. Models may be taken from some or all of the following industries: finance, commerce, manufacturing, mining, exploration, defence, scientific, travel and service.

At the same time small groupings of students will be involved in either a journal-based or an industry-based project. Each group will present a written report on its project, and probably a seminar too.

The following reference list will be supplemented by other materials (e.g. journal references) as required.

References:
- Burghes, D.N. & Borrie, M.S. Modelling with Differential Equations (Ellis Horwood, 1981)
- Noble, B. Applications of Undergraduate Mathematics in Engineering (Macmillan, 1967)
- Wan, F.Y.M. Mathematical Models and Their Analysis (Haper & Row, 1989)

MATH317 NUMBER THEORY

Not offered in 1991

Prerequisites MATH102 and MATH103

Hours 3 hours per week in one semester

Examination One 2 hour paper

Content

An essay: see note at the end of the listing for 300 level subjects


References


Lang, Calvin T. Elementary Introduction to Number Theory (Heath, 1982)

Notes on Mathematics Level 300 Essay Assignment

Students enrolled in Level 300 Mathematics semester subjects will be required to complete an essay on any topic chosen from the history or philosophy of Mathematics. Only one essay is required and students may nominate in which 300 level semester subject they will present the essay. The essay does not have to be on the material directly relevant to the semester subject in which it is submitted for assessment.

Physics Subject Descriptions

PHYS101 PHYSICS 101

Prerequisite MATH102

Assumed Knowledge HSC 2 unit Mathematics with a result in the top 30% of the candidate or equivalent.

Hours 6 hours per week for one semester

Examination Progressive assessment during the semester and one 2 hour paper at the end of the semester

Content

This is an introductory course in physics concentrating primarily on the core topics of classical physics. The lecture course consists of three main strands:

(1) Mechanics

(2) Electromagnetism

(3) Waves, optics and thermal physics.

There will also be 3 hours/week of laboratory and tutorial work.

Text


Reference


PHYS102 PHYSICS 102

Prerequisites PHYS101 or Assumed knowledge of HSC 2 unit Physics or 4 unit Science (with a result in the top 50% of the candidate) and HSC 3 unit Mathematics (with a mark of at least 120/150) or MATH101.

Hours 6 hours per week for one semester

Examination Progressive assessment during the semester, and one 2 hour paper at the end of the semester

Content

This lecture course consists of three principal strands, being:

(1) Mechanics

(2) Electromagnetism

(3) Thermal, nuclear and quantum physics.

There will also be 3 hours per week associated with laboratory and tutorial work.

The subject is a rigorous one, utilizing calculus, and stressing the unifying principles in the development of the physical concepts. The syllabus provides for discussion of modern applications.

Tests See PHYS102 Notice Board.

References To be advised.

PHYS103 PHYSICS 103

Prerequisite PHYS102

Assumed Knowledge HSC 2 unit Mathematics with a result in the top 30% of the candidate or equivalent.

Hours 6 hours per week for one semester

Examination Progressive assessment during the semester and one 2 hour paper at the end of the semester

Content

This lecture course consists of three principal strands, being:

(1) Advanced mechanics and electromagnetism

(2) Waves and optics

(3) Thermal, atomic, and quantum physics.

There will also be 3 hours per week associated with laboratory and tutorials.

Tests See PHYS102

PHYS201 QUANTUM MECHANICS AND ELECTROMAGNETISM

Prerequisites MATH103 and PHYS103, or PHYS101 and PHYS102 with credit or better and the approval of the Head of Department

Corequisites These should include MATH101 (Multivariable Calculus) and such other Mathematics 200 level subjects that will satisfy the prerequisites for any Physics 300 level subject

Hours 6 hours per week for one semester

Examination Progressive assessment during semester, and one 2 hour paper at end of semester

Content

Basic principles of modern quantum mechanics, and electromagnetic theory. Laboratory, computational and tutorial work in these areas.

Tests See the Physics 200 Notice Board.

References To be advised.

PHYS202 MECHANICS AND THERMAL PHYSICS

Prerequisites MATH102 and PHYS103 or PHYS101 and PHYS102 with credit or better and the approval of the Head of Department

Hours Up to 6 hours per week for one semester

Examination Progressive assessment during semester and one 2 hour paper at end of semester

Content

Thermal physics, advanced classical mechanics, and an introduction to relativity theory.

Tests See the Physics 200 Notice Board.

References To be advised.
**PHYSICS SUBJECT DESCRIPTIONS**

**PHYS203 SOLID STATE AND ATOMIC PHYSICS 10p**

*Prerequisite* PHYS201

*Hours* Up to 6 hours per week for one semester

*Examination* Progressive assessment during semester and one 2 hour paper at end of semester

*Content* Solid state physics and applications, atomic physics and spectroscopy, optics and laser physics.

*Texts* See the Physics 300 Notice Board.

*References* To be advised.

**PHYS204 ELECTRONICS AND INSTRUMENTATION 10p**

*Prerequisites* PHYS102 and MATH102

*Hours* Up to 6 hours per week for one semester

*Examination* Progressive assessment during semester and one 2 hour paper at end of semester

*Content* Introductory course in analog and digital electronics, microcomputer applications and signal processing principles, with emphasis on laboratory and measurement applications. This subject is recommended for students in all areas of science wishing to gain an understanding of the principles and applications of basic electronic instrumentation.

*Texts* See the Physics 300 Notice Board.

*References* To be advised.

**PHYS301 MATHEMATICAL METHODS AND QUANTUM MECHANICS 10p**

*Prerequisites* PHYS201, MATH201 and MATH203

*Hours* 2 lectures and 4 hours laboratory/tutorial per week for one semester

*Examination* Examination(s) and assessment equivalent to 3 hours examination

*Content* Mathematical methods. Quantum mechanics

*Tests and References* Refer to the Physics 300 Notice Board. Students should retain their Physics II texts.

**PHYS302 NUCLEAR PHYSICS AND ADVANCED 10p ELECTROMAGNETISM**

*Prerequisite* PHYS202

*Hours* 2 lectures and 4 hours laboratory/tutorial per week for one semester

*Examination* Examination(s) and assessment equivalent to 3 hours examination

*Content* Nuclear physics. Advanced Electromagnetism

*Tests and References* Refer to the Physics 300 Notice Board. Students should retain their Physics II texts.

**PHYS303 ATOMIC, MOLECULAR AND SOLID STATE PHYSICS 10p**

*Prerequisites* PHYS203 and PHYS301

*Hours* 2 lectures and 4 hours laboratory/tutorial per week for one semester

*Examination* Examination(s) and assessment equivalent to 3 hours examination

*Content* Atomic and molecular physics. Solid state physics

*Tests and References* Refer to the Physics 300 notice board. Students should retain their Physics II texts.

**PHYS304 STATISTICAL PHYSICS AND RELATIVITY 10p**

*Prerequisites* PHYS202 and MATH102

*Hours* 2 lectures and 4 hours laboratory/tutorial per week for one semester

*Examination* Examination(s) and assessment equivalent to 3 hours examination

*Content* Statistical physics. Relativity

*Tests and References* Refer to the Physics 300 notice board. Students should retain their Physics II texts.

**PSYC101 PSYCHOLOGY INTRODUCTION 1 10p**

*Prerequisites* PSYC102

*Hours* 5 hours per week for one semester

*Examination* One hour paper

*Content* Three written laboratory reports. Introductory Methodology and Statistics for Psychology: Biological Foundations/Perception and Learning

*Texts* General—any recent comprehensive text on General Psychology or Introduction to Psychology. The following alternatives are recommended (others may be added later).

*Addison, R.L., Atkinson, R.C., et al* 

*Introduction to Psychology* 10th edn (Harcourt Brace Jovanovich, 1990)

*For Statistics course:* 

*Howell, J.C.* 

*Fundamental Statistics for the Behavioural Sciences* 1st or 2nd edn (Duxbury, 1983 or 1989)

*References* To be advised

**PSYC102 PSYCHOLOGY INTRODUCTION 2 10p**

*Prerequisite* PSYC101

*Hours* 5 hours per week for one semester

*Examination* One 2 hour paper

*Content* Three written laboratory reports; Cognition; Social Psychology; Developmental Psychology

*Tests* General—as for PSYC101.

*For Social Psychology* 

*Cattan, V., Gallois, C. & Noller, P.* 


*References* To be advised

**PSYC201 FOUNDATIONS FOR PSYCHOLOGY 10p**

*Prerequisite* PSYC102

*Hours* 2 hours lectures per week for one semester together with laboratory work

*Examination* A 1 hour exam paper plus laboratory exercises

*Content* Three sections of topics in experimental design, parametric tests, introduction to analysis variance and related topics, and

*i) a range of topics aimed at elucidating the anatomy, physiology and biochemistry of the brain. The unit will be accompanied by

*a tutorial series in which practical experience will be given in the application of statistical methods using

*computer-assisted statistical packages and

*b) a laboratory component which will mainly deal with

*neuroanatomy.

*Texts* 

*Fergus, J.P.* 

*Interpersonal Behaviours* (Pergamon, 1985)

*References* To be advised

**PSYC202 BASIC PROCESSES 10p**

*Prerequisite* PSYC102

*Corequisite* PSYC201

*Hours* 2 hours lectures per week for one semester together with laboratory work

*Examination* A 1 hour exam paper plus laboratory exercises

*Content* This subject will examine basic processes in Psychology such as perception, cognition, and learning. Both animal and human models may be considered.

*The Cognition topic will examine two contrasting approaches to the study of human intelligence. It will do so within the historical contexts of both areas and in doing so will explore the strengths and limitations of the scientific method.*

*The Perception section will deal primarily with audition. The following topics will be covered: structure of the auditory system, subjective dimensions of sound, sound localization, elementary aspects of speech perception.*

*Tests* 

*Anastais, A.* 

*Psychological testing* 6th edn (Macmillan, 1988)

*Houl, S.J.* 


*References* To be advised

**PSYC203 DEVELOPMENTAL AND SOCIAL PROCESSES 10p**

*Prerequisite* PSYC102

*Corequisite* PSYC201

*Hours* 2 hours per week for one semester together with laboratory work

*Examination* A 1 hour exam paper plus laboratory exercises

*Content* This course will cover such topics as Social Cognition, Interpersonal Relationships and Developmental Themes.

*The Social Cognition course will continue from the study of social behaviours in PSYC102 and will examine the cognitive processes underlying these behaviours, focusing on attributions for events and our understanding of social situations, and attitudes and change and structure.*

*Text* 

*Fergus, J.P.* 

*Interpersonal Behaviours* (Pergamon, 1985)

*References* To be advised
### PSYC204 INDIVIDUAL PROCESSES 10cp

**Prerequisite** PSYC102  
**Corequisite** PSYC201  
**Hours** 2 hours per week for one semester together with laboratory work.  
**Examination** A 1 hour exam paper plus laboratory exercises.

**Content**  
This subject examines the ways in which individuals differ through a study of such topics as models of personality, patterns of abnormal behaviour, methods of assessing these differences. Abnormal Behaviour: It is intended that this topic should introduce the student to some of the main approaches to the understanding of abnormal behaviour. 

- The student should be able to demonstrate understanding of:  
  1. The historical background of mental illness  
  2. The basic diagnostic categories of psychiatric disorder  
  3. The symptoms of the major psychiatric diseases  
  4. The symptoms of neurosis (c) approaches to mental health care.  

**Personality:** The topic will examine a number of prominent approaches to personality theory, research, and assessment. Students will be expected to read assigned sections of the recommended text, and to complete simple exercises and present material in seminar sessions from time to time.  

**Text**  
Hall, C.S., & Lindsey, G. *Introduction to theories of personality* (Wiley, 1985) 

**References** To be advised.

### PSYC205 APPLIED TOPICS IN PSYCHOLOGY 1 10cp

**Prerequisite** PSYC102  
**Corequisite** PSYC201  
**Hours** 2 hours per week for one semester together with laboratory work  
**Examination** A 1 hour exam paper plus laboratory exercises.

**Content**  
This subject explains the application of Psychological theories with reference to selected areas of human concern such as human neuropsychological disturbance, and the effects of drugs on the brain. Neuropsychology: It is intended that this course should introduce the student to some of the types of human neurological disturbance and their causes. 

- Students should be able to demonstrate an understanding of:  
  1. Infantile neurological dysfunctions and their causes.  
  2. Childhood neurological dysfunctions and their causes.  
  3. Neurological dysfunctions of the elderly and their causes.  

