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The University of New South Wales

Sciences

Board of Studies in Science and Mathematics

Faculty of Biological and Behavioural Sciences

Faculty of Science

1989
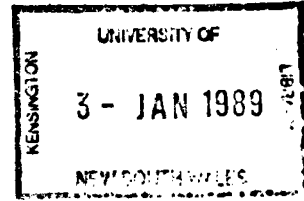# Faculty Handbook

The University of New South Wales
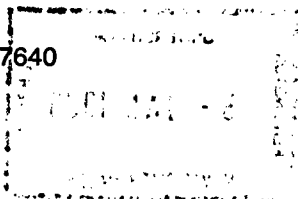
Sciences

Board of Studies in Science
and Mathematics
Faculty of Biological and Behavioural Sciences
Faculty of Science

1989
Faculty Handbook

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Subjects, courses and any arrangements for courses including staff allocated, as stated in the Calendar or any Handbook or any other publication, announcement or advice of the University, are an expression of intent only and are not to be taken as a firm offer or undertaking. The University reserves the right to discontinue or vary such subjects, courses, arrangements or staff allocations at any time without notice.

Information in this Handbook has been brought up to date as at 12 September 1988, but may be amended without notice by the University Council.

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Graduate Study: Faculty of Biological and Behavioural Sciences/Faculty of Science

Graduate Study: Subject Descriptions

Calendar of Dates

	1989	1990

Session 1 (67 teaching days)

	1989	1990
	27 February to 23 March	26 February to 12 April
Recess	*24 March to 2 April*	*13 April to 22 April*
	3 April to 8 June	23 April to 7 June
Study Recess	*9 June to 14 June*	*8 June to 13 June*
Midyear Recess	*1 July to 23 July*	*30 June to 22 July*
Examinations	15 June to 30 June	14 June to 29 June

Session 2 (67 teaching days)

	1989	1990
	24 July to 22 September	23 July to 21 September
Recess	*23 September to 2 October*	*22 September to 1 October*
	3 October to 1 November	2 October to 31 October
Study Recess	*2 November to 7 November*	*1 November to 6 November*
Examinations	8 November to 24 November	7 November to 23 November
Vacation Weeks	27 March to 2 April	16 April to 22 April
Common to Australian	3 July to 9 July	2 July to 8 July
Universities	25 September to 1 October	24 September to 30 September

Important Dates for 1989

January

M	2	New Year's Day — Public Holiday
F	6	Last day for acceptance of applications by the Admissions Section for transfer to another undergraduate course within th University.
W	18	Last day for applications for review of results of assessment.
Th	26	Australia Day — Public Holiday
T	31	Enrolment period begins for new undergraduate students and undergraduate students repeating first year.

February

M	6	Re-enrolment period begins for second and later year undergraduate and graduate students enrolled in formal courses. Students should consult the 1989 Re-enrolment Procedures booklet for details.
F	24	Last day for students to discontinue 1989 enrolment and receive a refund of the Higher Education Administration Charge Last day for acceptance of enrolment by new and re-enrolling students. Late fee payable thereafter if enrolment approve
M	27	Session 1 begins — all courses except Medicine III, IV and V.

March

F	10	Last day applications are accepted from students who enrol in additional Session 1 or whole year subjects.
F	24	Good Friday — Public Holiday
		Mid-Session Recess begins
M	27	Easter Monday — Public Holiday

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April

Su	2	Mid-Session Recess ends
F	21	Last day for students to discontinue without failure subjects which extend over Session 1 only
T	25	Anzac Day — Public Holiday

May

T	2	Confirmation of Enrolment forms despatched to all students
T	9	Publication of Provisional Timetable for June examinations
Th	11	Last day for acceptance of corrected Confirmation of Enrolment forms
W	17	Last day for students to advise of examination clashes
T	30	Publication of timetable for June examinations

June

Th	8	Session 1 ends
F	9-14	Study Recess
M	12	Queen's Birthday — Public Holiday
Th	15	Examinations begin
F	30	Examinations end

July

M	10	Assessment results mailed to students
T	11	Assessment results displayed on University noticeboards
Su	23	Midyear Recess ends
M	24	Session 2 begins
M	31	Last day for applications for review of July assessment results

August

| F | 4 | Last day applications are accepted from students to enrol in additional Session 2 subjects |
| | | Last day for students to discontinue without failure subjects which extend over the whole academic year |

September

F	8	Last day for students to discontinue without failure subjects which extend over Session 2 only
T	19	Confirmation of Enrolment forms sent to all students
S	23	Mid-Session Recess begins
Th	28	Last day for acceptance of corrected Confirmation of Enrolment forms
F	29	Closing date for applications to the Universities and Colleges Admission Centre

October

M	2	Mid-Session Recess ends
		Eight Hour Day — Public Holiday
T	3	Publication of provisional examination timetable for November examinations
W	11	Last day for students to advise of examination timetable clashes
T	24	Publication of timetable for November examinations

November

W	1	Session 2 ends
Th	2-7	Study Recess
W	8	Examinations begin
F	24	Examinations end

December

| F | 8 | Assessment results mailed to students |
| M | 11 | Assessment results displayed on University noticeboards |

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†In the field of organic chemistry.

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David Cecil Pye, MOptom *N.S.W.*

Tutors
Gavin Charles Boneham, BSc BOptom *N.S.W.*
Vanessa Jeanie Honson, BOptom *N.S.W.*
Colleen Marie Reilly, BOptom *N.S.W.*

Instructor
Ian William Robinson

Administrative Assistant
Yvonne Margaret Bartels, BA *Monash*

Cornea and Lens Research Unit

Director
Associate Professor Brien Anthony Holden

School of Physics

Associate Professor and Head of School
John Charles Kelly, BSc *Syd.*, PhD *R'dg.*, DSc *N.S.W.*, CPhys, FInstP,
FAIP, MAmPS

Professor of Experimental Physics
Kenneth Norman Robert Taylor, BSc PhD *Birm.*

Professor of Theoretical Physics and Head of Department of Theoretical Physics
Heinrich Hora, DiplPhys *Halle*, DrRerNat *Jena*, DSc *N.S.W.*, FInstP,
FAIP

Professor
Hans Gerard Leonard Coster, MSc PhD *Syd.*, MInstP, MAIP

Professor and Head of Department of Condensed Matter Physics
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Senior Lecturer and Executive Assistant to Head of School
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Associate Professor and Director of First Year Studies
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Principal Tutor
Paul Michael O'Halloran, BA *Macq.*, MEd *N.S.W.*

Senior Tutors
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Edward Peter Eyland, BSc MPhysics *N.S.W.*, BD *Lond.*
Marlene Noella Read, BSc PhD *N.S.W.*

Tutors
Jaan Ferdinand Jouke Boersma, MSc *Tas.*
Gail Patricia Box, BSc PhD *N'cle.(N.S.W.)*
Paul Westley Brooks, BSc *Adel.*
Gabriel Chircu, MSc *Buch.*
Joseph Khachan, BSc *N.S.W.*
Perry Robert Wiles, BSc *N.S.W.*

Professional Officers
Peter Robert Barker, BSc PhD *Monash*
Terence Calvin Chilcott, BE *Qld.*, MEngSc *N.S.W.*
Jack William Cochrane, BAppISc *Canberra C.A.E.*, MPhysics *N.S.W.*
Peter Russell Mars Crofts, BSc *N.S.W.*
Patrick Thomas McMillan, BSc DipEd *Syd.*
Barry Perczuk, BSc PhD *Monash*
John McLarem Tann, BAppSc *Melb.*
Jeremy Karl Walter, BSc *Lond.*

Honorary Associates
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Patrick Kelly, MA PhD ScD *Camb.*, FAIP, MInstP

Honorary Visiting Fellows
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Roderick Ian Sutherland, BSc *LaT.*, DipEd PhD *N.S.W.*
Stephen George Szirmai, BSc PhD *N.S.W.*

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Senior Lecturers
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Erik Harting, BSc PhD *N.S.W.*, ASTC, MAIP
Victor Raymond Howes, BSc PhD *Lond.*
Kenneth Reid Vost, BSc *Glas.*, MSc PhD *N.S.W.*, MAIP

Department of Astrophysics and Optics

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Peter Mitchell, BSc PhD *Adel.*, MAIP
George Lange Paul, MSc *Syd.*, PhD *Edin.*, FAIP
Betty Louise Turtle, BSc *Adel.*, PhD *A.N.U.*

Department of Biophysics

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Senior Lecturers
Raymond Gary Simons, BSc *Syd.*, MSc *Tel Aviv*, PhD *N.S.W.*
John Robert Smith, BSc *Syd.*, PhD *N.S.W.*, MAIP
Joseph Albert Wolfe, BSc *Qld.*, BA *N.S.W.* PhD *A.N.U.*

Department of Condensed Matter Physics

Associate Professor
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Senior Lecturers
Robert Louis Dalglish, BSc PhD *N.S.W.*
Peter Russell Elliston, BSc *Melb.*, PhD *Monash*
Michael Gal, MSc PhD *E.L.Bud.*
Leslie Beven Harris, BSc DSc *Lond.*, BA DipEd *Durh.*, PhD *N.S.W.*, CEng, FIM, FInstP
David John Miller, BSc PhD *N.S.W.*, DipEd *Syd.*, MAIP, MAmPS, MAAPT

Department of Theoretical Physics

Associate Professors
David Neilson, BSc *Melb.*, MS PhD *N.Y. State*
Jaan Oitmaa, BSc PhD *N.S.W.*, FAIP, MAmPS

Senior Lecturer
Michael Allister Box, BSc *Monash*, PhD *Syd.*, GradAInstP
Christopher John Hamer, MSc *Melb.*, PhD *Calif. Inst. Tech.*, DipCompSc *Canberra* FAIP
Robert John Stening, MSc *Syd.*, PhD *Qld.*, DipTertEd *N.E.*, MAIP MAMOS

Lecturer
John Richard Shepanski, MSc *Syd.*, MAIP, MAmPS

Introduction to the Sciences Handbook

This handbook has been designed to assist understanding of the academic activities of three inter-related groups within the university, namely the Board of Studies in Science and Mathematics, the Faculty of Biological and Behavioural Sciences and the Faculty of Science. The Board is respon-sible for the undergraduate studies of students majoring in disciplines associated with the two faculties and several schools from other faculties. The regulations governing the award of the degree of Bachelor of Science form a substantial part of the handbook. Other parts include details of the Science component of the combined degrees, Science/Law, Science/Commerce, Science/Civil Engineering, Science/Electrical Engineering, Science/Aeronautical Engineering, Science/Industrial Engineering, Science/Mechanical Engineering, Science/Naval Architecture, Science/Medicine, Science/Optometry, and of the two concurrent courses in Mathematics Educa-tion and Science Education.

Several specialist courses of study, also leading to the award of the degree of Bachelor of Science, are offered by the two faculties and the regulations covering these are given under the separate faculty sections. In addition the two faculties make available facilities to proceed to higher degrees and the conditions under which these awards are made are listed under the sections devoted to graduate study.

In the last part of the handbook there are brief statements of the syllabuses for subjects prescribed in the various regulations.

Faculty Information

Some People Who Can Help You

For information regarding particular courses advice may be obtained from staff members listed in the introduction to each of the sections related to the Board, the Faculty of Biological and Behavioural Sciences and the Faculty of Science, later in this handbook.

Enrolment Procedures
- **Faculty of Biological and Behavioural Sciences**
- **Faculty of Science**
- **Board of Studies in Science and Mathematics**

All students re-enrolling in 1989 or enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1989* available from Course Administration Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

The subject timetable for the Science and Mathematics Course (Course **3970**) is available in late October/early November from the Science and Mathematics Course Office, Room L-G06G, Biological Sciences Building. All re-enrolling students should collect one of these timetables along with a preliminary enrolment form (SM89). The preliminary enrolment form is to be completed and returned to the Science and Mathematics Office by the end of the first week in January.

Sciences Library Facilities

Although any of the University Libraries may meet specific needs, staff and students of the Faculty of Biological and Behavioural Sciences are served mainly by the Biomedical Library and the undegraduate collection while those of the Faculty of Science are served mainly by the Physical Sciences Library. The undergraduate collection and services are useful to students from both faculties.

Important: As changes may be made to information provided in this handbook, students should frequently consult the noticeboard of the Board of Studies in Science and Mathematics and the official noticeboards of the University.

The Biomedical Library

The Biomedical Library provides library services for staff and students from the Faculties of Medicine and Biological and Behavioural Sciences, and from the Schools of Biological Technologies, Health Administration and Fibre Science and Technology. It is closely associated with the libraries of the teaching hospitals of the University.

The Biomedical Library is located on Levels 2, 3 and 4 of the Mathews Building Annexe and is connected to the other Special Libraries via a link through the undegraduate collection.

Professional staff are available at the Reader Assistance Unit on Level 2 to provide reference services and to assist in the use of the catalogues. Instructional classes in the use of the library and in specific subject material can be arranged.

Computerized literature searches and interlibrary loans are also available.

Biomedical Librarian   Monica Davis

The Physical Sciences Library

This library, situated on Levels 6 and 7 of the Library tower, caters for the information needs of staff, graduate students and undergraduate students in the pure and applied sciences, engineering and architecture. Details of the books, serials and microforms in the Physical Sciences Library are included in the microfiche monograph and serials catalogues, and the items themselves are identified by the prefix 'P'.

Serials with the prefix 'PJ' are not for loan but self-service photocopying facilities are available on Level 7.

This Library provides reference, reader assistance and reader education services and also, where appropriate, inter-library loan and literature-searching services.

Trained staff are always available on Level 7 to assist readers with their enquiries.

Physical Sciences Librarian   Marian Bate

Undergraduate Services

- **The undergraduate collection** caters for the needs of students in Years 1 and 2 and other groups where large numbers require mass teaching. Levels 3 and 4.

- **The Open Reserve Section** houses books and other materials which are required reading. Level 2.

- **The Audio Visual Section** contains cassette tapes, mainly of lectures and other spoken word material. The section has wired study carrels and cassette players for student use. Level 3

- **The Reader Education program** provides orientation tours and introductory library research method lectures to students.

Students Clubs and Societies

Students have the opportunity of joining a wide range of clubs and societies. Many of these are affiliated with the Students' Union. There are numerous religious, social and cultural clubs and also many sporting clubs which are affiliated with the Sports Association.

Clubs and societies seeking to use the name of the University in their title, or seeking University recognition, must submit their constitutions either to the Students' Union or the Sports Association if they wish to be affiliated with either of these bodies, or to the Academic Registrar for approval by the University Council.

The Psychological Society

The Psychological Society aims to provide activities both educational and social for students of psychology, and, more generally, to act as an intermediary body between students of different years, and staff.

The Society organizes a variety of activities including staff-student functions, informal discussions, film showings, and occasional talks and seminars. An activities fee enables the Society to meet any of the finances needed to support its functions.

Statistical Society of Australia: New South Wales Branch

The Branch offers student membership to undergraduates who are following a recognized course of study which includes Statistics. The subscription for a student member is $21 per annum with a $6 rebate if paid before 31 December of the previous year.

The Branch holds about four general meetings each year at the end of which two talks, one theoretical and the other applied, are given on the one topic. The Branch conducts a Research Section, and membership of this group is open to members of the Branch free of charge. Each year the Branch also conducts a symposium for the study and discussion of particular statistical techniques or of statistical methods in a specialized field; symposia are open to members at reduced rates.

Members of the Branch receive *The Australian Journal of Statistics*, which is published three times a year by the Statistical Society of Australia, together with the Society's *Newsletter*.

Applications and requests for further information should be sent to the Hon. Secretary, Dr S. H. Huxham, School of Mathematical Sciences, U.T.S., P.O. Box 123, Broadway, NSW 2006.

Undergraduate Study:
Board of Studies in
Science and Mathematics

Board of Studies in Science and Mathematics

Introduction

The Science and Mathematics Course (3970) leads to the Bachelor of Science Degree on the completion of a three year program or a four year program chosen from specific programs approved by the Board of Studies in Science and Mathematics.

The Board of Studies in Science and Mathematics offers a wide choice of programs each designed to meet specific aims and objectives. Most programs are identified with a particular School or discipline but some are multi-disciplinary.

All students in the Science and Mathematics Course must enrol in two units of first year Mathematics; either Mathematics I or Higher Mathematics I or General Mathematics. Care must be taken in making the choice as, in general, General Mathematics considerably limits the choice of units in following years.

Most Schools and Departments do not offer a full range of Level III units in the evening. Those concerned are marked below with ‡.

Students seeking *general advice* should contact the Board of Studies in Science and Mathematics Office (Room L-G06G, Biological Sciences Building, map reference D25) and for *advice in specific disciplines* should contact the representative of the relevant School as listed below:

	First Year Biology	See School of Biological Science
‡	School of Anatomy	Dr B. Freeman
‡	Department of Applied Geology	Miss L. A. Bruce
		Dr G. R. Taylor
‡	Department of Biotechnology	Associate Professor N. W. Dunn
‡	School of Biochemistry	Associate Professor P.J. Schofield
‡	School of Biological Science	
	— Plant Science	Dr P.I. Dixon
	— Animal Science	Dr R.S. Vickery
‡	School of Chemistry	Dr D. S. Alderdice
		Dr T.J.V. Findlay (Year 1)
		Associate Professor M. A. Long (Year 2)
		Dr D. N. Duffy (Year 4)
‡	School of Community Medicine	Dr A. E. Stark
‡	School of Electrical Engineering and Computer Science	Dr P. W. Baker

‡ School of Geography . . . . Dr M. Melville
‡ Department of Information Systems . . . . Dr R. Edmundson
‡ School of Mathematics . . . . Associate Professor A. H. Low (Year 1)
                 Miss J. Todd
‡ Marine Science . . . . Dr P. Dixon
  School of Mechanical and Industrial
  Engineering . . . . Associate Professor E. J. Hahn
‡ School of Microbiology . . . . Dr I. Couperwhite
‡ School of Philosophy . . . . Dr P. Staines
‡ School of Physics . . . . Dr G. J. Russell (Year 1)
                 Dr J. R. Hanscomb
‡ School of Physiology and Pharmacology . . . . Dr B. S. Nail *or*
                 Associate Professor M. J. Rowe
‡ School of Psychology . . . . Professor B. J. Gillam
                 Mr T. J. Clulow
‡ School of Science and Technology Studies . . Dr D. Miller

Board of Studies in Science and Mathematics

The Board of Studies in Science and Mathematics includes all members of the Faculty of Biological and Behavioural Sciences* and the Faculty of Science* and some members of specific Schools in other faculties contributing to the Science and Mathematics Course: Chemical Engineering and Industrial Chemistry, Geography, Mines (Applied Science); Science and Technology Studies, Philosophy (Arts); Accountancy, Economics (Commerce); Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Surveying (Engineering); Anatomy, Community Medicine, Physiology and Pharmacology (Medicine); Education (Professional Studies); and the Centre for Liberal and General Studies.

The Dean is the Dean of the Faculty of Biological and Behavioural Sciences, Professor V. T. Buchwald.

The Chairman is Associate Professor G. Russell.

The Co-ordinator of Studies in Science and Mathematics in Dr R. J. King. The Administrative Assistant is Ms K. Irvine.

‡See text of **Introduction,** on previous page.
*See **Staff,** listed later in this handbook.

3970
Science and Mathematics Course

The Science and Mathematics Course, which leads to the Bachelor of Science degree, is administered by the Board of Studies in Science and Mathematics and offers a wide choice of programs, each designed to meet specific aims and objectives. Most programs are identified with a particular school or discipline but some are multi-disciplinary.

Aims of the Science and Mathematics Course

The main aims of the Science and Mathematics Course, diverse and not necessarily exclusive, may be summarized as providing opportunities to students to prepare themselves for careers in:
* research
* technology
* science and mathematics education
* areas of management or public policy involving the use of science or mathematics.

Objectives of the Science and Mathematics Course

The important general objectives of most programs in the Science and Mathematics Course are:

1. To develop and sustain an interest in and knowledge of Science and Mathematics.

2. To develop a working knowledge of scientific methods of investigation and a favourable attitude towards them.

3. To encourage curiosity and creative imagination and an appreciation of the role of speculation in the selection and solution of problems, the construction of hypotheses, and the design of experiments.

4. To develop an appreciation of scientific criteria and a concern for objectivity and precision.

5. To develop confidence and skill in formulating problems and in treating both qualitative and quantitative data.

6. To develop the ability and disposition to think logically, to communicate clearly by written and oral means, and to read critically and with understanding.

7. To develop the habit of seeking and recognizing relationships between phenomena, principles, theories, conceptual frameworks and problems.

8. To promote understanding of the significance of science, technology, economics and social factors in modern society, and of the contributions they can make in improving humans' material conditions and in widening their imaginative horizons and their understanding of the universe.

9. To provide opportunities for the development of students' motivations and social maturity, and an awareness of their own capabilities in relation to a choice of career which will be fruitful to themselves and to society.

There is a wide range of programs in single and multi-disciplinary areas leading to a three year degree or a four year (honours) degree.

The Structure of the Science and Mathematics Course

The Science and Mathematics Course consists of a number of individual programs, based on subjects ranked as Level I, Level II, Level II/III, Level III and Level IV with a unit size varying from 56-84 hours.

The terms Levels I, II, III do not necessarily refer to the years in which the subject must be studied. Subjects at the various levels may be taken in other years provided the prerequisites are met. Level II/III units have only Level I prerequisites.

The Bachelor of Science degree is awarded on completion of
• **a three year program**
or
• **a four year program**

chosen from specific programs approved by the Board of Studies in Science and Mathematics.