**Behavioural Assessment:** This topic addresses issues concerned with the assessment of human behaviour. The areas to be covered will be:  

- (a) models of behaviour assessment,  
- (b) DSM-III,  
- (c) behavioural observation,  
- (d) cognitive assessment,  
- (e) psychophysiological assessment,  
- (f) structural interview and rating scales.  

**Drugs and Behaviour:** Discussion will include questions about the classification of psychoactive drugs, the principles of drug action, drug effects on psychological processes and behaviour, addiction, dependency, and addictive behaviour.

**References**  

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### PSYC301 ADVANCED FOUNDATIONS FOR PSYCHOLOGY 10cp

**Prerequisite** PSYC201, PSYC202, PSYC203  
**Hours** 4 hours per week for one semester  
**Examination** One 2(1.2) hour exam paper.

**Content**  
A selection of topics in experimental design, advanced parametric tests, introduction to analysis of covariance and factor analysis and topics in applied statistics. 

The subject will be accompanied by a tutorial series in which practical experience will be given in the application of statistical methods using computer-assisted statistical packages.

**Text**  

**References**  

### PSYC302 INDEPENDENT PROJECT 10cp

**Prerequisite** PSYC201  
**Corequisite** PSYC301  
**Hours** 2 hours per week for the full year  
**Examination** Submission of a written report containing introduction, methods, results and discussion not more than thirty pages in length due early October.

**Content**  
This project consists of an experiment or series of experiments, surveys or tests designed to explore a hypothesis. Each student will be supervised by an academic staff member of the Department of Psychology. The list of research areas will be available at the beginning of the academic year. Students are advised that this subject is a prerequisite for entry into an Honours year in Psychology.

**References**  
Students are expected to read a wide range of current literature in the area chosen for the research project.

### PSYC303 BASIC PROCESSES 1 10cp

**Prerequisite** PSYC201  
**Corequisite** PSYC301  
**Hours** 4 hours per week for one semester  
**Examination** One 2 hour exam paper and a laboratory report.

**Content**  
This subject will examine basic processes in Psychology such as perception, cognition, memory and learning and the effects of early experience. Topics not covered in this subject will be dealt with in PSYC304. Both animal and human models will be considered. The subject will be supplemented with a laboratory program which will run for 4-5 weeks.

**References**  
Frisby, J. *Seeing* (Oxford U.P., 1979)  
Sekuler, R. & Blake, R. *Perception* (Knopf, 1985)  

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### PSYC304 INDIVIDUAL PROCESSES 10cp

**Prerequisite** PSYC201  
**Corequisite** PSYC301  
**Hours** 4 hours per week for one semester  
**Examination** One 2 hour exam paper and an analytical report.

**Content**  
This subject will extend the examination of basic processes covered in PSYC303. The subject will be complemented by either a laboratory or workshop program run over about 4-5 weeks.

**References**  
A series of readings will be recommended as the course progresses.

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### PSYC305 ADVANCED SOCIAL PROCESSES 10cp

**Prerequisite** PSYC201  
**Corequisite** PSYC301  
**Hours** 4 hours per week for one semester  
**Examination** By a combination of formal examination and essay and one laboratory report.

**Content**  
This unit examines factors underlying the social development of children. Such topics as the development of interpersonal relationships, children's friendships, empathy, self concept and social cognitive processes will be covered. The unit will be accompanied by a group practicum which will highlight one aspect of the course.

**References** Readings and references will be available during the lecture series.
PSYC307 ADVANCED APPLIED TOPICS IN PSYCHOLOGY 1 10cp

Prerequisite PSYC201
Corequisite PSYC301

Hours 4 hours per week for one semester

Examination Assessment will be by a combination of formal examination and written reports from projects of the student's own design aimed to give experience in field work.

Content
This unit will examine the theory underlying psychological test construction, and will introduce a range of psychological tests through practical sessions in which training will be given in test administration and interpretation. The underlying basis of interpreting an assessment technique will also be studied and training will be given in interviewing techniques, the construction and use of interview schedules and the interpretation of interview responses. Video and tape recording will be used extensively.

Tests
Keats, J. Introduction to quantitative psychology (Wiley, 1971)

References
A variety of references will be available throughout the course.

PSYC308 ADVANCED APPLIED TOPICS IN PSYCHOLOGY 2 10cp

Prerequisite PSYC201
Corequisite PSYC301

Hours 4 hours per week for one semester

Examination Assessment will be by a combination of formal examination, essays and written reports on the practical experience.

Content
This course will examine a number of different areas in which Psychology is applied. It will examine behavioural health care with particular emphasis on community-based interventions in establishing behavioural change. In addition to topics in psychological pathology, psychotherapy and abnormal psychology will be covered. The unit will be complemented with some practical experience in applied settings.

References

Additional references will be made available throughout the course.

PSYC309 TOPICS IN NEURAL SCIENCE 10cp

Prerequisite PSYC201
Corequisite PSYC301

Hours 4 hours per week for one semester

Examination One 2 - 3 hour examination and laboratory assessment

Content
A series of topics at the cellular and molecular level will examine the structural and functional mechanisms responsible for neural processing. The course will include the development and maintenance of the nervous system, the neural basis of consciousness, awareness and pain, abnormalities in the nervous system and cognitive processing.

The course will be complemented with a choice of laboratory sessions which highlight some aspects of the course and introduce students to some techniques for studying the brain at the cellular and molecular level.

References

PSYC401 PSYCHOLOGY HONOURS 401 (SEMINARS)

Prerequisite Three complete years of a BA (Psych) or BSc (Psych) including the subjects PSYC301 and PSYC302, at least 50 credit points of Psychology at the 200 level including PSYC201, and at least 60 credit points of Psychology at the 300 level including PSYC301 and PSYC302. Candidates must have achieved at least credit levels or better in each of four 300 level subjects including PSYC301 and PSYC302.

Please Note: Students who have completed a BSc or BA will enrol into PSYC401 under conditions listed in the Postgraduate Course description in Section five.

Hours 12 hours per week for the full year

Examination To be advised

Content
PSYC401 comprises half of the final Honours in Psychology. Full-time students are expected to enrol in PSYC402 as well. Part-time students complete PSYC401 in the first year and PSYC402 in the second. PSYC401 consists of five seminar series, including one compulsory unit on theoretical issues in Psychology, a choice of two units in mathematical or psychological Psychology, and a choice of two units in applied or social Psychology. Each unit will include seminars at which attendance and participation is compulsory, and will be assessed by essay, examination, oral presentation, or a combination. The exact topics of the seminars vary from year to year depending on staff availability. One seminar may be replaced with a practical placement and associated essay. There is some overlap with PSYC403.

Tests and References To be advised

PSYC402 PSYCHOLOGY HONOURS 402 (THESIS)

Prerequisite Three complete years of a BA (Psych) or BSc (Psych) including the subjects PSYC301 and PSYC302, at least 50 credit points of Psychology at the 200 level including PSYC201, and at least 60 credit points of Psychology at the 300 level including PSYC301 and PSYC302. Candidates must have achieved at least credit levels or better in each of four 300 level subjects including PSYC301 and PSYC302.

Please Note: Students who have completed a BSc or BA will enrol in PSYC401 under conditions listed in the Postgraduate Course description in Section five.

Hours 12 hours per week for the full year

Examination To be advised

Content
PSYC402 comprises half of the final Honours in Psychology. Full-time students are expected to enrol in PSYC404 as well. Part-time students complete PSYC401 in the first year and PSYC402 in the second. PSYC402 consists of three seminar series, including one compulsory unit on theoretical issues in Psychology, and a choice of two optional units. Each unit will include seminars at which attendance and participation is compulsory, and will be assessed by essay, examination, oral presentation, or a combination. The exact topics of the seminars vary from year to year depending on staff availability. There is some overlap with PSYC401.

Tests and References To be advised

PSYC403 PSYCHOLOGY 403 30cp

Prerequisite Candidates must be enrolled for the BA (Psych) or BSc (Psych) and must have completed the equivalent of three full time years of the degree, including passes or above in the subjects PSYC201 and PSYC302, at least 50 credit points of Psychology at the 200 level including PSYC201, and at least 60 credit points of Psychology at the 300 level including PSYC301.

Hours 8 hours per week for the full year

Examination To be advised

Content
PSYC403 comprises one third of the final year of the BA (Psych) or BSc (Psych). Full-time students are expected to enrol in PSYC404 as well. Part-time students complete PSYC401 in the first year and PSYC402 in the second. PSYC403 consists of one seminar series, including one compulsory unit on theoretical issues in Psychology, and a choice of two optional units. Each unit will include seminars at which attendance and participation is compulsory, and will be assessed by essay, examination, oral presentation, or a combination. The exact topics of the seminars vary from year to year depending on staff availability. There is some overlap with PSYC401.

Tests and References To be advised

PSYC404 PSYCHOLOGY 404 50cp

Prerequisite Candidates must be enrolled for the BA (Psych) or BSc (Psych) and must have completed the equivalent of three full time years of the degree, including passes or above in the subjects PSYC101 and PSYC102, at least 50 credit points of Psychology at the 200 level including PSYC201, and at least 60 credit points of Psychology at the 300 level including PSYC301.
SECTION FIVE

COMPUTER SCIENCE SUBJECT DESCRIPTIONS

Computer Science Subject Descriptions

COMP101 COMPUTER SCIENCE 1 20cp
Prerequisite: Entry to this subject by students other than those enrolled in the BCompSc, BEng(Computer Engineering) and BInfSc degree programs is limited by quota. See the Faculty Secretary for details.
Content: Introduction to the following aspects of computer science: The design of algorithms. The theory of algorithms. How algorithms are executed as programs by a computer. The functions of system software (compilers and operating systems). Applications of computers. Social issues raised by computers. An extensive introduction to programming Pascal and a functional programming language.

COMP201 ADVANCED DATA STRUCTURES 5cp
Prerequisite: COMP101 or COMP102
Corequisite: MATH212
Content: Basic data structures are investigated. Topics covered will include a review of elementary data structures, an introduction to the concept of an abstract data type and the abstraction and implementation of data types selected from lists, stacks, queues, trees, graphs and sets.

COMP202 COMPUTER ARCHITECTURE 5cp
Prerequisite: COMP203
Content: Provides basic introduction to the logical internal structure of computers and the implementation of computer arithmetic and number handling systems.

COMP203 ASSEMBLY LANGUAGE 5cp
Prerequisite: COMP101 or COMP102
Content: The course is divided into two sections. The first section provides an introduction to computer organisation and assembly language programming. Topics covered include data representation, computer structures, registers, addressing modes, instruction sets, subroutines and the use of stacks. The second section of the course is an introduction to operating system principles. Topics covered include process management, synchronisation and resource allocation.

COMP204 PROGRAMMING LANGUAGE 5cp
Prerequisite: COMP205
Content: Examination of the major concepts which underlie modern programming languages. A variety of programming styles will be compared, including imperative, object-oriented, functional, and logic programming. Representative languages will be introduced to illustrate the concepts behind each style.

COMP205 PROGRAMMING IN C 5cp
Prerequisite: COMP101 or COMP102
Content: Introduction to the theory of computer science, covering material in the areas of formal languages, automata theory and computability.

COMP206 THEORY OF COMPUTATION 5cp
Prerequisite: MATH212
Content: An introduction to the theoretical computer science, covering material in the areas of formal languages, automata theory and computability.

COMP207 ARTIFICIAL INTELLIGENCE 10cp
Prerequisite: COMP101 or COMP102

COMP208 SOFTWARE ENGINEERING PRINCIPLES 10cp
Prerequisite: COMP201
Content: The subject comprises lectures in first semester plus a major assignment in second semester. After a brief exploration of the nature and life-cycle of large software systems, the software crisis which they have created, and the desirable properties of well-designed systems, the lectures explore the nature of stable systems in the natural world and in engineering and consider how humans think about, remember and create complex systems. This leads to the re-evaluation of the principles and techniques used in the construction of major software systems, offering new insights into the concepts of modularity and hierarchical structure.

COMP209 DATABASE DESIGN 10cp
Prerequisite: COMP201
Content: A basic introduction to database systems, with particular emphasis on relational database systems. Topics covered will include: basic concepts and terminology, types of systems (hierarchical, relational, network, inverted list), data design, relational theory, relational algebra, relational calculus, data integrity/recovery, security, concurrency, distributed systems.

COMP210 DESIGN AND ANALYSIS OF ALGORITHMS 10cp
Prerequisite: COMP206
Content: Approaches to the design of computer algorithms with several important examples. Analysis of algorithm performance, computational complexity, NP-completeness.