The time specified is a minimum time required for completion of the degree. It may be taken over a longer period of time.

• A student must select and be enrolled in one of the pre-scribed programs.

• A student may not undertake more than 8 Science units in any one year unless approval is given by the Co-ordinator or the Dean of the Board of Studies in Science and Mathematics.

• With the exception of quota restricted programs and with approval of the Co-ordinator of Studies, a student may change from one selected program to another. A written application to make the change, together with details of any optional units selected in the new program, must be lodged at the office of the Board of Studies in Science and Mathematics, Room L-G06G (Biological Sciences Building, map reference D25).

• The programs listed are made up of a sequence of subjects. Where a choice of subjects is indicated within a program care must be taken to satisfy the requirements, such as pre-requisites and co-requisites.

• A prerequisite unit is one which must be completed prior to enrolment in the unit for which it is prescribed.

• A co-requisite unit is one which must either be completed successfully before or be studied concurrently with the unit for which it is prescribed.

• An excluded unit is one which cannot be counted towards the degree qualification together with the unit which excludes it. In exceptional circumstances, on the recommendation of the head of the appropriate school, the Board of Studies in Science and Mathematics may waive or vary a particular prerequisite, co-requisite or exclusion.

• A single major is a program specifying only 4 Level III units in a discipline.

• A double major is a program specifying 4 Level III units of each of 2 disciplines or 8 Level III units in a single discipline.

• Upon sufficient cause being shown in a particular case or cases, the Board of Studies in Science and Mathematics may vary any of these rules.

The three year program

The three year program leading to the award of the pass degree consists of:

1. at least 23 units at Level I, II, II/III, III as specified in an individual program with the following requirements:

(1) *not less than* eight *nor more than* ten units may be from Level I;

(2) two of the Level I units must be 10.001 Mathematics I, or 10.021B and 10.021C;

(3) *not less than* four units from Level III in a single discipline or as specified in individual programs.

2. General Education electives as specified in an individual program.

• In order to graduate a student must pass all the subjects specified in the program of his/her choice.

The four year program

The four year program, leading to an Honours Class I, II/1, II/2, III or pass degree consists of:

1. all requirements of the three year program (see above);

2. (1) an approved honours program offered by one or more schools;
or

(2) at least 10 units at Level IV as specified in an individual program.

For Entry to Year 4 students are required:

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1. to have completed Years 1, 2 and 3 of the specific program and to have satisfied prerequisite requirements as specified in Table 3;
2. to seek the guidance of the appropriate head of school at an early stage of study to ensure that the program being followed is best suited to lead to the Year 4 honours program;
3. to have completed relevant subjects normally with better than passing grades;
4. to have the approval of the appropriate Head of School at the end of Year 3.

A person on whom the pass degree of Bachelor of Science of the University has been conferred may be admitted by the Board of Studies in Science and Mathematics, on the recommendation of the relevant Heads of Schools, to candidature for an honours degree conversion program with credit for all subjects completed, if during his or her studies for the pass degree, he or she has satisfied the prerequisites for proceeding to honours level laid down by the School or Schools concerned.

General Education Program

The University requires that undergraduate students undertake a structured program in General Education as an integral part of studies for their degree.

Among its objectives, the General Education program provides the opportunity for students to address some of the key questions they will face as persons, citizens and professionals.

A new General Education program, administered by the Centre for Liberal and General Studies, was introduced in 1988.

The program requires students to undertake studies in three areas:

1. An introduction in non-specialist terms to an understanding of the environments in which humans function;
2. An introduction to, and a critical reflection upon, the cultural bases of knowledge, belief, language, identity and purpose;
3. An introduction to the development, design and responsible management of the systems over which human beings exercise some influence and control.

Subjects in categories 1 and 2 are in preparation. The exact form of category 3 is still being decided. This could involve, however, a slight subsequent change to the structure of the later years of degree programs.

There are differing requirements for students commencing before and from 1988:

Students who commenced their undergraduate program before 1988.

Students must complete a program of General Education in accordance with the requirements in effect when they commenced their degree program. Students yet to complete their General Education requirement may select subjects from any of the three categories of the new program.

Students commencing their undergraduate program in 1988 and following.

Students must complete a program of subjects selected from each of the three categories of study in accordance with the rules defined in the General Education Handbook and in sequences specified in the requirements for individual courses.

Further information may be obtained from the office of the Centre for Liberal and General Studies, Room G58, Morven Brown Building, and the General Education Handbook.

Workload

The expected maximum workload for students devoting most of their time to this course is four science units per session. This can only be exceeded in exceptional circumstances by students with a good academic record and requires the permission of the Co-ordinator of Studies.

Students with external commitments, such as part-time employment, in excess of ten hours per week, should take fewer units. External commitments are not to be taken into consideration in relation to such matters as extensions of time for written work or failure to attend examinations, which may, for some subjects, be scheduled on Saturday mornings.

Re-enrolment

Students not lodging a completed enrolment form before the first day of Session 1 have no guarantee that a place will be available in the subjects offered in that year. This is particularly important for subjects where laboratory space is limited or for subjects where quota restrictions may apply.

Rules governing admission to the Science and Mathematics Course with advanced standing

Any person who makes application to enrol in the Science and Mathematics Course (Course 3970) or in a combined degree course which includes the Science degree course administered by the Board of Studies in Science and Mathematics may be admitted to the course of study leading to such degree with such standing on the basis of previous attainment as may be determined by the Board of Studies in Science and Mathematics provided that:

(1) Where students transfer from another tertiary institution, such students shall not in general be granted standing in the course which is superior to that which they have enjoyed at the institution from which they transferred.

(2) The standing granted by the Board of Studies in Science and Mathematics in the case of any application based upon any degree(s) or other award held by applicants, should not be such as will permit the applicants to qualify for the science degree, without completing the course of instruction and passing examinations in at least those subjects comprising the latter half of the Science and Mathematics course, so that where such a program of study would involve the applicants in repeating courses of instruction in which the Board of Studies in Science and Mathematics deems the applicants to have already qualified, the Board may prescribe an alternative program of studies in lieu thereof.

(3) The standing granted by the Board of Studies in Science and Mathematics in the case of applications based on partial completion of the requirement for any degree or other award of another institution shall not be such that it will permit the applicants to qualify for the award of the science and mathematics degree by satisfactory completion of the program of study deemed by the Board to be less than that required for students in full time attendance in the final year of the Science and Mathematics Course (Course **3970**).

(4) The standing granted by the Board of Studies in Science and Mathematics in the case of applications based upon the partial completion of the requirements for any degree or award of the University may be such as to give full credit in the Science and Mathematics Course (Course **3970**) for work done in the course from which the students transfer.

Programs

Students are advised that it is not possible to complete their studies by attendance at evening classes alone.

Each program has a four-digit identifying number.

Most programs have been set out as Years 1, 2, 3 and 4 for the four year program and in these cases Years 1, 2 and 3 comprise a three year program. A few programs are set out as Years 1, 2 and 3 and lead to the pass degree only.

Students wishing to take a double major are warned that due to timetabling difficulties it may take longer than three years to complete degree requirements.

To progress through a program a student must meet all the prerequisites and co-requisites as detailed in Tables 1, 2 and 3.

The range of programs has been designed to cover a wide variety of needs in the various areas of science and mathematics:

Anatomy	see program **7000**
Animal Science	see program **4500**
Biochemistry	see program **4100**
Biology	Biology is taught in Year 1 as a single discipline but in later years as specific subjects: animal science, biotechnology, biochemistry, genetics, microbology and plant science.
Biotechnology	see program **4200**

Business Information Technology	see program **1405**
Chemistry	see programs **0200, 0205**
Community Medicine	subjects available in some programs **(the identifying number is 79)**
Computer Science	see program **0600**
Genetics	see program **6840**
Geography	see program **2700**
Geology	see programs **2500, 2503**
Information Systems	see program **1400**
Marine Science	see programs **6831, 6832, 6833, 6834**
Mathematics	see program **1000, 1006, 1061, 6810**
Microbiology	see program **4400**
Pharmacology	see program **7300**
Philosophy	see program **5200**
Physics	see programs **0100, 0161, 2503**
Physiology	see program **7300**
Plant Science	see program **4300**
Psychology	see program **1200**
Science and Technology Studies	see program **6200**

In addition to Course 3970 programs are also included for Courses 3611 (Science/Aeronautical Engineering), 3661 (Science/Industrial Engineering), 3681 (Science/Mechanical Engineering), 3701 (Science/Naval Architecture), 3725 (Science/Electrical Engineering), 3730 (Science/Civil Engineering), 3820 (Science/Medicine), 3951 (Science/Optometry), 3995 (Science/Commerce) 4070 (Mathematics/Education), 4080 (Science/Education), 4770 (Science/Law).

Physics

The study programs offered by the School reflect the importance of Physics in science and technology at both the fundamental and at the applied levels. Thus within the Board of Studies in Science and Mathematics, professional training in Physics is provided by programs 0100 and 0161 while in areas such as Engineering a number of courses are available in which Physics is combined as a major study.

The features are summarized in the following table:

Professional Training in Physics	Physics in other Courses
Program	Courses
0100 Physics	3170 Textile Physics
Including:	3611 Aeronautical Engineering with Physics
Theoretical Physics	
Applied Physics	3661 Industrial Engineering with Physics
Biophysics	3681 Mechanical Engineering with Physics
Physics/Geology	

0161 Physics/Computer
Science

3701 Naval Architecture with
Physics
3725 Electrical Engineering
with Physics
3730 Civil Engineering with
Physics and
Mathematics
4770 Law with Physics
5801 Education with Physics

Professional Training

Program 0161 (Physics/Computer Science) has been carefully structured to include not only the basic areas of Physics but also those Mathematics and Computer Science subjects necessary to meet the specific aims of the program. Only minor variations from this program can be considered.

On the other hand, Program 0100 Physics offers greater flexibility in the choice of subjects particularly for the student who intends to take out the BSc degree at Pass level after 3 years. Also, for those students who intend to proceed further, Honours may be taken in either Physics, Theoretical Physics, Applied Physics, Physics/Geology or Biophysics.

Sample programs of study and guidance as to the choice of subjects can be obtained from the School. The following information relating to Program 0100 should be particularly noted:

Program 0100

1. It is suggested that the subjects chosen in Year 1 might comprise 6.711, 1.061, 2.121, 2.131.

2. Students wishing to proceed to Year 4 (Honours) must complete at least 7 Level III units. These will normally be taken from the Physics subjects on offer (unless the student is specializing in Biophysics or in Geology) and include at least *one* subject from 1.0533, 1.0543, 1.133, 1.7613 for students majoring in Physics or in Applied Physics.

3. For the study of Applied Physics certain Level III subjects are strongly recommended. These are subjects of a more applied nature eg 1.133 Electronics.

4. For the study of Theoretical Physics, additional mathematics subjects are specified. Thus in Year 2 students should include subject 10.111A (or 10.121A) and in Year 3, subject 10.212D (or 10.222D). Certain Level III subjects of a theoretical nature, eg 1.1133 are also strongly recommended.

5. Arrangements exist to enable a joint major in Physics/Geology. Students are expected to include 2 units of Geology in Year 2 and 4 units of Geology in Year 3. The possibility of joint majors in other subjects (eg Mathematics or Chemistry) exists.

6. For the study of Biophysics, students are required to take Chemistry and Biology subjects in Year 1 and Biochemistry in Year 2 in addition to Physics subjects.

7. In addition to the above there are other areas of study of major interest. Thus an introduction to Astrophysics and Optics is available to students choosing the elective subjects 1.1633, 1.7123, 1.7133, 1.7613 and the study of Condensed Matter (Solid State) Physics may be furthered by the inclusion of elective subjects such as 1.3133 and 1.3143.

8. In certain circumstances subject 1.002 may be deferred to Year 3.

Subject descriptions of the subjects may be found in another section of this handbook. As is to be expected, several of the elective subjects mentioned above reflect the research interests of the various Departments of this School. These are at present five in number: Applied Physics, Astrophysics and Optics, Biophysics, Condensed Matter Physics, Theoretical Physics.

9. Students are encouraged to select Higher Level Mathematics subjects where applicable.

Physics in other Courses

The previous page lists those courses which have been arranged with other schools. Several of these can lead to honours in Physics (eg 3725) so it must not be thought that the only avenue to specialization in Physics is via the professional programs 0100, etc.

Students should also bear in mind that prerequisites and co-requisites can be waived in certain cases, eg when it is judged that an equivalent study has been undertaken in some other combinations of subjects. The possibility also exists of relaxing the requirements of programs to allow a student to select a subject in which he or she has a special interest but which is not a recommended one in the program.

0100
Physics**

General Education: see Contents

Year 1
1.001
10.001   *Physics*
Choose 4 Level I units from:**†   *Mathematics*
1. Table 1 *and/or*
2. Table 2 for program 0100

Year 2
1.002⁶, 1.012, 1.022, 1.032
10.1113*, 10.1114*, 10.2111*, 10.2112*
Choose 2 units from:**
1. Table 1 *and/or*
2. Table 2 for program 0100
1 General Education subject

Year 3
1.0133, 1.0143⁶, 1.023, 1.0333, 1.0343⁶, 1.043
Choose at least 3 units from:**
1. Table 1 *and/or*
2. Table 2 for program 0100
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
Choose one of 1.104, 1.304, 1.504, 1.604, 68.430

**Students should read carefully the above description relating to program 0100 and seek advice from the School of Physics regarding the choice of subject. An incorrect choice of subjects could exclude a student from the study of certain areas of Physics and/or prevent the combination of Physics with other disciplines.
⁶Students with a special interest in Biophysics may replace 1.002 with 2.102B and units 1.0143, (or 1.0343) with 1.1433 provided 2.121, 2.131, 17.031 and 17.041 are completed in Year 1 and 41.101 is taken in Year 2.

0161

Physics/Computer Science

General Education: see contents

Year 1††

1.001, 1.061	*Physics*
6.711	*Computer Science*
10.001	*Mathematics*

Choose 2 Level I units from Table 1**

Year 2

1.012, 1.022, 1.032
6.712
10.1113, 10.1114, 10.2111, 10.2112
Choose 1 Level II Computer Science unit
Choose 1 further unit from 1.062, 10.111A, 10.261A
or Level II Computer Science
1 General Education subject

Year 3

1.002, 1.0133, 1.0333
Choose 2 further Level III Physics units**
Choose 1 Level III Computer Science unit
Choose 2 units from:**
1. 1.062, 10.212A, 10.212D, 10.261A, 10.262A
2. Level III Physics
3. Computer Science
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours) **

1.104 or 1.304 or 1.504

**Students intending to proceed to Year 4 are required to choose appropriate subjects. This choice is determined by the requirements of program 0100. Students are required to consult the School of Physics.
††Quota restrictions apply to most Level III Computer Science subjects. Students wishing to take these subjects should in Year 1 apply for entry to the Computer Science quota. Advice should be obtained from the office of the Board of Studies in Science and Mathematics.

Geophysics

See program 2503

Recommended Double Majors

Physics/Geology

Chemistry

The School is divided into four departments (Physical, Organic, Inorganic and Nuclear, and Analytical) and a First Year Teaching unit. Each department contributes to first year teaching and offers specialty courses in its own area for the Science and Mathematics programs, and servicing to other faculties.

The study program 0200 offered by the School of Chemistry provides both a basic scientific education and a professional training in chemistry. Fundamental, applied, environmental and industrial aspects of chemistry are included. The program allows the study of chemistry to be combined with the study of another discipline, for example, physics, biochemistry, mathematics or computer sciences, by suitable choice of subjects.

Suitable choice of subjects makes it possible to study chemistry as a co-major with another branch of science (eg geology, biochemistry, computer science, biotechnology, physiology) to an advanced level. A combination of Level III chemistry and mathematics subjects provides a useful basis for specialization in aspects of physical or theoretical chemistry whilst a combination of Level III chemistry and geology subjects is suitable for those who wish to specialize later in geochemistry. Level III chemistry and physiology subjects could form the basis of specialized studies of body chemistry.

Students wishing to undertake the maximum number of chemistry subjects should follow Program 0205 Pure and Applied Chemistry. This involves 14 chemistry subjects and is referred to as a double major in terms of the Science and Mathematics course. It is designed for specialization in chemistry and should be selected by students who wish to devote their studies at Level III entirely to chemical topics.

The Chemistry programs are open to all students who have satisfied the requirement for entry into the Science and Mathematics course. However, those who have not studied sufficient science at school (see prerequisites under subject number) may be required to study a special introductory subject (2.111) before enrolling in the Level I Chemistry subjects (2.121, 2.131, 2.141) specified. The Level I subject 2.141 is designed specifically for students intending to major in Chemistry. It covers the same material, at a similar level to that in 2.121 and 2.131, but is a full year subject and the order of treatment of the topics is different. The Chemistry programs have a first year of study which includes chemistry, physics and mathematics, in common with many other programs, and an elective. It is in the choice of this elective that special care has to be given as an incorrect choice could exclude the combination of chemistry with another selected discipline at Level II or III, (eg omission of biology units would preclude taking biochemistry at Level II). Advice from the course advisors should be sought on this point.

The Chemistry programs lead to study at the Honours level (Level IV) and to graduate studies in chemistry. The usual introduction to research in Chemistry is in Level IV and at this level the student devotes the major part of the time to research under the direction of a member of staff as supervisor. A proportion of the time is taken up with formal course work. The Honours year (or its equivalent in qualifying studies) may be followed by a higher research degree. Further information about graduate courses is included in this handbook and in a booklet: *School of Chemistry Research Activities.*

0200
Chemistry**

General Education: *see Contents*

Year 1

1.001	*Physics*
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B	*Mathematics*
and 10.021C	

Choose 2 Level I units from Table 1

Year 2*

2.102A, 2.102B, 2.102C, 2.102D
Choose 3 units from Table 1
2 General Education subjects

Year 3

Choose 4 Level III Chemistry units of which at least 3 are from:
2.103A, 2.103B, 2.103C, 2.103D
Choose 4 units from Table 1

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)

2.004

*Students wishing to do a co-major of Chemistry with Geology or Biotechnology may apply for a variation of the specified units to the Programs Committee of the Board of Studies in Science and Mathematics.
**Students should read carefully the above descriptions relating to programs 0200 and 0205 and seek advice from the School of Chemistry regarding the choice of subjects.

0205
Pure and Applied Chemistry**

General Education: *see Contents*

Year 1

1.001	*Physics*
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B	*Mathematics*
and 10.021C	

Choose 2 Level I units from Table 1

Year 2

2.102A, 2.102B, 2.102C, 2.102D
Choose 3 units from Table 1
2 General Education subjects

Year 3

2.103A, 2.103B, 2.103C, 2.103D
Choose 4 Level III Chemistry units

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)

2.004

**Student should read carefully the above descriptions relating to programs 0200 and 0205 and seek advice from the School of Chemistry regarding the choice of units.

Recommended Double Majors

Chemistry/Biochemistry
Chemistry/Biotechnology
Chemistry/Computer Science
Chemistry/Geology
Chemistry/Mathematics
Chemistry/Physics
Chemistry/Physiology

Computer Science

Computer Science involves the study of the design, construction and uses of computer systems. It is concerned with the representation of data and data structures in computer systems and the design of algorithms for automatic manipulation of this information by programming languages and machine systems. It is very much concerned with the design and development of hardware and software tools by which computer applications may be developed, but not so much with the applications themselves. At the University of New South Wales, particular emphasis is given to comprehension of the basic principles behind computing tools, operating systems, compilers and translators, and computer hardware.

Graduates who major in Computer Science frequently find employment where the requirement is for an expert knowledge of computer systems rather than extensive experience in a particular application area. Potential employers include the computer manufacturers, consulting companies, specialist companies marketing computer hardware and software services, and many large organizations with major computing establishments.

All Science students with the appropriate Mathematics prerequisites have entry into all Year 1 and Year 2 Computer Science subjects. Resources limit the number of students who may enter most Year 3 Computer Science subjects but other subjects are proposed which will allow computer applications majors to complete an appropriate course of study.

Entry to a Computer Science major is *either* by direct selection at university entry *or* by competitive entry at the end of Year 1 or Year 2. Students who wish to compete at the end of their first year for a place in Program 0600 Computer Science enrol in their first year in Program 6806 or some other program. Students in program 6806 may also have the alternative of entering program 1400 Information Systems at the end of their first year. Acceptance into program 0600 or 1400 is based on academic performance in Year 1 or Year 2.

Science/Law students may enrol directly into Year 1 of the Course 4770 Computer Science program. To progress into Year 2 of this program, these students must, at the end of Year 1, compete with students in Course 3970.

Students majoring in other disciplines may undertake all Level I and Level II and one of the Level III Computer Science subjects and thus undertake a substantial amount of Computing. Programs available are Physics/Computer Science (0161) and Mathematics with Computer Science (1061). Students with very good academic records may be able to enrol in further Computer Science units by special permission from the Head of the Department of Computer Science.

There are many ways to study Computer Science and computer applications at this University, apart from the Science and Mathematics Course. A new 4-year professional Computer Engineering degree course is to be launched in 1989. This course combines subjects from Computer Science, Electrical Engineering and Mathematics. Students may also major in Computer Science as part of the 5 year combined degree programs in Electrical Engineering, Aeronautical Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture which leads to the award of the two degrees of BE and BSc (see under Courses 3725, 3611, 3661, 3681 and 3701 respectively and the Faculty of Engineering Handbook).

Students may also major in Computer Science in the combined Science/Law degree course. A major sequence in Computer Science is also available in the Bachelor of Arts course (see the Faculty of Arts Handbook). Other courses and subjects which include computing and computing applications are available in other Schools, for example students may major in Information Systems in the Bachelor of Commerce degree course: see the Faculty of Commerce Handbook.