COMP211 COMPUTER GRAPHICS 10cp
Prerequisite: COMP201, COMP205, MATH208 and MATH216
Content: This subject will cover advanced computer graphics topics with relevant mathematical and programming techniques and an overview of graphics hardware design. Topics covered will include: hardware devices for graphics output and input; geometrical transformations; homogeneous coordinates; planar projections; clipping in 2D and 3D modelling and object hierarchy; standard graphics libraries; raster graphics; scan conversion; anti-aliasing; region filling; 3D shape representation; polygon meshes; parametric curves, Hermite, Bézier and B-splines; transforming curves and patches, hidden line removal, hidden surface removal algorithms; shading and texture mapping; diffuse and specular reflection; colour modelling; growth models; fractals and particle systems; animation techniques; advanced graphics hardware architectures; future trends in computer graphics.

COMP212 OPERATING SYSTEMS 10cp
Prerequisite: COMP201
Content: An introduction to operating system structure and design. The course begins with a review of process management and interprocess synchronisation, covered as part of the Assembly Language course. New topics covered include advanced synchronisation techniques, deadlock detection, memory management including virtual storage techniques, multiprocessing and file systems. The emphasis will be on practical operating systems, and where possible reference will be made to existing systems currently in use.
**Information Science Subject Description**

**INFO101 INTRODUCTION TO INFORMATION SYSTEMS**

*Hours*: 3 lecture hours and 2 tutorial hours

*Examination*: To be advised

**Content**

Computers have made it possible to store and retrieve massive amounts of data; the "information age" is now a reality. This course introduces the skills and concepts needed to fully exploit the power of this new tool.

After completion of the subject students will understand how and why organisations build and use information systems, and will be able to use the microcomputer as a personal support tool.

The course provides a solid grounding in computers and their use which today is important for all students, irrespective of the discipline which they are studying.

**Topics covered include:**

- The evolution of computer hardware and software.
- Systems and their characteristics, the components of an Information System (hardware, software, data and people). Examples of computer based information systems.
- Problems which can/cannot be solved using computers. Types of information systems, formal/informal, public/private. Types of problems structured/unstructured.
- The computer as a personal support tool, word-processing, spreadsheets, data base management.
- Systems Analysis, understanding and documenting information systems, structured analysis and design, data flow diagrams, data dictionaries, modularity, information hiding.
- The importance of people in the information network, the social, organisational and personal implications of computer based information systems.
- Extending the information network, the need for integration of data, Networks (LANs, WANs etc), electronic mail, electronic data interchange.
- Future trends, Decision Support, End User Computing, Expert Systems, 5GLs, alternative development methodologies.

**Texts**: To be advised

**References**

- Ingalsbe, L. *Business Applications Software for the IBM PC* (Merrill, 1988)
- Ingalsbe, L. *Business Applications Software for the IBM PC* (Merrill, 1988)
- Shore, B. *Introduction to Computer Information Systems* (HRW, 1988)
- Szymanski, R., Szymanski, D. et al. *Introduction to Computers and Information Systems* (Merrill, 1988)

**Philosophy Subject Description**

**PHIL207 SCIENTIFIC KNOWLEDGE AND SCIENTIFIC METHOD**

*Prerequisites*: For 2nd year Science students and 2nd year Arts students 40 cp. For 3rd year Arts students 30 cp in Philosophy at 200 level

*Hours*: 3 hours per week for one semester and 1 tutorial hour

*Examination*: Assessment by assignments to be submitted during semester and essay to be submitted at the end of semester

**Content**

An examination of the theory of scientific method. Topics to be covered include: the principle of empiricism, scientific induction, criticisms of inductivism, the theory-dependence of observation, the theory of method of Sir Karl Popper, the notion of falsifiability, T.S. Kuhn on paradigms, the distinction between Normal Science and Revolutionary Science. The concepts dealt with in the course will be illustrated by means of numerous examples drawn from the History of Science and recent Science.

**Texts**: To be announced.

**References**

- Feyerabend, P.K. *Problems of Empiricism I & II* Articles, to be made available.
Statistics Subject Descriptions

STAT101 INTRODUCTORY STATISTICS 10cp

Prerequisites This course does not assume knowledge of calculus or matrix algebra

Hours 3 lecture hours, 1 laboratory hour and 1 tutorial hour per week. The course is offered in Semester 1 and Semester 2

Purpose To introduce students to the principles of study design, data analysis and interpretation, the statistical computing program MINITAB will be used extensively


Text Staude, R.

Ryan, B.P., Joiner, B.L. & Ryan, T.A. MINITAB Handbook 2nd edn (Duxbury, 1985)
Miller, R.B. MINITAB Handbook for Business and Economics. (PWS-Kent, Boston, 1985)
Wonnacott, T.H. & Wonnacott, R.J.


Statistics Part of Mathematics 103

Mathematics 103 is the most advanced level 100 Mathematics subject and it has Mathematics 102 as a prerequisite. The Statistics part is one quarter of the subject Mathematics 103 and it involves 1 lecture hour per week and 1 tutorial hour per fortnight contact time.

MATH103 will be offered in Semester 2 in 1991.

As students will be more familiar with University-level mathematical subjects and computing, the course will proceed faster than STAT101. Nevertheless, several topics will not be covered in as much depth and regression, time series and chi-squared tests will not be included. The statistical computing program MINITAB will be used extensively.

STAT201 MATHEMATICAL STATISTICS 10cp

Prerequisites Either MATH103 or Introductory Statistics (STAT101) and MATH102 (or a level of mathematics equivalent to MATH102)

Hours 3 lecture hours and 1 laboratory/tutorial hour per week for one semester

Content Random variables, density and distribution functions, expectation, likelihood, point and interval estimation. Tests of significance.

Text Kalbfleisch, J.G.

Probability and Statistical Inference Volumes I and II, 2nd edn (Springer, 1985)

Reference Larsen, R.J. & Marx, M.L.


STAT202 REGRESSION ANALYSIS 10cp

Prerequisites Mathematical Statistics (STAT201) or Introductory Statistics (STAT101) and MATH102 (or equivalent)

Hours 2 lecture hours, 1 laboratory and 1 tutorial hour per week for one semester


This course covers the practical and theoretical aspects of multiple regression analysis, including the assumptions underlying normal linear models, use of matrix notation, prediction and confidence intervals, interaction terms, variable reduction methods, examination of the adequacy of models, analysis of variance and covariance and statistical computer packages.

Text Weisberg, S.

Applied Linear Regression 2nd edn (Wiley, 1985)

References Bowman, B.L., O'Connell, R.T. et al.

Linear statistical models - an applied approach (Duxbury, 1986)

Cox, D.R. & Snell, R.J.


Driper, N.K. & Smith, H.


Daniel, C. & Wood, F.S.

Fitting equations to data (Wiley, 1971)

Neter, J., Wasserman, W. & Kutner, M.H.

Applied Linear Statistical Models (Irwin, 1985)

STAT203 QUEUEs & SIMULATION 5cp

Prerequisite MATH102 or equivalent

For the BSc degree STAT204 would also have to be taken. This course covers topics specifically required for Computer Science but is also relevant for Statistics and other disciplines.

Hours 2 lecture/laboratory hours per week for one semester

Content Statistical inference is the drawing of conclusions from data and this course is concerned with the theory and practice of that. The main emphasis is on likelihood-based methods of estimation and hypothesis testing, but other topics to be covered may include: special distributions, transformed variables, some re-sampling and some computer-based techniques.

References Kalbfleisch, J.G.

Probability and Statistical Inference II 2nd edn (Springer, 1985)

Hogg, R.V. & Craig, A.T.


Silvey, S.D.

Statistical Inference (Chapman and Hall, 1978)

Cox, D.R. & Hinkley, D.V.

Theoretical Statistics (Chapman and Hall, 1974)

STAT204 NON-PARAMETRIC STATISTICS 5cp

For the BSc degree STAT203 would also have to be taken

Prerequisites Mathematical Statistics (STAT201) or Introductory Statistics (STAT101) and MATH102 (or equivalent)

Hours 2 lecture and laboratory hours per week for one semester


Test and References To be advised.

STAT205 ENGINEERING STATISTICS 5cp

Note: credit cannot be obtained for both STAT201 and STAT205

Hours 2 lecture and laboratory hours per week for one semester

Prerequisite MATH102. This subject is mainly taken by students in Mechanical or Industrial Engineering but is also available to other students


References Chatfield, C.

Statistics for Technology, 3rd edn (Chapman and Hall, 1983)

Gutman, J., Wilks, S.S., Hunter J.S.


Hogg, R.V. & Ledolter, J.

Engineering Statistics (Macmillan, 1987)

STAT301 STATISTICAL INFERENCE 10cp

Prerequisite Mathematical Statistics (STAT201), Regression Analysis (STAT202) and MATH102 (or a level of mathematics equivalent to MATH102, i.e. multivariable calculus)

Hours 3 hours per week for one semester

Content Statistical inference is the drawing of conclusions from data and this course is concerned with the theory and practice of that. The main emphasis is on likelihood-based methods of estimation and hypothesis-testing, but other topics to be covered may include: special distributions, transformed variables, some re-sampling and some computer-based techniques.

References Kalbfleisch, J.G.

Probability and Statistical Inference II 2nd edn (Springer, 1985)

Hogg, R.V. & Craig, A.T.


Silvey, S.D.

Statistical Inference (Chapman and Hall, 1978)

Cox, D.R. & Hinkley, D.V.

Theoretical Statistics (Chapman and Hall, 1974)

STAT302 STUDY DESIGN 10cp

Prerequisites Mathematical Statistics (STAT201) and Regression Analysis (STAT202).

Hours 3 hours per week for one semester

Content This course contrasts two methods for collecting and analysing data: experimental studies and non-experimental studies involving surveys. The topics included to illustrate the principles of experimental design are completely randomized designs, randomized block designs and factorial designs. For surveys the topics include: simple random sampling, stratified and cluster sampling, ratio and regression estimators. Class projects are used to illustrate practical problems and the statistical packages BMDP and SAS are used to carry out analyses.

Text Barnett, Y.

Elements of sampling theory (Hodder and Stoughton, 1986)

References Cochran, W.G.

Sampling Techniques 3rd edn (Wiley, 1977)

Kish, L.

Survey Sampling (Wiley, 1965)

Neter, J., Wasserman, W. et al.

Applied Linear Statistical Models (Irwin, 1983)

Cochran, W.G. & Cox, G.M.

Experimental Designs (Wiley, 1964)

Box, G.E.P., Hunter, W.G. et al.

Statistics for Experiments (Wiley, 1978)

STAT303 GENERALIZED LINEAR MODELS 10cp

Prerequisite Statistical Inference (STAT301)

Hours 3 hours per week for one semester

Content The course covers the theory of generalized linear models and illustrates the ways in which methods for analysing continuous, binary, and categorical data fit into this framework. Topics include the exponential family of distributions, maximum likelihood estimation, sampling distributions for goodness-of-fit statistics, linear models for continuous data (regression and analysis of
Extraneous Subjects

EDUC211 MATHEMATICS EDUCATION 211 10cp
Not offered in 1991
Prerequisite At least 60 credit points at the 100 level for the Bachelor of Mathematics degree and Mathematics Education 211
Hours 2 hours per week for one semester
Examination Progressive assessment based on performance in tutorials, preparation of case study reports and completion of self-evaluation procedures. A statement of attainment will be given to each student. The grade to be awarded is Ungraded Pass.

Content
Teaching and Learning Mathematics; Planning and Implementing Mathematics Learning Activities, Communicating Mathematical Ideas, Negotiating Mathematical Meaning, How People Learn Mathematics.

The course requires active participation by students in preparing and presenting material for group discussion and tutorials dealing with ways of teaching and learning mathematics. Each student will be expected to prepare a case study. The case study is a report of how an individual school pupil has learned school mathematics. It records pupil background, pupil learning problems, methods used to diagnose the learning problems, remedial action taken and evaluation procedures used to determine pupil success.

Reference
Polya, G.
How To Solve It 2nd edn (Princeton Univ. Press, 1973)
SOME RECOMMENDED PROGRAMS

Advisory Information Only

The choice of subjects now offered by the Faculty of Science and Mathematics has expanded more than two-fold with the advent of semesterisation. In order to provide some guidance to students, each Department has provided one or more possible degree patterns which would lead to a suitable professional qualification in their discipline. The patterns are not prescriptive, except in so far as they meet the requirements of the various degree rules. Students may vary their selection in conformity with degree rules, and prerequisite and corequisite requirements as detailed in the semester subject tables. All courses selected must aggregate to 240 credit points for a pass degree or 320 points for the four year Bachelor of Science (Psychology) degree.

All semester subjects are identified by a code which includes up to four letters representing the department offering the subject, followed by three numbers, the first of which signifies the level (100, 200, 300, 400) at which the subject is being presented. For a complete list of subject descriptions, please refer to the subject descriptions.

The following arrangements have been made to permit currently enrolled students, entering Aviation 200 Level and Aviation 300 Level, to complete their Diploma or Degree under the regulations in force when they enrolled.

AVIATION

In 1991, a new syllabus for the Diploma in Aviation Science and Bachelor of Science (Aviation) has been introduced. Details of the subjects are provided below.

The following arrangements have been made to permit currently enrolled students, entering Aviation 200 Level and Aviation 300 Level, to complete their Diploma or Degree under the regulations in force when they enrolled.

The following programs have been set out as recommendations for inclusion in the first, second and third calendar years of a pass degree. Some programs include a fourth year for the Honours Degree which is generally a postgraduate degree.

**Aviation 200 Level, 1991**
Second year students will undertake the new program. Those enrolled in a subject other than Aviation will substitute it for AVIA213 (Aircraft Structures and Materials) in Semester I and AVIA216 (Aviation Management) in Semester II. A similar arrangement will be made in 1992 for students proceeding to Year III.

**AVIATION 300 LEVEL, 1991**
Third year students will follow the existing program (as provided in 1990), based on Aviation being one of their third year subjects. Students with Commercial Pilot and Airline Transport Pilot Licences will be required to enrol in all subjects, but will be exempted from sections which they have already completed. These exemptions will be decided in consultation with the course lecturer.

**BIOLOGICAL SCIENCES**

Students wishing to study Biological Sciences are advised to develop capacities in a broad range of the basic sciences, as well as in the Biological Sciences. Additionally, students' interests can change during their University training, and it is advisable to undertake a first-year program which could lead in many directions, depending upon individual experiences and interests developed during the first year at University. Students intending to major in Biology should consider Program A. Those wishing to major in Biology and another discipline might elect to complete Programs B or C.

**Environmental Biology and Geography — Program B**

| Year 1 | BIL101, BIL102, GEOG101, GEOG102 plus 4 other semester subjects |
| Year 2 | BIL202, BIL203, BIL205, GEOG201, GEOG205, GEOG204 plus 2 other semester subjects from Biology, Chemistry, Geography, Mathematics or Geology |

**Environmental Biology and Geography — Program C**

| Year 1 | BIL101, BIL102, CHEM101, CHEM102 plus 4 other semester subjects |
| Year 2 | BIL201, BIL204, BIL205, CHEM221 plus 2 other semester subjects |
| Year 3 | BIL301, BIL305, BIL307, BIL309 plus 2 other semester subjects from Biology, Chemistry or one other discipline |

**CHEMISTRY**

Chemistry is a science concerned primarily with matter and the changes that it undergoes. The study of Chemistry is important not only in itself but also as a background to many other sciences. The study of Chemistry is open to all students who have qualified for admission into the University. However, those who have not studied sufficient sciences at school are advised to do some self-preparation before beginning Level 100 Chemistry subjects. Details on expected backgrounds and suggested remedial reading are provided under the appropriate Level 100 subject descriptions.

The Chemistry Department offers courses over the whole range of the subject. A basic chemical education is available in the traditional areas of analytical, inorganic, organic and physical chemistry together with some applied subjects. Thus students interested in Environmental Sciences will find relevant Chemistry subjects (e.g. CHEM261, CHEM314) to include in their program.

The flexible system of subjects offered by the Department allows a student to major in Chemistry on a broad level or to specialise in certain areas of the subject and to combine these with relevant subjects offered by other Departments. Thus a student interested primarily in Physical Chemistry may elect to choose Physics and Mathematics subjects as complements. Conversely, students majoring in other Departments may choose companion Chemistry subjects relevant to their interests. Thus some courses in Analytical and Inorganic Chemistry would be useful to Geology majors; Organic Chemistry subjects would be relevant for Biology majors; Physics majors would benefit from study of some courses in Physical Chemistry, etc. At Level 300 specialist topics in active research areas of Chemistry are offered to provide a modern picture of the subject.

Students intending to do a major in Chemistry would have to complete Program A which is regarded as a minimum requirement for a thorough grounding in the subject. Students wishing to devote themselves fully to Chemistry will undertake a double major as in Program B where they can complete up to two thirds of their degree program in this one discipline. Many subject combinations in between these two programs are possible. Thus for example, a student may choose six Level 300 subjects in Chemistry and two from another Department, etc.
Chemistry is a recognised profession which is served by a professional body, the Royal Australian Chemical Institute (RACI). Many employment opportunities for chemists require membership of this organisation. Graduates seeking membership must have completed at least the subjects listed in Program A.

Following either of these programs or combinations thereof may lead to postgraduate study at the Honours standard (Level 400), for which entry requirements are a credit average in at least four Level 300 semester subjects. The Department strongly recommends the Honours Degree to students both for the additional experience it provides and for its enhancement of employment opportunities and professional standing. Honours students gain most of their time to an independent research project together with some formal course work. The project is selected in an area of interest from lists provided by members of the academic staff. This degree is also the normal entry requirement to the research higher degrees (MSc and PhD) offered by the Department.

**Chemistry — Program A**

**Year 1**
CHEM101 and CHEM102; either MATH111/112 or MATH112/103; and four other subjects from Level 100.

**Year 2**
CHEM221, CHEM222, CHEM241, CHEM241, plus four other subjects from Level 200.

**Year 3**
Choose at least four equivalent full subjects from the Level 300 chemistry list and up to four other subjects from Level 300. The inclusion of at least two of CHEM311, CHEM321, CHEM331, CHEM341 is recommended.

**Year 4**
CHEM401 and CHEM402.

**Chemistry — Program B**

**Year 1**
CHEM101 and CHEM102; either MATH111/112 or MATH112/103; and four other subjects from Level 100.

**Year 2**
CHEM221, CHEM222, CHEM241, CHEM241, CHEM261 and two other subjects from Level 200.

**Year 3**
Choose eight equivalent full subjects from the Level 300 chemistry list. The inclusion of CHEM311, CHEM321, CHEM331, CHEM341 is recommended.

**Year 4**
CHEM401 and CHEM402.

**GEOGRAPHY**

Geography is the study of the Earth and its people, giving emphasis to the interactions among the physical, economic and social elements of the environment. Modern Geography can be divided into studies in Human Geography (Program A) and Physical Geography (Program B), but students may advantageously combine units from Human and Physical Geography (Program C).

Human Geography (Program A) analyses the factors and processes that govern the distribution of people and their economic and social activities. Changes in distribution patterns and activities through time require study of past processes and prediction for the future from analysis of present trends and patterns. A wide range of opportunity is available for graduates in private business and public service departments especially in areas that involve planning, social and economic analysis.

Physical Geography (Program B) analyses the factors and processes that influence the distributions of phenomena in the physical environment. Emphasis is placed on study of the processes that develop landforms and soils, on the meteorological processes that cause variations in climate, and on the factors that influence variations in vegetation communities and animal distributions.

Employment opportunities are good both in the private and public sector which is currently demanding graduates with a good understanding of environmental issues and their management.

BIOI101, BIOI102, GEOL101, GEOL102, PHYSI101 and PHYSI102 are useful complementary 100 level subjects.

**Geography** (Program C) combines units from Human Geography and Physical Geography at the 200 and 300 levels with other subjects from the Faculties of Arts, Economics, Education and Science and Mathematics. This program can be taken at Major level without selecting the Methods courses GEOG201, GEOG202, GEOG301 and GEOG302, but for Honours a Methods stream (GEOG201 plus GEOG301 or GEOG202 plus GEOG302 is necessary). Employment opportunities are good but diverse.

**Major in Human Geography — Program 1**

Choose six other subjects recommended from Level 100 to comply with Bachelor of Science degree requirements.

**Year 2**
GEOG202, GEOG205 and GEOG206
Choose five other subjects from Level 200.

**Year 3**
GEOG302, GEOG303, GEOG306, and GEOG309
Choose four other subjects from Level 300.

**Year 4**
GEOG401 and GEOG402.

**Major in Physical Geography**

**Year 1**
GEOG101 and GEOG102
Choose six other subjects from Level 100.

**Year 2**
GEOG201, GEOG203 and GEOG204
Choose five other subjects from Level 200.

**GEOLOGY**

Geology provides the ultimate understanding of our planet, its environment and its evolution. As a natural science, much of the course is outdoors on field excursions and mapping occurs in a diversity of environments. The course is presented as an integrated study of the major processes, hence field, laboratory and lecture work are intertwined.

Students are strongly advised to choose companion courses, especially if interests are in palaeontology and evolution (biological sciences), surficial processes (geography), geophysics (physics and mathematics), geochemistry, tectonics, mineralogy and petrology (chemistry).

Employment for geologists is available in the minerals, petroleum, coal, environmental and engineering industries. A Bachelor's degree (80 credit points at 300 Level in Geology) is required for membership with the professional body. Employers and the Department very strongly recommend the Honours degree (GEOG401/GEOG402) which allows professional research through some independent investigation.

**MATHEMATICS**

The Department of Mathematics offers semester subjects at all levels for the Bachelor of Mathematics degree, the Bachelor of Science degree, the Bachelor of Arts degree and the Bachelor of Engineering degree. However, students wishing to obtain professional qualifications in mathematics should enrol in the Bachelor of Mathematics degree program, where it is possible (although not compulsory) to fill completely their second and third years with mathematics.

Some Faculties use the word "major" to describe a complete strand of study which is considered to be appropriate and sufficiently educative that they may quote the name of the discipline as a component of their degree. The program suggested for the Bachelor of Science degree would fulfill the requirements for a major in mathematics.

**Bachelor of Science Degree**

**with Mathematics as a major**

This is a course of study which includes at least the following semester subjects.

**Year 1**
MATH102, MATH103 and 6 other subjects from Level 300

**Year 2**
MATH201, MATH203, MATH204, MATH206, MATH218 and one chosen from [MATH213, MATH214, MATH215] plus 5 other subjects from Level 200.

**Year 3**
Four semester subjects from Mathematics Level 300, chosen with advice from the Department, and four further subjects to meet the BSc degree requirements.

**Mathematics — Bachelor of Mathematics Degree**

The Bachelor of Mathematics degree enables a student to complete a full course in Mathematics, or to combine a Mathematics major with Computer Science, Statistics, Physics or another appropriate discipline as set out in the Rules. Note that for the Bachelor of Mathematics degree, certain specific subjects are required at the 200 level, thus provoking a base for a double major in Mathematics, or a major in Statistics, with options also for majors in Physics or Computer Science.

Subjects should be chosen according to the requirements of Schedule 4 of the Bachelor Degree Rules in this handbook. In total, at least 160 credit points must include the subjects in the following list. The remaining 80 points for the ordinary degree may include subjects offered elsewhere in the University.

The prescribed components of the degree include

**Year 1**
MATH102 and MATH103 (20 credit points)

**Year 2**
MATH201/MATH203, MATH204, MATH206, MATH218 and one of [MATH213, MATH214, MATH215] (30 credit points); and a further 30 credit points from MATH300, STAT300, COMP300 and/or PHYS300.

**Year 3**
MATH300 and/or STAT300 (40 credit points); plus a further 40 credit points from MATH300, STAT300, COMP300 and/or PHYS300.

(For the Math IHon) program consists of [MATH101] and [MATH102]

It has been found that certain combinations of subjects have been popular, and some, in the judgement of the Department, are particularly worthwhile combinations in terms of education or
In satisfying the requirements for the degree, a suitable program could be:

1. BMath with "Pure" Mathematics as the major interest

   To follow the progress of Mathematics is to be well ahead of applications, although Mathematics itself is matched by those applications. To be able to follow such progress, the student needs to have as wide an experience in Mathematics as possible, and a thorough grounding in the basic truths.

   Since the Year 3 program can accommodate no more than 8 different topics, some selection must be made. Although the program does not appear very "applied", nonetheless graduates with such backgrounds have adapted quickly to careers in industry and commerce as well as in research.