0600
Computer Science*

General Education: *see Contents*

Year 1*

6.6711, 6.712	*Computer Science*
10.001, 10.081	*Mathematics*

Choose 3 Level I units from:**
1. Table 1 *and/or*
2. Table 2 for program 0600 *and/or*
3. The BA course

Year 2

3 Level II Computer Science units
Choose 5 units from:**
1. Table 1 *and/or*
2. Table 2 for program 0600 *and/or*
3. The BA course
1 General Education subject

Year 3

Choose 4 Level III Computer Science units
Choose 3 units from:**
1. Table 1 *and/or*
2. Table 2 for program 0600 *and/or*
3. The BA course
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units including 6.613, 6.632, 6.642 & 6.643.

Year 4 (Honours)
6.606

*In Year 1 students who have not gained direct entry to this program must enrol in program 6806 or another science program and apply for entry to this program at the end of Session 2. Enrolment in Year 2 is based on academic performance in Year 1.
**The program may include up to 8 units other than Computer Science units that are not in Table 1. Subjects chosen from the BA degree course are restricted to those offered by the following schools: Economics, English, French, German Studies, History, Music, Political Science, Russian Studies, Sociology, Spanish and Latin American Studies and Theatre Studies. Science and Technology Studies subjects are available in Table 1. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072 (6 BA degree credit points at Level I or 4 credit points at Upper Level are equivalent to 1 science unit).

Computer Science/Physics

See program 0161 Physics/Computer Science

Computer Science/Mathematics/ Statistics

See program 1061 Mathematics or Statistics/Computer Science

See also

1400 Information Systems

Mathematics

The School is divided into Departments of Pure Mathematics, Applied Mathematics and Statistics. The School provides courses at the Pass and Honours levels based on the above departments and in specified interdisciplinary programs such as Mathematics of Management. There is considerable overlap of interests and interaction between the departments; students in general will take units from more than one department.

Pure Mathematics is concerned with the whole structure of mathematics. Research focuses on the creation of new mathematical systems and the finer analysis of partially understood fields. Problems of mathematics come from many sources of science and industry but the pure mathematician is more concerned with the problems themselves than with the sources from which they arise. Courses in the Department of Pure Mathematics are designed to provide the necessary equipment for those

who intend to use mathematics in any way, to give basic familiarity with the fundamental language of modern science and technology and to develop appreciation for and insight into one of our major cultural achievements.

Applied Mathematics is concerned with the development of mathematics and mathematical models for understanding scientific phenomena, for the solution of technical and industrial problems, and for use in the social, economic and management sciences. Problems originate not only from the physical and engineering sciences, but also from such diverse areas as the biological sciences, computer science, the communication industry and commerce. Courses in Applied Mathematics are designed to provide basic mathematical and computational skills needed for a wide range of applications, to develop the capability to construct, analyse, and interpret mathematical models, and to encourage enthusiasm for the role of the mathematician in a variety of contexts.

The major research interests of the Department of Applied Mathematics are:

1. Optimization control theory and operations research, with applications in a wide range of areas.
2. Numerical analysis and mathematical computing.
3. Nonlinear dynamical systems.
4. Fluid dynamics, with a special interest in oceanographic and environmental applications.

The Department of Applied Mathematics offers training to graduate research level in each of these areas.

Statistics is the science and art of using factual material for modelling and inference. Its mathematical foundations are in the theory of probability and it deals with how to estimate and make decisions using knowledge which is uncertain or observational material which is subject to error. There is a rich interplay of ideas between the theory of statistics and fields such as engineering, medicine and biological and behavioural sciences where statistical problems constantly arise. The department has strong interest in the areas of applied statistics, stochastic processes, biometry, inference, design of experiments, sequential analysis, discrete distributions, nonparametrics and statistical computing.

Programs of study

Program 1000 (Mathematics)

Within this program it is possible to major in Pure Mathematics, Applied Mathematics or to undertake a General Mathematics major with a mixture of Pure and Applied Mathematics and possibly some Statistics; it is also possible by extending the program to four years to undertake Honours in Pure Mathematics or Applied Mathematics. Students wishing to major or undertake Honours in Statistics should consult program 1006.

Pure Mathematics major

Any completed 1000 program will be deemed to be a major in Pure Mathematics if it has included the equivalent of four units made up of units and half units listed in Table 1 as Pure Mathematics Level III or Higher Pure Mathematics Level III.

It is strongly recommended that students choose, among the many optional mathematics units, those which are appropriate to their interest. In particular, 10.081 in Year 1 is highly recommended.
Furthermore:

1. Pure Mathematics subjects relevant to the mathematical aspects of Computer Science are 10.1115 and 10.1116 in Year 2, and 10.1123 and 10.1521 in Year 3.
2. Pure Mathematics subjects relevant to mathematics teaching are 10.1111, 10.1112, 10.1121, 10.1124, 10.1127 and 10.1128 in Year 3, or their higher equivalents.
3. Pure Mathematics subjects relevant to the applications of mathematics in physics or engineering are 10.1125, 10.1126, 10.1128, 10.1522 and 10.1523 in Year 3.

Pure Mathematics Department staff will be happy to advise students on choices of subjects appropriate to their study goals.

Pure Mathematics Honours

Honours in Pure Mathematics is obtained by completing 10.123, for which the normal prerequisites are at least three Pure Mathematics III subjects (total value) at the Higher Level. However, students with a credit average in at least four Level III Mathematics units may also be considered for entry into Pure Mathematics 4. Usually, students doing Honours in Pure Mathematics do Higher level courses from Year 1 onwards.

Pure Mathematics Department staff will be happy to advise students on choices of subjects appropriate to their study goals.

Applied Mathematics major

Any completed 1000 program will be deemed to be a major in Applied Mathematics if it has included four units (total value) of subjects listed in Table 1 as Level III Applied Mathematics (or their higher equivalent). When selecting optional subjects in program 1000, the following choice of mathematics subjects (or their higher equivalent) are strongly recommended.

Year 2: At least two of 10.2113, 10.2115, 10.2116.

Year 3: At least three of 10.212A, 10.212B, 10.212D, 10.212L, 10.212M, 10.212N, 10.222C.

In addition, Applied Mathematics students are expected to select relevant subjects from other disciplines according to the particular applications of mathematics in which they are interested. The following choices are recommended in first year.

1. Applied mathematics for physical and engineering sciences or for theoretical oceanography and fluid mechanics: *either* 1.001 *or* appropriate level I Engineering subjects.

2. Applied mathematics for economic or management sciences: 14.501, 14.511, 15.001, 15.011. Note that if 14.501 and 14.511 are chosen then all four must be taken in first year and permission must be obtained through the Board of Studies office as there is a quota. For further details see program 6810.

3. Applied mathematics for social or biological sciences, choose at least two of the following groups:
a. 17.031 *and* 17.041,
b. 12.100,
c. 1.001,

d. 2.141 *or both* 2.121 *and* 2.131.

4. Applied mathematics for computational methods or computer science: 6.711, 10.081.

Applied Mathematics Department staff will be happy to advise students on choices of subjects appropriate to their study goals.

Applied Mathematics Honours

A student interested in taking an Honours degree in Applied Mathematics must enrol in 10.001 in first year and complete at least one Level II and three Level III Applied Mathematics units (total value). Students who have obtained a credit average in at least four Level III Mathematics units (total value) may be considered for entry into 10.223 Applied Mathematics 4.

Students are advised to select optional subjects according to the recommendations above for an Applied Mathematics major. Students should obtain a copy of recommended programs for Applied Mathematics from the School of Mathematics office before entering Year 2, and they are strongly encouraged to consult a staff member in Applied Mathematics regarding appropriate courses of study.

Program 1006 (Statistics)

Statistics Major

The completed 3 year program 1006 (Statistics) will be deemed to be a major in Statistics.

Statistics Honours

Honours in Statistics are obtained by completing 10.323, the prerequisite for which is the completion of 3 years of program 1006 (Statistics) with all corresponding Higher Statistics Level II and Level III units preferably all Higher Mathematics Level I, II and III units.

Program 1061 (Mathematics or Statistics/Computer Science) will be of particular interest to students who wish to combine a Mathematics (or Statistics) major with a substantial amount of computing.

Program 6810 (Mathematics of Management) includes subjects given by the Schools of Accountancy and of Economics. There has been an increasing trend towards more use of mathematics, and the use of more advanced mathematics, in scientific management. This program is intended to train mathematicians with an interest in the application of mathematics to management science. The mathematics content is very solid indeed, amounting to a full mathematics degree. A student completing this course with a good record is eligible for entry to the Master of Commerce graduate degree program in the School of Accountancy. If appropriate subjects are selected, then this degree (MCom), which may be awarded by part-time study, qualifies the graduate for provisional membership of the Australian Society of Accountants; full membership is then granted after appropriate experience.

Mathematics/Computer Science

See Computer Science/Mathematics

1000
Mathematics***

General Studies: *see Contents*

Students intending to proceed to the Honours year should take Higher Mathematics subjects throughout.

Year 1
10.001   *Mathematics*
Choose 6 Level I units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000

Year 2
10.111A, 10.1113, 10.1114, 10.2111, 10.2112
Choose 1 further Level II *or* III Mathematics unit
Choose 4 units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000
1 General Education subject

Year 3
Choose 4 Level III Mathematics units (not 10.312F or 10.262A)
Choose 3 units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000
1 General Education subject

*Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.***

Year 4 (Honours)
10.123 *or* 10.223 *or* 10.623

*Not more than 8 units of this program may be from subjects not in Table 1. The BA degree subjects are limited to those offered by the following schools: Economics, English, French, German, History, Music, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre Studies. Science and Technology Studies and Philosophy subjects are available in Table 1. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072. (6 BA credit points at Level I or 4 credit points at Upper Level are equivalent to 1 science unit.)

**Students proposing to take Honours in Pure or Applied Mathematics are advised to include at least three units of Level III Higher Mathematics units (total value) from the relevant department. However, students who have obtained a credit average in at least four Level III Mathematics units may also be considered for entry into Mathematics Honours.

***Students should read carefully the above description relating to program 1000 and seek advice from the School of Mathematics regarding the choice of subjects.

1006
Statistics

General Education: *see contents*

Students intending to proceed to the Honours year should take Higher Mathematics subjects throughout.

Year 1††
10.001   *Mathematics*
Choose 6 units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000

Year 2
10.111A, 10.1113, 10.1114, 10.2112, 10.311A, 10.311B, 10.3111, 10.3112
Choose 2½ units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000
1 General Education subject

Year 3
Choose 4 units from 10.312A, 10.312C, 10.322D, 10.312F, 10.3121, 10.3122, 10.3123, 10.3124
Choose 3 Level III Mathematics *and/or* Computer Science units
1 General Education subject
Students proposing to proceed to Year 4 (Honours) must complete 4 Higher Level III Statistics units including 10.3225.