   In satisfying the requirements for the degree, a suitable program is:

   **Year 1**
   - Math102 and Math103 together with other subjects worth 60 credit points (Computer Science and/or Physics and/or Statistics and/or Philosophy are popular but the choice is wide. See No. 6 below).

   **Year 2**
   - All available Math200 level subjects (except perhaps one or two of Math213, 214, 215, 216) together with some 200 level subjects to continue a subsidiary interest from Year 1.

   **Year 3**
   - Math301, Math302, Math304, Math305, Math306, Math310, Math311, Math313 or Math314, is a "Pure Mathematics" selection of subjects - but there are variations.

   **Year 4**
   - The BMath (Honours) program consists of: Year 4 Math401 and Math402

2. BMath with Mathematical Physics as a major interest

   Nowadays a student who wishes to understand current theories of Nature, ranging from the quantum world of elementary particles to the large scale structure of the Universe itself, must be familiar with a formidable amount of mathematics. Areas of mathematics previously the preserve of the pure mathematician have found fruitful application in modern physics. Now the standard tools include functional analysis, group theory, algebra, differential geometry and topology, and the list is continually changing.

   A student wishing to study the exciting developments in modern mathematical physics needs a strong grounding in these subjects, and the ability to quickly assimilate new mathematics as required, which can only come from a firm grounding in "pure" mathematics.

   In satisfying the requirements for the degree, a suitable program could be:

   **Year 1**
   - Math102 and Math103 together with other subjects (Physics and Computer Science should be included)

   **Year 2**
   - Math201, Math202, Math203, Math204, Math205, Math206, Math207, Math210, Math211, Math214 together with other Math200 subjects, and/or other subjects to continue an interest from Year 1.

   **Year 3**

   **Year 4**
   - The BMath (Honours) program consists of: Year 4 Math401 and Math402

3. BMath with "Applied" Mathematics as a major interest

   "Applied" Mathematics uses mathematics as a tool for investigating problems which come from other disciplines. This interdisciplinary approach to problem-solving has been remarkably successful, but practitioners need both strong grounding in the technical aspects of Mathematics as well as knowledge of subjects which concentrate on Applied Mathematics.

   It also includes subjects from the Departments of Statistics and Computer Science which provide additional skills for the professional Applied Mathematician.

   It is recommended that a student include at least a first year second year combination from another discipline. This provides a further opportunity to see how mathematics can be applied.

   In satisfying the requirements for the degree, a suitable program is:

   **Year 1**
   - Math102 and Math103 and/or other subjects worth 40 credit points.

   **Year 2**

   **Year 3**
   - STa203, PH112, 242 (that is a desirable program, but it may modify it).

   **Year 4**
   - Four Math300 subjects and four Comp300 subjects. (There is wide choice for specialisation).

   **Year 4**
   - The BMath (Honours) program consists of: Year 4 Math401 and Math402, or the Rules for BCompSci(Hons) Faculty of Engineering

4. BMath with Statistics as a major interest

   (Although Stat101 is shown as desirable, it is not a prerequisite for Stat201 for students in BMath).

   In satisfying the requirements for the degree, a suitable program is:

   **Year 1**
   - Math201, Math202, Math203, Math204, Math205, Math206, Math207, Math210, Math211, Math214 together with other Math200 subjects, and/or other subjects to continue an interest from Year 1.

   **Year 3**

   **Year 4**
   - The BMath (Honours) program consists of: Year 4 Math401 and Math402

5. BMath with Computer Science as a major interest

   In satisfying the requirements for the degree, a suitable program could be:

   **Year 1**
   - Math102 and Math103, Comp101, and other subjects worth 40 credit points.

   **Year 2**

   **Year 4**
   - The BMath (Honours) program consists of: Year 4 Stat400 Subjects

6. First year subjects in the BMath Degree

   The rules demand Math102 and Math103 (giving 20 credit points out of 80) but the remaining 60 credit points can be taken in almost any other discipline. Popular choices include Computer Science (Comp101), Physics (Phys101/02 or 102/103), Information Science and Statistics (Inf101/01/04/101). However, BMath students choose widely, and the following areas have been approved for them in the past:

   - Accounting, Biology, Chemistry, Classical Civilisation, Drama, Engineering, Economics, English, French, Geography, Geology, German, Greek, History, Japanese, Latin, Legal Studies, Linguistics, Philosophy, Psychology, Sanskrit, Sociology.

   There is room in the BMath course to include Level 200 subjects to continue with one of the choices made during the first year course.

SECTION SIX

RECOMMENDED PROGRAMS

PHYSICS

For employment as a physicist, students must have a minimum of an ordinary Bachelor of Science degree with a major in Physics. An Honours degree in Physics or a combination of Physics/Mathematics would be preferred.

Physics as a profession is represented by the Australian Institute of Physics. Membership is limited to graduates with a minimum of a major in Physics. The Australian Institute of Physics has a number of grades of membership which are related to experience as a physicist. There is a grade of membership for students currently working towards a degree. The Institute monitors courses in Physics at tertiary institutions and judges them in terms of suitability for admission to membership of the Australian Institute of Physics. The Institute also responds on behalf of physicists to matters relating to physicists and their role. There are no formal conditions for registration as a physicist, but a degree is usually necessary for government and industry recognition and status as a professional physicist.

It is advisable for intending physicists to include some applied mathematics in their course and pursue a related science such as Chemistry or Geology to Level 200 subjects if at all possible.

For a Physics major in the Bachelor of Science degree at least the following semester subject structure is necessary:

- Year 1: Phys102, Phys103, Math102 and Math103.
- Choose four other subjects from Level 100, preferably leading to Level 200 in at least one other science discipline.

- Year 2: Phys201 and at least two subjects chosen from Phys202*, Phys301 or Phys302; and Math201 (advisory).

("Students achieving a credit level or better in Phys101 and Phys102 may be admitted to Level 200 in Physics with the approval of the Head of Department)."

- Year 3: Phys201, Phys202 and two subjects chosen from Phys303, Phys304 or Phys305. Note that the Level 300 subjects should be passed with a credit or better for admission to the Bachelor of Science (Honours) degree (in Year 4).

PSYCHOLOGY

As a discipline, Psychology is open to all students who gain admission to the University. Psychology is a broad discipline and it is difficult to state preparatory subjects that should be studied together with Psychology. Recently legislation was passed through the State Parliament which will require anyone wishing to practice as a Psychologist to have a minimum of four years training. In the Science and Mathematics Faculty, Psychology can be taken either as a BSc or a BSc (Psychology) degree. The BSc degree is a three year course which can be followed by a fourth or Honours year. The BSc (Psychology) degree is a four year degree. The programs within these two degrees are set out below.

The Department's aim is to produce "psychologists who should by virtue of their training be able to play a unique role such as critically examining research and scholarly literature in the field of psychology, contributing to empirical research in psychology, administering and interpreting psychological tests and measurement procedures and prescribing, implementing and evaluating forms of psychological intervention and remediation".
Entry to Psychology 401 and 402 requires Credit Grades in each of four 300 level Psychology subjects including PSYC301 and PSYC302.

Entry to PSYC403 and PSYC404 requires Pass grades in at least six 300 level subjects.

The Department currently offers two Applied Masters Degrees. The Master of Psychology (Clinical) degree has an Honours entry requirement while the Master of Psychology (Educational) has an undergraduate degree with a major in Psychology as an entry requirement, a teaching qualification and in addition, two years teaching (or other relevant) experience. The Honours degree is the normal entry into the research degrees of Master of Science and Doctor of Philosophy.

BSc with a Psychology Major

Year 1
PSYC101, PSYC102 plus 6 other semester subjects at level 100

Year 2
PSYC201, PSYC202, PSYC203 plus other subjects at the 200 level, some of which may also be taken in Psychology

Year 3
PSYC301, PSYC303, PSYC304 plus at least one other chosen from PSYC302, PSYC305, PSYC306, PSYC307 or PSYC308, and four other subjects chosen at the 300 level

BSc Honours Degree in Psychology

Year 1
PSYC101, PSYC102, plus 6 other subjects from level 100

Year 2
Eight 200 level subjects including PSYC201, PSYC202, PSYC203 and at least two other Psychology subjects at the 200 level, plus other 200 level subjects chosen from the scheduled list.

Year 3
PSYC301, PSYC302 and at least two other Psychology subjects at the 300 level, plus other 300 level subjects chosen from the scheduled list including those offered by the Psychology Department.

Year 4
PSYC401 and PSYC402. Entry to the Honours degree requires passes in five Psychology subjects at the 200 level including PSYC201, as well as credits in each of at least 4 of the 6 Psychology subjects at the 300 level including PSYC301 and PSYC302, and at least passes in the remaining two 300 level Psychology subjects.

BSc (Psychology) — Degree

Years 1 and 2
As for Psychology Honours above

Year 3
PSYC301, and at least five other Psychology subjects at the 300 level, plus other 300 level subjects chosen from the scheduled list including those offered by the Psychology Department.

Year 4
PSYC403 and PSYC404

STATISTICS

Statistics has been described as the science of turning data into information. This involves collecting, presenting and analysing data, interpreting the results and using them to draw conclusions or make decisions. The principles of Statistics are based on ideas from the philosophy of science and mathematics and, more recently, from developments in computing. Computers play an essential role in Statistics for data management and analysis. Statistics is a practical subject. It involves designing experimental plans and sampling procedures, calculating how many subjects or objects should be studied and determining how the measurements should be made in order to obtain data which is reliable, accurate and relevant. Methods of statistical analysis, based on mathematics including probability theory, are used to decide what conclusions can validly be drawn from the data.

The Statistics Department offers subjects from the 100 level through to the Honours level. Research degrees may be pursued in the area of Statistics.

For a major in Statistics a student should take the following subjects:

Year 1
STAT101 and MATH102 or MATH102 and MATH103. Choose other subjects worth 60 credit points from Level 100

Year 2
STAT201, STAT202, STAT203, STAT204 and MATH201. Choose other subjects worth 45 credit points from Level 200

Year 3
STAT 301, STAT 302, STAT 303, STAT 304. Choose other subjects worth 40 credit points from Level 300

Year 4
80 credit points selected from STAT401 to STAT411

POSTGRADUATE DEGREE RULES

Rules Relating to the Honours Degree of Bachelor of Science

1. General
These Rules prescribe the requirements for the Honours degree of Bachelor of Science of the University of Newcastle and are made in accordance with the powers vested in the Council under By-Law 5.2.1.

2. Definitions
In these Rules, unless the context or subject matter otherwise indicates or requires:
“course” means the total requirements prescribed from time to time to qualify a candidate for the degree;
“Dean” means the Dean of the Faculty;
“the degree” means the degree of Bachelor of Science (Honours);
“Department” means the Department or Departments offering particular subjects and includes any other body so doing;
“Faculty” means the Faculty of Science and Mathematics;
“Faculty Board” means the Faculty Board of the Faculty;
“Honours Subject” means a 40 point 400 level subject.

3. Admission to Candidature
In order to be admitted to candidacy for the degree an applicant shall:
(a) have completed the requirements for admission to the Ordinary degree of Bachelor of Science of the University of Newcastle or to any other degree approved by the Faculty Board, or have already been admitted to that degree;
(b) have completed any additional work prescribed by the Head of the Department offering the honours subjects; and
(c) have obtained approval to enrol given by the Dean on the recommendation of the Head of the Department offering the honours subject.

4. Qualification for Admission to the Degree
(1) To qualify for admission to the degree a candidate shall, in one year of full-time study or two years of part-time study, complete two honours subjects for a total credit point score of 80 points.

(2) Students undertaking study in one discipline shall enrol in and pass two honours subjects offered by the one Department, to be chosen from:
   - Biology 401 and 402
   - Chemistry 401 and 402
   - Geography 401 and 402
   - Geology 401 and 402
   - Physics 401 and 402
   - Psychology 401 and 402

(3) Students undertaking study in a combined Honours degree shall enrol in one honours subject from each of two Departments, in one of the following combinations:
   - Biology 401 and Mathematics 401
   - Geology 401 and Mathematics 401
   - Mathematics 401 and Physics 401
   - Mathematics 401 and Psychology 401

The Head of each Department shall prescribe the contents of these honours subjects which may contain coursework, projects or a thesis or any 400 level subject offered by that Department.

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SECTION SIX

RECOMMENDED PROGRAMS

YEAR 84

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5. Subject
(1) To complete an honours subject a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or other work as the Department shall require.
(2) To pass an honours subject a candidate shall complete it and pass such examinations as the Faculty Board shall require.

6. Withdrawal
(1) A candidate may withdraw from an honours subject only by informing the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.
(2) A candidate who withdraws from an honours subject after 31 August shall be deemed to have failed in the subject save that, after consulting with the Head of Department, the Dean may grant permission (or withdrawal without penalty.

7. Classes of Honours
There shall be three classes of Honours: Class I, Class II and Class III. Class II shall have two divisions, namely Division 1 and Division 2.

8. Relaxing Provision
In order to provide for exceptional circumstances arising in a particular case the Senate on the recommendation of the Faculty Board may relax any provision of these Rules.

LIST OF APPROVED SUBJECTS REFERRED TO IN THE HONOURS DEGREE OF BACHELOR OF SCIENCE
Entry to an Honours degree requires a Credit or better average in appropriate 300 level subjects.

<table>
<thead>
<tr>
<th>Number</th>
<th>Subject</th>
<th>Credit Points</th>
<th>When</th>
<th>Prerequisites/Corequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL401</td>
<td>Biology Honours 401</td>
<td>40</td>
<td>F</td>
<td>Consult Department</td>
</tr>
<tr>
<td>BIOL402</td>
<td>Biology Honours 402</td>
<td>40</td>
<td>F</td>
<td>BIOL401</td>
</tr>
<tr>
<td>CHEM401</td>
<td>Chemistry Honours 401</td>
<td>40</td>
<td>F</td>
<td>40cp Level 300 at Credit Grade</td>
</tr>
<tr>
<td>CHEM402</td>
<td>Chemistry Honours 402</td>
<td>40</td>
<td>F</td>
<td>CHEM401</td>
</tr>
<tr>
<td>GEOG401</td>
<td>Geography Honours 401</td>
<td>40</td>
<td>F</td>
<td>GEOG401 &amp; 102 and either (GEOG201 &amp; 301) or (GEOG202 &amp; 302)</td>
</tr>
<tr>
<td>GEOG402</td>
<td>Geography Honours 402</td>
<td>40</td>
<td>F</td>
<td>GEOG401</td>
</tr>
<tr>
<td>GEBOL401</td>
<td>Geology Honours 401</td>
<td>40</td>
<td>F</td>
<td>40cp Level 300 at Credit Grade</td>
</tr>
<tr>
<td>GEOG401</td>
<td>Geography Honours 401</td>
<td>40</td>
<td>F</td>
<td>GEOG401</td>
</tr>
<tr>
<td>PHYS401</td>
<td>Physics Honours 401</td>
<td>40</td>
<td>F</td>
<td>Any 4 PHYS300 (Credit Average)</td>
</tr>
<tr>
<td>PHYS402</td>
<td>Physics Honours 402</td>
<td>40</td>
<td>F</td>
<td>PHYS401</td>
</tr>
<tr>
<td>PSYC401</td>
<td>Psychology Honours 401</td>
<td>40</td>
<td>F</td>
<td>Five PSYC 200 subjects &amp; credit grades in each of four PSYC 300 subjects including PSYC 301 &amp; PSYC302</td>
</tr>
<tr>
<td>PSYC402</td>
<td>Psychology Honours 402</td>
<td>40</td>
<td>F</td>
<td>PSYC401</td>
</tr>
</tbody>
</table>

F=Full Year, S1=Semester 1, S2=Semester 2
SECTION SEVEN

Rules Governing the Honours Degree of Bachelor of Mathematics

1. These rules prescribe the requirements for the Honours degree of Bachelor of Mathematics of the University of Newcastle and are made in accordance with the powers vested in the Council under By-Law 5.2.1.

2. Definitions

In these Rules, unless the context or subject matter otherwise indicates or requires:

"course" means the program of studies prescribed from time to time to qualify a candidate for the degree;

"Dean" means the Dean of the Faculty;

"department" means the Faculty of Science and Mathematics;

"Faculty" means the Faculty Board of the Faculty;

"Faculty Board" means the Faculty Board of the Faculty;

"Honours" means the degree of Bachelor of Mathematics (Honours);

"Honours subject" means a 400 level subject.

3. Admission to Candidature

In order to be admitted to candidature for the degree, an applicant shall

(a) have completed the requirements for admission to the Ordinary degree of Bachelor of Mathematics of the University of Newcastle or any other degree approved by the Faculty Board, or have already been admitted to that degree;

(b) have satisfactorily completed any additional work prescribed by the Head of the Department offering the honours subject; and

(c) have obtained approval to enrol given by the Dean on the recommendation of the Head of the Department offering the honours subject.

4. Qualification for Admission to the Degree

(1) To qualify for admission to the degree a candidate shall, in one year of full-time study or two years of part-time study, complete Honours subjects for a total credit point score of 80.

(2) Students undertaking study in Mathematics shall enrol in Mathematics 401 and 402. Students undertaking study in Statistics shall enrol in 80 credit points, to be chosen, with the approval of the Head of Department, from STAT401, STAT402, STAT403, STAT404, STAT405, STAT406, STAT408, STAT409, STAT410 and STAT411 or other relevant subjects.

(3) Students undertaking study in a combined honours degree shall enrol in one honours subject from each of two Departments, in one of the following combinations:

<table>
<thead>
<tr>
<th>Economics 401 and Mathematics 401</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology 401 and Mathematics 401</td>
</tr>
<tr>
<td>Mathematics 401 and Physics 401</td>
</tr>
<tr>
<td>Mathematics 401 and Psychology 401</td>
</tr>
</tbody>
</table>

The Head of each Department shall prescribe the content of these honours subjects which may contain coursework, projects or a thesis from any 400 level subject offered by that Department.

5. Subject

(1) To complete an honours subject a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or other work as the Department shall require.

(2) To pass an honours subject a candidate shall complete it and pass such examinations as the Faculty Board shall require.

6. Withdrawal

(1) A candidate may withdraw from an honours subject only by informing the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.

(2) A candidate who withdraws from an honours subject after the 31 August shall be deemed to have failed the subject save that, after consulting with the Head of the Department, the Dean may grant permission for withdrawal without penalty.

7. Classes of Honours

There shall be three classes of Honours: Class I, Class II and Class III. Class II shall have two divisions, namely Division 1 and Division 2.

8. Relaxing Provision

In order to provide for exceptional circumstances arising in a particular case the Senate on the recommendation of the Faculty Board may relax any provision of these Rules.
Rules Relating to the Diploma in Coal Geology  

(Not available in 1991)  

1. These Rules prescribe the requirements for the Diploma in Coal Geology of the University of Newcastle and are made in accordance with the powers vested in the Council under By-law 5.2.1.  

2. In these Rules, unless the context or subject matter otherwise indicates or requires:  

"Department" means the Department of Geology;  
"Diploma" means the Diploma in Coal Geology;  
"Faculty Board" means the Faculty Board of the Faculty of Science and Mathematics;  
"Head of Department" means the Head of the Department;  
"Leader" means the Dean of the Faculty of Science and Mathematics;  
"Member" means the Faculty Board of the Faculty of Science and Mathematics;  
"Secretary" means the Secretary to the University;  
"Student" means the Diploma in Mathematical Studies;  
"Subject" means the Faculty Board of the Faculty of Science and Mathematics;  
"University" means the University of Newcastle;  
"Work" means the Diploma in Mathematical Studies.  

3. An applicant for admission shall:  

(a) have satisfied the requirements for admission to a degree of the University of Newcastle or a degree, approved for this purpose by the Faculty Board, of any other tertiary institution, provided that the course completed for that degree by the applicant included a major sequence in Geology; or  
(b) have other qualifications and professional experience deemed appropriate by the Faculty Board on the recommendation of the Head of the Department.  

4. Admission to candidature shall require the approval of the Faculty Board on the recommendation of the Head of the Department. Such approval shall be subject to such conditions as the Faculty Board may determine on the recommendation of the Head of the Department.  

5. (1) To qualify for the Diploma a candidate shall enrol and shall complete to the satisfaction of the Faculty Board a program consisting of  

(a) lectures, tutorials and practical work as determined by the Faculty Board on the recommendation of the Head of the Department; and  
(b) two reports, each embodying the result of a project, at least one of which shall be field-oriented.  

(2) Except with the permission of the Faculty Board given on the recommendation of the Head of the Department, the program shall be completed in not less than two years of part-time enrolment.  

6. A candidate may withdraw from the course only by notifying the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.  

7. In cases where a candidate's performance in the program has reached a level determined by the Faculty Board the Diploma may be awarded with merit.  

8. In order to provide for exceptional circumstances arising in particular cases, the Senate, on the recommendation of the Faculty Board, may relax any of the provisions of these Rules.  

Rules Governing the Diploma in Mathematical Studies  

1. These Rules prescribe the Requirements for the Diploma in Mathematical Studies of the University of Newcastle and are made in accordance with the powers vested in the Council under By-law 5.2.1.  

2. (1) In these Rules unless the context or subject matter otherwise indicates or requires:  

"Dean" means the Dean of the Faculty of Science and Mathematics;  
"Diploma" means the Diploma in Mathematical Studies;  
"Faculty Board" means the Faculty Board of the Faculty of Science and Mathematics;  
"Subject" means any part of a candidate's program of studies for which a result may be recorded.  

(2) For the purposes of these Rules, the unit value of a subject shall be determined by the Dean.  

3. The Diploma shall be awarded in two grades, Diploma in Mathematical Studies with Merit or Diploma in Mathematical Studies.  

4. An applicant for admission to candidature for the Diploma shall:  

(a) have satisfied all the Requirements for admission to a degree of the University of Newcastle, or to a degree of any other tertiary institution approved for this purpose by the Faculty Board; or  
(b) in exceptional circumstances have other qualifications approved for this purpose by the Faculty Board.  

5. The Faculty Board will appoint an advisor for each candidate.  

6. (1) To qualify for the award of the Diploma a candidate shall, in not less than two years of part-time or one year of full-time study, pass a program of study approved by the Dean, comprising subjects from levels above 100 to a total of no less than 80 credit points.  

(2) The program shall consist of subjects offered by the Department of Mathematics, and the Department of Statistics, or other subjects with considerable mathematical content offered by other Departments of the University. The Dean shall determine the suitability of such subjects, on the advice of the Head of Department of Mathematics, and, if not otherwise determined, shall allot a credit-point rating for the purpose of this Diploma.  

(3) No more than twenty credit points from level 200 subjects may be counted towards the Diploma.  

(4) On the advice of the Dean, the Faculty Board may approve the inclusion of a Project as part of the program and such a project shall contribute no less than six, but no more than twelve credit points towards the Diploma.  

7. A candidate may be granted standing by the Faculty Board for work completed in this University or in another tertiary institution approved for this purpose by the Faculty Board. Such standing shall not be given for work on the basis of which a degree or diploma has already been conferred or awarded or approved for.  

Requirements for the Diploma in Psychology  

General  

1. There shall be a Diploma in Psychology.  

2. In these Requirements, unless the context or subject matter otherwise indicates or requires:  

"Faculty Board" means the Faculty Board of the Faculty of Science and Mathematics;  
"Board of Studies" means the Board of Studies in Psychology; and  
"Dean" means the Dean of the Faculty of Science and Mathematics.  

3. A candidate for the Diploma shall register in one of the following specialisations:  

(a) Clinical Psychology; or  
(b) Educational Psychology.  

4. The Diploma shall be awarded in one grade only.  

5. A candidate may withdraw from the course only by informing the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.  

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

Clinical Specialisation  

7. An applicant for registration as a candidate for the Diploma in the Clinical Specialisation shall:  

(a) have satisfied all the requirements for admission to a Bachelor's degree with honours in Psychology in the University of Newcastle or to such a degree in another university approved for this purpose by the Faculty Board; and  
(b) be selected for admission to the course by the Board of Studies which shall, in making this determination, take account of the applicant's academic qualifications, experience, and the report of an interview which shall be conducted by a selection committee which the Board shall appoint.  

8. (a) Notwithstanding the provisions of subsection (1) of Section 7, the Faculty Board, on the recommendation of the Board of Studies, may permit to register as a provisional candidate a person who has satisfied all the requirements for admission to a degree in the University of Newcastle or another university approved for this purpose by the Faculty Board, provided that the course completed for that degree by the applicant included a major study in Psychology.  

(b) A candidate permitted to register provisionally under the provisions of subsection (1) of this Section shall complete such work as is such examinations at Bachelor's degree honours level as may be prescribed by the Faculty Board before his registration may be confirmed by the Faculty Board.
Section Six

Rules Governing the Diploma in Science

1. These Rules prescribe the requirements for the Diploma in Science of the University of Newcastle and are made in accordance with the powers vested in the Council under By-law 5.2.1.