Year 4 (Honours)
10.323

*See footnote to program 1000.
††See footnote to program 0161.

1061
Mathematics or Statistics/Computer Science

General Education: *see Contents*

Students intending to proceed to the Honours year should take Higher Mathematics subjects throughout.

Year 1††
6.711   *Computer Science*
10.001, 10.081   *Mathematics*
Choose 4 Level I units from:
1. Table 1 *and/or*
2. Table 2 for program 1000 *and/or*
3. The BA course

Year 2
6.712
10.111A, 10.1113, 10.1114, 10.2112
Choose one of the strands:

a. 10.2111, 10.261A, 10.331
Choose at least 1 unit from: 10.1115, 10.1116, 10.2113, 10.2115.
or
b. 10.311A, 10.311B, 10.3111, 10.3112,
Choose further units from Mathematics and/or Computer Science to make a total of 8 for the year.
1 General Education subject

Year 3
Continue the strand chosen in Year 2:
a. 6.646
10.262A
3 Level III Mathematics units
or
b. 10.312F
Choose further units from Mathematics and/or Computer Science to make a total of 8 for the year.
4 Level III Statistics units
1 General Education subject

Year 4 (Honours)*
10.123 *or* 10.223 *or* 10.323 or 10.623

*The requirements for entry to the Honours year are as for programs 1000 and 1006.
††See footnote to program 0161.

Mathematics/Marine Science (Physical Oceanography)

See program 6831

Recommended Double Majors

Mathematics or Statistics/Computer Science
Mathematics/Geology

Psychology

Modern psychology is both a basic discipline and a field of professional practice. As a science, psychology is concerned with the study of both the more complex forms of behaviour, and associated mental processes. It seeks to understand the basic psychological processes such as learning, memory, perception

and motivation; the biological basis of behaviour; the development and decline of behavioural capacities from infancy to old age; individual differences in behaviour; social influences on behaviour; and the collective behaviour of social groups. In addition, disorders of behaviour form an important part of the subject matter of psychology.

Program 1200 in the Science and Mathematics course leads to a major in Psychology after 3 years and to Honours after 4 years. Choice of support subjects will depend upon which facet of Psychology is of interest to the student. Suitable supporting subjects range from Anatomy, Physiology, Genetics of Behaviour to Science and Technology Studies and Philosophy. If necessary students may contact the School for advice.

There is also a four year full-time professional science degree course (Course 3431) which is described in detail later in this handbook (see **Faculty of Biological and Behavioural Sciences**).

Students who wish to obtain qualifications that will allow them to practise psychology need to complete one of the above four year honours programs. The present minimum qualifications for membership of the Australian Psychological Society (the professorial body of Australian psychologists) require a degree (with a major in psychology) and a fourth year of study of psychology, followed either by further graduate study or two years of supervised experience in some practical field of psychology. A professional qualification in psychology may lead to careers in research, teaching and applied fields such as personnel selection and management, vocational guidance, advertising and clinical practice.

1200
Psychology

General Education: *see Contents*

Year 1

10.001 *or both* 10.021B & 10.021C	*Mathematics*
12.100	*Psychology*

Choose 4 Level I units from:
1. Table 1 *and/or*
2. Table 2 for program 1200

Year 2*
12.206
Choose 2 units from:
12.204, 12.207, 12.208, 12.209
Choose 5 units from Table 1 (no more than 1 additional unit from Level II Psychology)
1 General Education subject

Year 3*
Choose 4 Level III Psychology units
Choose 3 units from Table 1
1 General Education subject

Year 4 (Honours)
12.403 *or* 12.404

*Students intending to proceed to honours in Psychology must take 12.206, 12.207, 12.208 and 12.209 in Year 2, together with 3 other units from Table 1 (a total of 7 units in Year 2). Currently in Year 3 students must take 8 Level III Psychology units including 12.300 and 12.305 from Group A for 12.404 in Year 4. Additionally, students intending to take 12.403 in Year 4 are required to also include 12.301 from Group B.
The compulsory Level III Psychology units are presently being revised.

Recommended Double Majors

Psychology/Anatomy
Psychology/Physiology

Information Systems

Information Systems is concerned with information systems analysis and design, data management, computer processing, edp audit, management information systems and applied expert systems within business and government organisations. There is a growing maturity in the discipline as the underlying theory and associated principles become better understood and as advanced information processing techniques emerge. In many respects the development of the knowledge base which forms the discipline parallels developments in computing technology as new opportunities become apparent for the solution of information processing problems. Hence, information systems is concerned with the way in which computer systems are used within organisations — mainly business and government. There is a high degree of complementarity between the roles of Computer Science and the discipline of Information Systems. The program is intended to develop students' conceptual and practical skills in the discipline. After an introductory first year students study systems design, database, communications and commercial programming in parallel with computer science, mathematics and management accounting units. An honours year is available for well qualified students. This specializes in advanced information systems and data management topics.

1400
Information Systems

General Education: *see Contents*

Year 1*

6.711	*Computer Science*
10.001	*Mathematics*

Choose 5 Level I units from:
1. Table 1 *and/or*
2. Table 2 for program 1400

Year 2
6.712
14.501, 14.511, 19.602, 19.603, 19.609
10.331 *or* 10.311A
Choose 1 unit from:
1. Table 1 *or*
2. Table 2 for program 1400
1 General Education subject

Year 3
14.522, 19.605, 19.607, 19.608
Choose 3 units including at least one at Level III from:
1. Table 1 *and/or*
2. Table 2 for program 1400 *and/or*
3. 14.611
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)
14.794, 19.853, 19.857, 19.886, 19.887, 19.891
If 19.611 has not previously been taken this unit should replace 19.857.

*In Year 1 students must enrol in another science program and apply for entry to this program at the end of Session 2. Enrolment in Year 2 is based on academic performance in Year 1.

Business Information Technology

This four year program teaches Information Systems (see Program 1400 above for a description) and provides industrial training linked to that teaching. Students are admitted to the program through the BIT selection procedures and receive a scholarship for the duration of the program from a fund to which the industrial sponsors contribute. The three industrial training periods in the program are each of approximately six months duration, running from January of Years 2 and 4, and July of Year 3 of the program.

1405
Business Information Technology

Year 1*
6.711, 6.712	Computer Science
10.001	Mathematics
14.501, 14.511	Accounting
19.602	Information Systems
15.101E	Economics

Year 2
19.603, 19.609
19.691
15.102E
Choose 2 units from:
1. Table 1 and/or
2. Table 2 for program 1400
1 General Education subject

Year 3
10.331
14.522, 19.605, 19.608, 19.616
19.692

Year 4
19.607, 19.611
19.693
Choose 3 units from:

1. Table 1 and/or
2. Table 2 for program 1400
1 General Education subject

* Entry to the program is in Year 1 and is only available to students who have been offered a scholarship through the BIT selection procedures.

Geology and Geophysics

Programs in Geology and Geophysics are offered to the Board of Studies in Science and Mathematics by the Department of Applied Geology in the School of Mines. The School is part of the Faculty of Applied Science and the Department of Applied Geology is dedicated to teaching and research in resource geology as well as in the fundamentals of the science.

Geology is the study of the nature and evolution of the earth. It is concerned with the composition and modes of formation and deformation of the igneous, sedimentary and metamorphosed rocks and concentrations of minerals that comprise the earth's crust and interior. Geology enquires into the essential controls on the development and distribution of such rocks and minerals in space and geologic time. Likewise it is concerned with the nature, distribution, and evolution of life forms through time. Resource geology is concerned with the application of all geological knowledge to the location and extraction of mineral and energy deposits, and to engineering and environmental tasks, ie activities that are fundamental to the well-being of modern society. Thus geology has an applied, professional function as well as being a scientific discipline.

Geophysics employs sophisticated instrumentation in order to construct physical earth models and is a companion discipline to Geology.

Program for Professional Geology

After June 1986, the Australasian Institute of Mining and Metallurgy requires that its corporate members, including professional geologists, shall have completed a four year course. Students wishing to enter the geology profession should preferably undertake the four year Course 3000 Applied Geology in the Faculty of Applied Science that is specifically designed to meet the needs of a professional geologist. However, an identical course of study is available in the Science Faculty program 2500 by taking the three year program with a double major in Applied Geology and by achieving a standard that enables progression to the Year 4 program and graduation with Honours. Training of a professional geologist demands a thorough understanding of basic geological principles; accordingly, in the early part of the course students receive instruction in fundamental geological subjects. As with other science based disciplines, appropriate standards in Physics, Chemistry and Mathematics are also required. As the course progresses, increasing emphasis is placed on practical applications of geological principles to mineral and energy exploration and development and to engineering and environmental geology. Mineral and energy exploration techniques including geochemical and geophysical methods are also studied. Year 4 is divided between a core of

advanced geological topics, and one strand chosen from mineral resources, sedimentary basin resources, engineering and environmental geology, or geophysics. Session 2 of Year 4 is devoted to a specialized research project.

Geophysics

Professional geophysicists work closely with geologists and, appropriately, studies of both disciplines are undertaken in the one school. Fundamental and applied geophysics are taught to geology students in program 2500 (and Course 3000), but students who intend to become professional geophysicists should take program 2503.

Single Major in Geology

Because Geology is a natural companion to other sciences, such as Chemistry (in Geochemistry), Botany and Zoology (in Palaeontology) and Geography, and of widespread interest to science in general, program 2500 is organized so that a single major in Geology may be acquired. Selected students who have completed such studies may undertake an honours degree that includes geology with another science should consult the Department of Applied Geology about recommended programs. Those who are specifically interested in combining Geology with Animal and/or Plant Science should carefully read the following section.

Geology with Biological Science

Geology and the Biological Sciences meet in a common field of study (Palaeontology) concerned with the evolution and environmental controls on the growth of ancient life forms. Palaeontologists may have an applied function, providing geologists with essential information about the relative ages and depositional environments of sedimentary rocks, particularly the strata with a potential to yield fossil fuels. Students intending to pursue this combination should take the subjects designated in footnote (*) to program 2500.

Geology in Marine Science

Students interested in marine sciences should consider program 6833 which is concerned with geological aspects of the marine environment.

Programs in Geology are also offered in the Combined Science/Civil Engineering course 3730, the Science Education course 4080 and the Combined Science/Law Course 4770.

2500
Geology

General Education: *see Contents*

Year 1

1.001*	*Physics*
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B and 10.021C	*Mathematics*
25.110, 25.120	*Geology*

Year 2
25.211, 25.212, 25.221
Choose at least 4½* units from:
1. 25.223, 25.2261 (compulsory for Double Major) *and*
2. Table 1 other than units offered by Applied Geology
1 General Education subject

Year 3
25.311, 25.312
Choose at least 2 Applied Geology units from:
25.314, 25.3162, 25.321, 25.324, 25.325, 25.3261, 25.3271, 25.333
(Double Majors in Applied Geology must take all of these subjects)
Choose further units from Table 1 to give a total of 23 for the complete program*
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
25.435

*Carefully read the description of program 2500 and seek advice from the Department of Applied Geology about the choice of subjectss. Students following a combination of Applied Geology with Animal and/or Plant Science are permitted in Year 1 to substitute the two Biology subjects, 17.031 & 17.041, for 1.001. In Year 2 they should take 45.111, 45.101, 45.201, 45.301 and 1 unit chosen from 17.012, 43.131 *and* 43.112; in Year 3 25.321, *either* 25.321 *or* 25.325, 45.302 and 2 units chosen from 43.152, *either* 43.112, 43.172, 45.112, 45.121, 45.402.