2. In these Rules, unless the context or subject matter otherwise indicates or requires:
   “Department” means the Department offering the subject in which a person is enrolled or is proposing to enrol;
   “Diploma” means the Diploma in Science;
   “Faculty Board” means the Faculty Board of the Faculty of Science and Mathematics;
   “Subject” means a 40 point 400 level subject offered in the course leading to the Honours degree of Bachelor of Science.

3. (1) An applicant for admission to candidature for the diploma shall have satisfied all the requirements for admission to a degree of the University of Newcastle, or to a degree, approved for this purpose by the Faculty Board, of any other tertiary institution.

4. (2) An applicant shall have met such requirements for entry to a subject as may be prescribed from time to time by the Head of the Department and approved by the Faculty Board or have achieved at another tertiary institution a standard of performance deemed by the Head of the Department to be equivalent.

5. To qualify for the Diploma, a candidate shall enrol and shall complete two subjects to the satisfaction of the Faculty Board.

6. (1) A candidate may withdraw from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty.

7. (1) If the Faculty Board is of the opinion that the candidate is not making satisfactory progress towards the degree then it may terminate the candidature or place such conditions on its continuation as it deems fit.

8. For the purpose of assessing a candidate’s progress, the Faculty Board may request a candidate to submit a report or reports on their progress.

9. A candidate shall complete all requirements for admission to the degree of Bachelor of Science within seven days from the date of receipt of the notification.

Section Seven

Rules Governing Masters Degrees

Part I — General

1. (1) These rules prescribe the conditions and requirements relating to the degrees of Master of Architecture, Master of Arts, Master of Commerce, Master of Computer Science, Master of Computing, Master of Education, Master of Educational Studies, Master of Engineering, Master of Environmental Engineering, Master of Environmental Studies, Master of Law, Master of Letters, Master of Mathematics, Master of Philosophy (Clinical), Master of Philosophy (Educational), Master of Science, Master of Medical Science, Master of Medical Statistics, Master of Scientific Studies, Master of Special Education and Master of Surveying.

2. In these Rules and the Schedules thereto, unless the context or subject matter otherwise indicates or requires:
   “Faculty Board” means the Faculty Board of the Faculty responsible for the course in which a person is enrolled or is proposing to enrol;
   “Program” means the program of research and study prescribed in the Schedule;
   “Schedule” means the Schedule of these Rules pertaining to the course in which a person is enrolled or is proposing to enrol;

3. These Rules shall apply to degrees conferred honoris causa.

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

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

6. (1) A candidate may withdraw from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty.

7. (1) If the Faculty Board is of the opinion that the candidate is not making satisfactory progress towards the degree then it may terminate the candidature or place such conditions on its continuation as it deems fit.

8. (2) For the purpose of assessing a candidate’s progress, the Faculty Board may request a candidate to submit a report or reports on their progress.

9. A candidate against whom a decision of the Faculty Board has been made under Rule 8(1) of these Rules may request the Faculty Board cause the case to be reviewed.

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

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

Masters Degree Rules

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

Part III — Provisions Relating to Theses

12. (1) The subject of a thesis shall be approved by the Faculty Board on the recommendation of the Head of the Department in which the candidate is carrying out the research for the thesis.
   (2) The thesis shall not contain as its main content any work or material which has previously been submitted by the candidate for a degree in any tertiary institution unless the Faculty Board otherwise permits.
   (3) The candidate shall give to the Secretary of the University three months' written notice of the date the candidate expects to submit a thesis and such notice shall be accompanied by any prescribed fee.*

14.(1) The candidate shall comply with the following provisions concerning the presentation of a thesis:
   (a) the thesis shall contain an abstract of approximately 200 words describing its content;
   (b) the thesis shall be typed and bound in a manner prescribed by the University;
   (c) three copies of the thesis shall be submitted together with:
      (i) a certificate signed by the candidate that the main content of the thesis has not been submitted by the candidate for a degree in any other tertiary institution; and
      (ii) a certificate signed by the supervisor indicating whether the candidate has completed the program and whether the thesis is of sufficient academic merit to warrant examination; and

   (2) The Faculty Board shall determine the course of action to be taken should the certificate of the supervisor indicate that in the opinion of the supervisor the thesis is not of sufficient academic merit to warrant examination.

* at present there is no fee payable

SECTION SEVEN

Masters Degree Rules

15. The University shall be entitled to retain the submitted copies of the thesis, accompanying documents and published work. The University shall be free to allow the thesis to be consulted or borrowed and, subject to the provisions of the Copyright Act, 1960(COin), may issue it in whole or in any part in photoprint or microfilm or other copying medium.

16.(1) For each candidate two examiners, at least one of whom shall be an external examiner (being a person who is not a member of the staff of the University) shall be appointed either by the Faculty Board or otherwise as prescribed in the Schedule.
   (2) If the examiners' reports are such that the Faculty Board is unable to make any decision pursuant to Rule 11 of these Rules, a third examiner shall be appointed either by the Faculty Board or otherwise as prescribed in the Schedule.

SCHEDULE 8 — MASTER OF MATHEMATICS

1. The Faculty of Science and Mathematics shall be responsible for the course leading to the degree of Master of Mathematics.

2. To be eligible for admission to candidature an applicant shall:
   (a) have satisfied all the requirements for admission to a degree of Bachelor of the University of Newcastle with honours in the area of study in which the applicant proposes to carry out research or to an Honours degree, approved for this purpose by the Faculty Board, of another University; or
   (b) have satisfied all the requirements for admission to a degree of Bachelor of the University of Newcastle or to a degree, approved for this purpose by the Faculty Board, of another tertiary Institution and have completed such work and set for such examinations as the Faculty Board may have determined and have achieved a standard at least equivalent to that required for admission to a degree of Bachelor with second class honours in an appropriate subject; or
   (c) in exceptional cases produce evidence of possessing such academic or professional qualifications as may be approved by the Faculty Board.

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

4. The program shall be completed in not less than two years except that, in the case of a candidate who has completed the requirements for a degree of Bachelor with Honours or for a qualification deemed by the Faculty Board to be equivalent or who has had previous research experience, the Faculty Board may reduce this period by up to one year.

5. A part-time candidate shall, except with the permission of the Faculty Board, which shall be given only in special circumstances:
   (a) conduct the major proportion of the research or design work in the University; and
   (b) take part in research seminars within the Department in which the the program is being carried out.

SCHEDULE 9 — MASTER OF PSYCHOLOGY

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

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

2. On the recommendation of the Head of the Department of Psychology, the Board may appoint a course controller who shall recommend to the Faculty Board the nature and extent of the programs to be prescribed and shall be responsible for the collation of all written work submitted by candidates in pursuing these programs.

3. To be eligible for admission to candidature an applicant shall:
   (a) have satisfied all the requirements for admission to a degree of Bachelor with Honours in Psychology of the University of Newcastle or to an Honours degree, approved for this purpose by the Faculty Board, of another University or
   (b) on the recommendation of the Board, have satisfied all the requirements for admission to a degree of the University of Newcastle or to a degree, approved for this purpose by the Faculty Board, of another University, provided that the course completed for that degree by the applicant included a major sequence in Psychology.

4.(1) The Board shall consider each application for admission to candidature and shall make a decision thereon.
   (2) Before approving an application to candidature under Section 3(0) of this schedule the Board may require an applicant to complete such work and pass such examinations at honours level as may be prescribed by the Board.

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

6. In considering an application, the Board shall take account of the applicant's academic qualifications and experience, the report of an interview with the applicant and any other selection procedures applied to the applicant as determined by the Board. The interview and selection procedures shall be conducted by a Selection Committee approved by the Board.

5.(1) To qualify for admission to the degree the candidate shall:
   (a) attend such lectures, seminars and tutorials and complete to the satisfaction of the Faculty Board such written work and practical work and examinations as may be prescribed by the Board; and
   (b) submit a thesis embodying the results of an empirical investigation.

6. To be eligible for admission to candidature an applicant shall:
   (a) have satisfied all the requirements for admission to a degree of Bachelor of the University of Newcastle or to a degree, approved for this purpose by the Faculty Board, of another University and have satisfactorily completed four hundred level Psychology subjects; or
   (b) have satisfactorily completed four hundred level Psychology subjects or a standard in Psychology deemed by the Board to be equivalent; and
   (c) have at least two years teaching or other relevant practical experience approved by the Board.

4.(1) The Board shall consider each application for admission to candidature and shall make a decision thereon.
   (2) Before an application for admission to candidature is approved, the Board shall be satisfied that adequate supervision and facilities are available.

3. In considering an application, the Board shall take account of the applicant's academic qualifications and experience, and also the report of an interview with the applicant and any other selection procedures applied to the applicant as determined by the Board, which shall be conducted by a Selection Committee approved by the Board.
5.(1) To qualify for admission to the degree the candidate shall:
(a) attend such lectures, seminars and tutorials, and complete to the satisfaction of the Board such written and practical work and examinations as may be prescribed by the Board; and
(b) submit a thesis embodying the results of an empirical investigation.

(2) The program shall be completed in not less than two years and, except with the permission of the Faculty Board given on the recommendation of the Board, not more than six years.

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

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

7. Before a decision is made under Rule 11 of these Rules the Board shall consider:
(a) the examiners’ reports on the thesis; and
(b) a report of the internal examiner made in consultation with the course controller on the candidate’s performance in the work prescribed under section 5(1) of this Schedule; and shall submit these to the Faculty Board together with its recommendation. The Faculty Board shall make its decision in the light of these reports and on the recommendation of the Board.

SCHEDULE 11 — MASTER OF SCIENCE
1. A candidate for the degree of Master of Science may be enrolled in either the Faculty of Engineering or the Faculty of Science and Mathematics. The Faculty in which the candidate is enrolled shall be responsible for the program.

2.(1) To be eligible for admission to candidature in the Faculty of Science and Mathematics an applicant shall:
(a) have satisfied the requirements for admission to a degree with Honours in the University of Newcastle or other university approved for this purpose by the Faculty Board in the area in which the applicant proposes to carry out research; or
(b) have satisfied the requirements for admission to a degree in the University of Newcastle or other university approved for this purpose by the Faculty Board and have completed the satisfactory of the Faculty Board such work and examinations as determined by the Faculty Board; or
(c) in exceptional cases produce evidence of possessing such other qualifications as may be approved by the Faculty Board; and

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

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

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

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

SCHEDULE 13 — MASTER OF SCIENTIFIC STUDIES
1. The Faculty of Science and Mathematics shall be responsible for the course leading to the degree of Master of Scientific Studies.

2. To be eligible for admission to candidature an applicant shall:
(a) have satisfied the requirements for admission to a degree with Honours in the University of Newcastle or other tertiary institution approved for this purpose by the Faculty Board; or
POSTGRADUATE DEGREE SUBJECT DESCRIPTIONS

Notes on Subject and Topic Descriptions
The subject and topic outlines and reading lists which follow are set out in a standard format to facilitate easy reference. An explanation is given below of some of the technical terms used in this Handbook.

Prerequisites are subjects which must be passed before a candidate enrols in a particular subject. The only prerequisites noted for topics are any topics or subjects which must be taken before enrolling in the particular topic. To enrol in any subject which the topic may be part of, the prerequisites for that subject must still be satisfied.

Corequisites are subjects or topics which the candidate must pass before enrolment or be taking concurrently.

Examination. Under examination rules “examination” includes mid-year examinations, assignments, tests or any other work by which the final grade of a candidate in a subject is assessed. Some attempt has been made to indicate for each subject how assessment is determined. See particularly the general statement in the Department of Mathematics section headed “Progressive Assessment” referring to Mathematics subjects.

Tests are essential books recommended for purchase.

References are books relevant to the subject or topic which, however, need not be purchased.

LIST OF APPROVED SUBJECTS REFERRED TO IN THE HONOURS DEGREE OF BACHELOR OF SCIENCE

Entry to an Honours degree requires a Credit or better average in appropriate 300 level subjects.

BIOL401 HONOURS IN BIOLOGICAL SCIENCES 40cp

Prerequisites Completion of Ordinary Degree requirements and permission of the Head of the Department.

Content Carry out a research project and complete a thesis, essay, viva and two seminars.

CHEM401) HONOURS IN CHEMISTRY 40cp

Prerequisites Completion of Ordinary Degree requirements and permission of the Head of the Department.