2503
Geophysics

General Education: *see Contents*

Year 1

1.001	*Physics*
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001	*Mathematics*
25.110, 25.120	*Geology*

Year 2
1.002, 1.012, 1.022, 1.032
10.2111, 10.2112
25.5212, 25.223, 25.2261
2 General Education subject

Year 3
25.3162, 25.333, 25.9311, 25.9312,
25.9313, 25.9314, 25.9321
Choose 2 units from Level III Physics and Mathematics
Choose 2 units from:
1. Table 1 *and/or*
2. Table 2 for program 2503

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
25.435

Recommended Double Majors

Geology/Animal and Plant Science
Geology/Chemistry
Geology/Geography
Geology/Mathematics
Geology/Physics

Geography

Geography is the scientific study of variations from place to place on the earth's surface. It provides an analytical framework for understanding and investigating many of society's pressing problems such as the use and management of scarce resources, the impact of environmental hazards on human activities, soil erosion and conservation, land use conflicts, and the spatial organization of human affairs.

Program 2700 comprises a three-year structured sequence of substantive subjects in physical and human Geography, with particular emphasis on studies of the natural environment, as well as a grounding in basic analytical skills and techniques (eg statistical methods and computing, remote sensing and air photo interpretation, field and laboratory techniques) required for problem-solving and application. Because of its essentially interdisciplinary nature, a training in Geography is increasingly recognized as a relevant qualification for employment in a wide range of planning and conservation-related fields.

Considerable flexibility exists in program 2700 for students to combine subjects in Geography with those from cognate disciplines to suit individual interests and career aspirations. Studies in Geography with a co-major in other sciences, especially Geology and Plant Science, are encouraged. Details of particular courses of study and subject combinations offered within the program are available from the School Office.

2700
Geography

General Education: *see Contents*

Year 1
10.001 *or both* 10.021B   *Mathematics*
and 10.021C
27.819 *and* 27.818 *or* 27.010,   *Geography*
27.030 *and* 27.100
Choose further Level I units from Table 1 to make a total of 8

Year 2
Choose 3 Level II Geography units
Choose 5 units from Table 1
1 General Education subject

Year 3
Choose 4 Level III Geography units
27.300
Choose 3 units from Table 1
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units and must have completed 27.050 or 27.884.

Year 4 (Honours)
27.844

Recommended Double Majors

Geography/Plant Science.
Geography/Geology

Biochemistry

Biochemistry is at the foundation of the biological sciences and is concerned with an understanding of life processes, especially with regard to molecular aspects of living organisms. Initially the approaches of chemistry were applied to biological systems but now Biochemistry has achieved its own techniques, approaches and body of knowledge and its ideas pervade the whole of biology. It, however, retains a molecular basis and is an ideal study for those interested in understanding and appreciating biological processes at the molecular rather than descriptive level. Biochemistry also represents a fundamental component of medical science and has an important role in many aspects of modern medicine.

Study of Biochemistry begins at Level II (41.101 Principles of Biochemistry and Molecular Biology) building on a base of Level I Chemistry and Biology. The material in this double unit introduces the basic concepts of the subject, describes biological molecules, and their interconversions in cells and tissues, the relationship between the structures and functions of enzymes, other proteins, hormones and biological membranes.

At Level III, further subjects are offered which cover various aspects of Biochemistry. These include 41.102 Biochemistry of Macromolecules, 41.112 Human Biochemistry, 41.122 Cellular Biochemistry and Control, 41.132 Molecular Biology of Higher Organisms and 41.142 Biochemistry and Genetic Engineering of Plants.

In Year 4, the Honours Course in Biochemistry (41.103 Biochemistry Honours) offers the opportunity for those students who have obtained above average results to carry out a research project under supervision and to receive training in the latest research techniques.

Program 4100 Biochemistry

The program outlined below leads to a single major in Biochemistry and also provides for a considerable choice of subjects offered by other Schools. It can be used as a framework to lead to co-majors with other disciplines, for example, microbiology, chem-

istry, physiology, biotechnology, plant science, animal science or anatomy; other co-majors are possible. In arranging co-majors, the programs of the two relevant Schools should be consulted, especially if there is a possibility of proceeding to Year 4 (Honours). Program 4100 also can be followed to achieve a single major in biochemistry supported by one or two minor sequences — for example biochemistry with some chemistry and some microbiology or biochemistry with some physiology and some anatomy. The program also permits 5 Level III units of biochemistry to be taken rather than the minimum of 4 units. All of these combinations can serve as prerequisites for an Honours Year in biochemistry provided that passes are obtained in a total of 8 Level III units including above average results in Biochemistry.

4100
Biochemistry

General Education: *see Contents*

Year 1
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B	*Mathematics*
and 10.021C	
17.031, 17.041	*Biology*
Choose 2 Level 1 units from Table 1*

Year 2
2.102B *or* 2.102D
17.050, 17.601
41.101
Choose 2 or 3 units from Table 1†
1 General Education subject

Year 3
41.102
Choose at least 2 units from Level III Biochemistry
Choose further units from Table 1 to give a total of 23 for the complete program
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
41.103

*Recommended are units offered by the School of Physics and the Department of Computer Science.
†Students are recommended to take both 2.102B and 2.102D.

Recommended Double Majors

Biochemistry/Animal Science
Biochemistry/Biotechnology
Biochemistry/Chemistry
Biochemistry/Microbiology
Biochemistry/Physiology
Biochemistry/Plant Science

Biotechnology

Biotechnology employs a body of multidisciplinary expertise directed towards the utilization and recycling of natural resources by controlled biological action, usually in a reactor. Its study provides an appreciation of the capabilities of biological systems and the skills required to maximize these capabilities on the industrial scale. Particular attention is given to: the selection of the appropriate systems and their maximization by genetic and/or enzyme tailoring; the design of biological reactors and their ancillary equipment; optimization and control of the processes. It is by these means that products are manufactured at ensured standards of quality. The products include certain foods and beverages, baker's yeast, antibiotics, steroids, vaccines, enzymes, amino acids, nucleotides, vitamins, organic acids, alcohols, metals, plant growth regulators and insecticides. Specific mammalian proteins, such as insulin and growth hormone, are also produced by micro-organisms which have been genetically engineered to contain the appropriate mammalian gene.

Students wishing to undertake training in biotechnology may do so by combining such training with a major in another relevant discipline, preferably biochemistry, microbiology or chemistry. The fourth (Honours) year includes further formal training as well as research in biotechnology.

Alternatively, students with no previous training in biotechnology may undertake the biotechnology honours year, provided they have the necessary background training in biochemistry and microbiology; in such cases the Level III biotechnology units constitute the formal component.

4200
Biotechnology

General Education: *see Contents*

Year 1
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B	*Mathematics*
and 10.021C	
17.031, 17.041	*Biology*
Choose 2 Level 1 units from Table 1

Year 2
17.050, 17.601
41.101
Choose at least one of: 42.101, 44.121
Choose additional units from Table 1 to make a total of 7 for the year
2 General Education subjects

Year 3
42.102A, 42.102B
Choose 4 Level III units from a single discipline* in Table 1
Choose additional units from Table 1 to give a total of 23 for the complete program

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
42.103
*Recommended disciplines are Biochemistry, Chemistry, Microbiology.

Recommended Double Majors

Biotechnology/Biochemistry
Biotechnology/Chemistry
Biotechnology/Microbiology

Biological Science

Biological Science encompasses all aspects of plants and animals including their relationship to each other and to the environment. The courses leading to the award of a science degree in Biological Science range from cell biology, plant and animal physiology through ecology, genetics and taxonomy, to entomology and evolutionary studies. These studies are particularly relevant in the fields of agriculture, forestry, wild life management, conservation and related environmental sciences. Specialisations are available in both Plant and Animal Science.

Biological Science may be taken as a major or a minor study in the Science and Mathematics course (3970).

4300
Plant Science

General Education: *see Contents*

Year 1
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B	*Mathematics*
and 10.021C	
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1

Year 2
17.050, 17.601
41.101
45.101, 45.111
Choose additional units from Table 1 to make a total of 8 for the year
1 General Education subject

Year 3
Choose 4 units from 43.112, 43.132, 43.142, 43.152, 43.172, 43.192
Choose 3 units from Table 1*
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
43.103
* Students with an interest in molecular aspects of plant science should choose at least two of 41.132, 41.122 or 41.142.

4500
Animal Science

General Education: *see Contents*

Year 1
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B	*Mathematics*
and 10.021C	
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1

Year 2
17.050, 17.601
41.101
45.101, 45.201, 45.301
Choose 1 unit from Table 1
1 General Education subject

Year 3
Choose 4 units from 45.112, 45.121, 45.122, 45.132, 45.142, 45.152, 45.302, 45.402, 45.422
Choose 3 units from TAble 1
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units

Year 4 (Honours)
45.103

Recommended Double Majors

Animal Science/Anatomy
Animal and Plant Science/Biochemistry
Plant Science/Geography
Animal and Plant Science/Geology
Animal Science/Mathematics
Plant Science/Microbiology
Animal Science/Physiology

Microbiology

The discipline of microbiology encompasses the scientific study of the smallest forms of life, namely bacteria, viruses, algae, fungi and protozoa. Microorganisms are probably best known as agents of disease in man, in other animals and in plants. Other microorganisms cause food spoilage, as well as serious deterioration in textiles and structural materials. Not all microorganisms are harmful. We depend on microorganisms for the recycling of organic wastes, for the maintenance of soil fertility, and for the production of foods,

beverages, pharmaceuticals (especially antibiotics), and other industrially important materials.

The program in Microbiology requires students to take basic courses in Chemistry, Mathematics and Biology in Year 1.

4400
Microbiology*

General Education: *see Contents*

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*
Choose 2 Level 1 units from Table 1	

Year 2

17.050, 17.601
41.101
44.121
Choose 2 or 3 units from Table 1
1 General Education subject

Year 3

44.102, 44.112
Choose at least 3 units from Table 1 to give a total of 23 for the complete program
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)

44.103

*1. Those students interested in a specialist career in Microbiology should also choose 44.122 and 44.132 in Year 3. Students wishing to include 44.122 Immunology in their program are strongly advised to take 70.011A History in Year 2. 2. Many students combine a major in Microbiology with a major in Biochemistry or Biotechnology. 3. Students should note that Mycology is an aspect of Microbiology which is taught in the School of Biological Science in units 43.131 and 43.132. 4. The subject 45.101 Biometry is recommended as a useful elective. In particular, students interested in environmental microbiology or in a research career in any area are strongly advised to take this subject.