Content The Honours program extends over two semesters or its part-time equivalent and consists of:

SECTION EIGHT

HONOURS COURSE IN STATISTICS

This is a level 400 course consisting of several course-work subjects and a project.

Prerequisite for 1991, 40 credit points from Level 300 subjects offered by the Department of Statistics and 40 credit points from Level 300 subjects in one or more other disciplines.

Content Students are required to take subjects worth 40-60 credit points of which at least 3 subjects must be chosen from Level 400 subjects offered by the Department of Statistics.

Students are also required to complete project work which can be worth 20, 30 or 40 credit points, to be determined by consultation with the Head of the Department. The results of the project are to be presented in a thesis. The project may be a practical one involving the analysis of data, or a theoretical one. Work on the project normally starts early in February. Level 400 units which may be offered in 1991 are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
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<tbody>
<tr>
<td>STAT401</td>
<td>PROBABILITY THEORY</td>
</tr>
<tr>
<td>STAT402</td>
<td>ANALYSIS OF CATEGORICAL DATA</td>
</tr>
<tr>
<td>STAT403</td>
<td>DEMOGRAPHY AND SURVIVAL ANALYSIS</td>
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<tr>
<td>STAT404</td>
<td>ROBUST REGRESSION AND SMOOTHING</td>
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<td>STAT406</td>
<td>STATISTICAL CONSULTING</td>
</tr>
<tr>
<td>STAT408</td>
<td>METHODS FOR QUALITY IMPROVEMENT</td>
</tr>
<tr>
<td>STAT408-11 PROJECT</td>
<td>10, 20, 30 OR 40</td>
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</table>

LEVEL 400 STATISTICS SUBJECTS

STAT401 PROBABILITY THEORY 10cp

This is a rigorous course on the mathematical theory of probability, presenting techniques and theory needed to establish limit theorems. The applications of such techniques are spurious throughout the Handbook. The course covers the following:

- Probability Theory
- Analysis of Categorical Data
- Demography and Survival Analysis
- Robust Regression and Smoothing
- Statistical Consulting
- Methods for Quality Improvement

References

Bilingsley, P. Probability and Measure (Wiley, 1979)

Braun, L. Probability (Addison-Wesley, 1968)


## STAT402 ANALYSIS OF CATEGORICAL DATA 10cp

The course will discuss the analysis of categorical data. It will begin with the coverage of random and fixed effects models for contingency tables. Topics to be covered include regression models for categorical data, measures of association, measures of agreement, the Mantel-Haenszel method for combining tables, applications of logistic regression and loglinear models.

### References

## STAT403 DEMOGRAPHY AND SURVIVAL ANALYSIS 10cp

This course presents a mathematical treatment of the techniques used in population projections, manpower studies, and the survival models used in demography and biostatistics.

### Text

### References

## STAT404 ROBUST REGRESSION AND SMOOTHING 10cp

The main theme is the use of the computer to fit models to data when the assumptions of traditional models may not be satisfied or whether it is not known in advance what form of model is appropriate. Topics to be covered include: concepts of robustness, L1-, M- and high breakdown estimation in linear regression, scatterplot smoothers (e.g. ACE, LOESS and splines), kernel regression and methods for choosing the amount of smoothing, and radical approaches (e.g. CART and projections pursuit).

### References

## STAT405 STATISTICAL CONSULTING 10cp

The aim of this course is to develop the statistical and nonstatistical skills required for a successful consultant. The course includes a study of the consulting literature, a review of commonly-used statistical procedures, problem formulation and solving, analysis of data sets, report writing and oral presentation, role-playing and consulting with actual clients.

### References
- Cowling, T.G. *Magnetohydrodynamics* (Interscience, 1957)
- Spiegel, R.M. *Problems of Stellar Convection* (Spiegel, 1976)

## MATH502 BANACH ALGEBRA 10cp

### References

## MATH503 CONVEXITY 10cp

### References

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### Examination
- One 2 hour paper

### Content
- The normal state of matter in the universe is that of a plasma, or ionized gas, permeated by magnetic fields. Moreover, these fields (unlike that of the earth) may be dominant, or at least significant, in controlling the structure of the region. The aim of this course is to investigate the effects of astrophysical magnetic fields, ranging from 10-6 gauss in the galaxy to 1012 gauss in a neutron star.

### Examination
- One 2 hour paper

### Content
- A Banach Algebra is a mathematical structure where the two main strands of pure mathematical study — the topological and the algebraic — are united in fruitful contact. The course will cover the following subject matter. Normal algebras: regular and singular elements; the spectrum of an element and its properties; the Gelfand-Mazur theorem; Banach-Alaoglu theorem; numerical ranges of operators on nonned linear spaces. We study extreme point theory and optimisation problems. We then study topology on linear spaces generated by convex sets, separation properties. We then study topologies for locally convex spaces.

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### Text
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<thead>
<tr>
<th>Subject Description</th>
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<tbody>
<tr>
<td>MATH506 HISTORY OF ANALYSIS TO AROUND 1900</td>
<td>10cp</td>
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<td>MATH508 MATHEMATICAL PHYSIOLOGY</td>
<td>10cp</td>
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<td>MATH304 (Opic P</td>
<td>10cp</td>
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<tr>
<td>MATH509 NONLINEAR OSCILLATIONS</td>
<td>10cp</td>
</tr>
</tbody>
</table>

This course will examine in some detail a few of the previously mentioned mathematical models; relevant physiological material will be introduced as required.

References
Christensen, H.N. Biological Transport (W.A. Benjamin, 1975)
Fung, Y.C. Biodynamics: Circulation (Springer, 1984)
Fung, Y.C., Perone, N. & Anilker, M. (eds.) Biomechanics Its Foundations and Objectives (Pren- 
Margaria, R. Biomechanics and Energy of Muscle Excitation (Clarendon, 1976)
West, J.B. (ed.) Bioengineering Aspects of the Lung (Marcel Dekker, 1977)

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West, J.B. (ed.) Bioengineering Aspects of the Lung (Marcel Dekker, 1977)
MATH312 RADICALS & ANNIHILATORS 10cp
Prerequisite: MATH312 (Topics T or X pre 1990)
Hours: About 27 lecture hours — Full year
Examination: One 2 hour paper.
Content
This topic will briefly outline the classical theory of finite dimensional algebras and the emergence of the concepts of radical, idempotence, ring, chain conditions, etc. Hopefully thus set in perspective, the next part will deal with the Artin-Hopkins-Jacobson ring theory and the significance of other radicals when finiteness conditions are dropped. The relations between various radicals, noetherian rings, left and right annihilators and the Goldie-Small theorems will end the topic.

References
Cohn, P.
Algebra
Vol. 2 (Wiley, 1977)
Dixmian, N.
Rings and Radicals
(Allen-Unwin, 1964)
Herstein, I.N.
Non-commutative Rings
(Wiley, 1968)
Kaplansky, I.
Fields and Rings
(Chicago, 1969)
McCoy, N.
The Theory of Rings
(McClmnn, 1965)

MATH313 SYMMETRY 10cp
Prerequisite: Some knowledge of Linear Algebra
Hours: About 27 lecture hours — Semester 1
Examination: One 2 hour paper.
Content
This course studies various aspects of symmetry. Matters discussed may include: invariance of lattices, crystals and associated functions and equations; permutation groups, finite geometries; regular and strongly-regular graphs; design; tactical configurations, “classical” simple groups, Matrix groups, representations, characters.

References
Biggs, N.L. & White, A.T.
Permutation Groups and Combinatorial Structures
(Cambridge, 1979)
Coxeter, H.S.M.
The Theory of Groups
(Clunbridge, 1979)

MATH314 VISCOUS FLOW THEORY 10cp
Prerequisite: MATH 305 (Topic Q pre 1990)
Hours: About 27 lecture hours — Semester 1
Examination: One 2 hour paper.
Content
Basic equations. Some exact solutions of the Navier-Stokes equations. Approximate solutions: theory of very slow motion, boundary layer theory, etc.

References
Batchelor, G.K.
An Introduction to Fluid Dynamics
(Cambridge, 1967)
Landau, L.D. & Lifshitz, E.M.
Fluid Mechanics
(Pergamon, 1959)
Langlois, W.R.
Slow Viscous Flow
(Macmillan, 1964)
Pat, S.
Viscous Flow Theory Vol.1
(Van Nostrand, 1956)
Rosenhead, L.
Laminar Boundary Layers
(Oxford, 1963)
Schlichting, H.
Boundary Layer Theory
(Cambridge, 1968)
Teman, R.
Navier-Stokes Equations—Theory and Numerical Analysis
(North Holland, 1976)

MATH315 GEOMETRICAL MECHANICS 10cp
Recommended Companion: Foundations of Modern Differential Geometry
Hours: About 27 lecture hours — Semester 2
Examination: One 2 hour paper.
Content
For all but the simplest systems Lagrangian or Hamiltonian formulations of mechanics are vastly superior (albeit equivalent) to Newton’s equations. Initially the course will introduce Lagrangian and Hamiltonian formulations, and apply them to systems of particles with constraints and to rigid-body systems. The second part of the course will present the modern geometrical formulations of Lagrangian and Hamiltonian mechanics. An ab initio introduction will be given to smooth vector fields and their flows, differential forms, the tangent and cotangent bundles. Lagrangian mechanics will then be presented in terms of flows on the tangent bundle of configuration space, with Hamiltonian mechanics taking place on the cotangent bundle. If time (and student interest) permits topics that might be touched upon include: Hamilton-Jacobi theory, action-angle variables, approximation methods, classical field theory, geometrical quantisation.
topologies, compactness and Tychonoff’s Theorem. To link to metric spaces we outline the basic metrisation theorem.

We then study linear topologies and their special properties, local bases and locally convex topologies, the metrisation and normability theorems. Gauges and Polars. The Hahn Banach Separation Properties are developed. The theory is applied to the study of weak topologies on Banach spaces, the Banach-Alaoglu Theorem and Goldstine Theorem.

References
Giles, J.R.
Convex Analysis with Application in the Differentiation of Convex Functions (Pitman, 1982)
Jameson, G.J.O.
Topology and Normed Spaces (Chapman & Hall, 1974)
Kelly, J.L.
General Topology (Van Nostrand, 1965)
Kelly, J.L. & Namioka, I.
Linear topological spaces (Van Nostrand, 1965)
Robertson, A.P. & W.J.
Topological vector spaces (Cambridge, 1964)
Simons, G.F.
Introduction to topology and modern analysis (McGraw-Hill, 1963)
Taylor, A.E. & Lay, D.C.
Introduction to Functional Analysis 2nd ed. (Wiley, 1980)
Wilansky, A.
Wilansky, A.
Functional Analysis (Blaisdell, 1964)
Willard, S.
General Topology (Addison-Wesley, 1970)

MAT159 LIE GROUPS AND ALGEBRAS WITH APPLICATIONS TO DIFFERENTIAL EQUATIONS

Prerequisite: MAT1304 (Topic P pre 1990)

Hours: Approximately 27 lecture hours — Semester 1

Examination: One 2 hour paper

Content

MAT159 GENERAL RELATIVITY 10cp

Recommended Companion: Foundations of Modern Differential Geometry

Hours: Approximately 27 lecture hours — Semester 1

Examination: One 2 hour paper

Content
This topic presents an introduction to general relativity — the current theory of gravitation. The subject will be presented using methods of modern differential geometry. Relativity may be (and will be) regarded as a special application of pseudo-Riemannian geometry, where the manifold, here space-time, has a metric that is not positive definite.

Particles, fluids and electromagnetic fields will be introduced into arbitrary space-times. It will then be shown how these sources of "matter" can generate the geometry of space-time via Einstein’s field equations. Applications of the theory will include introductions to black holes and to relativistic cosmology.

References
O’Neill, B.
Semi-Riemannian Geometry with applications to Relativity (Academic, 1983)
Hawking, S.W. & Ellis, G.F.R.
The Large scale structure of space-time (Cambridge, 1973)

Others to be advised.
<table>
<thead>
<tr>
<th>SECTION NINE</th>
<th>SUBJECT COMPUTER NUMBERS</th>
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<tbody>
<tr>
<td>BIOL204</td>
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<td>BIOL205</td>
<td>PSYC201 Foundations for Psychology 10</td>
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<td>STAT205 Engineering Statistics 5</td>
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<td>GEOG203</td>
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<td>BIOL303 Environmental Plant Physiology 10</td>
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<td>GEOG212</td>
<td>BIOL307 Molecular Biology of Plant Development 10</td>
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