Recommended Double Majors

Microbiology/Biochemistry
Microbiology/Biotechnology
Microbiology/Plant Science

Philosophy

Philosophy is a wide-ranging discipline, catering for a great diversity of interests, for instance, in science, reasoning, persons, and social issues, and encouraging critical and imaginative thought about the foundations of other subjects. Apart from providing considerable choices for students majoring in Philosophy, the diversity of Upper Level subjects makes it possible for students majoring in other disciplines to select subjects complementing their main interest.

First Enrolment in Philosophy

There are two Level I subjects:

52.103 Introductory Philosophy A (Session 1)
52.104 Introductory Philosophy B (Session 2).

Each of these has one unit value. They can be taken separately, and a student can gain Level II status in Philosophy (ie qualify to enrol in Upper Level subjects) by passing in only one. However, students enrolling in one normally enrol in both, and students wishing to major in Philosophy must do so.

Value of Upper Level Subjects in Philosophy

Unless otherwise stated, all Level II/III subjects in Philosophy are half units, of which three together can be counted as two science units.

Major in Philosophy

Students majoring in Philosophy must take the equivalent of two Level II/III units in Year 2, and the equivalent of four Level II/III units in Year 3.

Level II/III

Some Level II/III subjects deal with particular philosophical topics; others can be taken in sequence to give more sustained treatments of larger areas. Students may select freely among these, subject to stipulations regarding prerequisites. They are welcome to seek advice and further information from the School.

In certain circumstances the prerequisite specified for subjects may be waived; for example, in the case of students who have already studied similar material, or who wish to take isolated subjects relevant to another discipline. Students who feel they have a case for a concession of this kind should consult the School.

5200
Philosophy

General Education: *see Contents*

Year 1

10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
52.103, 52.104	*Philosophy*
Choose 4 Level I Units from Table 1	

Year 2
Choose 2 Philosophy units*
Choose 6 units from Table 1
1 General Education subject

Year 3
Choose 4 Philosophy units*
Choose 3 units from Table 1
1 General Education subject

*Due to the extra library work required in the preparation of essays, a combination of 3 half unit Philosophy subjects count as the equivalent of 2 Science units.

Year 2
52.220
52.214O or 62.202U
62.224U
Choose further units from Table 1 to make a total of 8 for the year
1 General Education subject

Year 3
52.304
Choose 3 units from:
52.2003, 52.2140, 62.202U, 62.207U, 62.301
Choose 3 units from Table 1
1 General Education subject

Philosophy of Science

The Philosophy of Science program is designed to provide a coherent sequence of subjects for students who wish to prepare themselves for the undertaking of advanced study within the areas of logic, methodology and philosophy of science, or who merely wish to deepen their comprehension of the subject matter of a major in another field. The program leads towards a core subject 52.304 Advanced Philosophy of Science in Year 3.

Students should note, however, that they may not 'double-count' subjects towards a second major and they must satisfy general requirements for the Science and Mathematics Course. Also, students must meet certain prerequisite requirements within the program. While the program given below is to be taken as normative, variations may be approved by the Co-ordinator. In particular, students otherwise deemed suitably prepared may be permitted to enter the program in Year 2, without being required to complete all of the usual Year 2 subjects, provided they complete an additional option from within the program.

Suitably qualified students may proceed from the program to a fourth year honours program in Science and Technology Studies. The regulations are set out below under the Science and Technology Studies heading. Intending students should consult the School of Science and Technology Studies at the earliest opportunity.

5262
Philosophy of Science

Year 1

10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
Choose 1 unit from:	
52.103, 52.104 or	*Philosophy*
62.102I, 62.115I, 62.104I	*STS*
Choose 5 Level I units from Table 1	

Science and Technology Studies

Students may take units within the School leading to the award of the BSc degree at pass or honours level.

Some students may wish to take a small number of subjects, where their programs allow sufficient flexibility, as complements to their usual experimentally-based science subjects.

Broadly speaking, students wishing to make their careers in areas related to S & T studies (for example, museum work, science journalism, tertiary teaching, government administration, etc) will need to pursue their studies at graduate level, but there are some career opportunities for those who have bachelor degrees only.

The School offers course-work programs leading to the degrees of Master of Science and Society and Master of Cognitive Science. Research degrees at the Master and Doctoral level may also be undertaken. Interested students should enquire at the School.

The Pass Degree
The program offered by the School gives students a wide range of options from which to choose in studying the historical, philosophical and social aspects of science and technology. Students intending to complete the pass degree are required to take eight S & T units, of which three are prescribed and five are elective. The remaining units in this program may be chosen from those listed in Table I, which allows sufficient flexibility for the completion of a second major in a scientific discipline, if this is desired. Students wishing to enquire about such a double major within program 6200 are invited to contact the School and the relevant second School for further information.

While S & T Studies units may be combined in a variety of ways, they generally fall into two main areas, concerned on the one hand with the History and Philosophy of Science, and on the other hand with Social Studies of Science and Technology. Some individual units, however, offer significant coverage of both areas and fit naturally into either one. Students who wish to concentrate in the History and Philosophy of Science or in Social Studies of Science and Technology may use the following list as a guide to recommended groupings of S & T units in these two areas.

History and Philosophy of Science

1. Level I units
62.102I, 62.104I, 62.115I
2. Level II/III units
62.201U, 62.202U, 62.205U, 62.207U,
62.208U, 62.209U, 62.210U, 62.211U,
62.214U, 62.217U,
62.218U, 62.219U, 62.224U
3. Level III units
62.300U, 62.30111, 62.305U

Social Studies of Science and Technology

1. Level I units
62.101I
2. Level II/III units
62.201U, 62.203U, 62.204U, 62.205U,
62.206U, 62.210U, 62.212U, 62.213U,
62.219U, 62.220U, 62.221U, 62.222U.
3. Level III units
62.300U

The Honours Degree

Students intending to proceed to an honours degree in S & T studies complete the first three years of program 6200 with marks that result in an average of Credit or better in the eight S & T units included. The three-year program leading to honours entry offers-sufficient scope for the completion of a second major in a scientific field, if this is desired. All students intending to complete an honours degree within program 6200 are invited to contact the School and the relevant second School for further information regarding combined major sequences.

Scientia

The Scientia Society gives students enrolled in S & T units an opportunity to meet one another informally, to discuss their interests in Science and Technology Studies, to hear visiting speakers and to enjoy a number of social events throughout the year. In addition, as a student organisation within the School, Scientia provides a means for undergraduates and graduates to express their views on matters of School policy and planning. Notices of Scientia activities are posted on a bulletin board near the School office (Morven Brown room 241) and all students enrolled in S & T units are welcome to attend.

6200
Science and Technology Studies

General Education: *see Contents*

Year 1
10.001 *or both* 10.021B   *Mathematics*
and 10.021C
62.101I *or* 62.102I *or* 62.104I *or* 62.115I   *S & T Studies*
Choose 5 Level I units from Table 1

Year 2
62.201U, 62.202U
Choose 1 additional S & T unit
Choose 5 units from Table 1
1 General Education subject*

Year 3
Choose 4 S & T units*
Choose 3 units from Table 1
1 General Education subject*

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
62.400H

*26.251, 26.443 and 26.2506 may not be included in this program.

Recommended Double Majors

Science and Technology Studies/Anatomy
Science and Technology Studies/Animal Science
Science and Technology Studies/Geology
Science and Technology Studies/Plant Science

Board of Studies in Science and Mathematics

6801
For Anatomy Programs

General Education: *see Contents*

Year 1
10.001 *or both* 10.021B   *Mathematics*
and 10.021C
17.031, 17.041   *Biology*
Choose 4 appropriate Level I units from Table 1

Enrolment in Year 2 of program 7000 is based on academic performance in Year 1. Students should select the subjects specified in the program they wish to pursue in Year 2.

Students may obtain advice from the Office of the Board of Studies in Science and Mathematics in the Biological Sciences Building.

6806
For Computer Science Programs

General Education: *see Contents*

Year 1
10.001, 10.081   *Mathematics*
6.711   *Computer Science*
Choose 4 Level I units from Table 1

Entry into program 0600 or 1400 is based on academic performance in Year 1. Students may obtain advice from the office of the Board of Studies in Science and Mathematics in the Biological Sciences Building.

6810
Mathematics of Management*†

General Education: *see Contents*

Year 1
10.001   *Mathematics*
14.501, 14.511   *Accounting*
15.101E, 15.102E   *Economics*
Choose 2 Level I units from:

1. Table 1 *or*
2. Table 2 for program 6810

Year 2

10.111A, 10.1113, 10.1114, 10.2111, 10.2112
10.2113, 10.2115, 10.311A *or* 10.331
14.522, 19.602
Choose 1 unit from: 14.542, 19.603, 98.613.
1 General Education elective

Year 3

Choose 2 units from: 10.212A, 10.212D, 10.212L, 10.212M,
10.311B, 10.312A, 10.3321, 10.3322.
Choose 2 further Level III Mathematics units
Choose 2 units from one of the strands:

1. 14.563, 14.583
2. 19.605, 19.607, 19.608
3. 98.614, 98.615

Choose 1 unit from:

1. Table 1 *or*
2. Table 2 for program 6810
1 General Education elective

*Enrolment in this program requires the approval of the Chairman of the Board of Studies
in Science and Mathematics and the head of the School of Accountancy.*
***Throughout this program Mathematics subjects can be replaced by the correspond-
ing Higher Mathematics subject.*
†For details see preamble to Mathematics programs.

6817
For Biological Sciences Programs

Year 1

2.141 *or* both 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B	*Mathematics*
and 10.021C	
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1

In Year 2 students would transfer to a program administered
by the Board of Studies in Science and Mathematics and should
obtain advice from the Office of the Board of Studies in Science
and Mathematics in the Biological Sciences Building or from the
Office of the School in which they intend to major.

From 1989 the Faculty of Biological and Behavioural Sciences
will introduce a compulsory common core in Level II consisting
of four units as follows: Principles of Biochemistry and Molecu-
lar Biology, Introductory Genetics, and Fundamentals of Biology.

The core is compulsory for all students majoring in other than
Psychology programs that are offered totally within the Faculty
of Biological and Behavioural Sciences (in particular 4100 Bi-
ochemistry, 4200 Biotechnology, 4300 Plant Science, 4400
Microbiology and 4500 Animal Science). The changes have
been made in order to avoid duplication of effort (eg between
biochemistry, microbiology and genetics) and to present basic
material covering a broad spectrum of biological science in a
more cohesive manner.

Individual subjects within the core will be available to students
in other programs and are prescribed in such programs as 6832
Marine Science (Biological Oceanography) and 6840 Genetics
as well as for interfaculty double majors (eg Biochemistry/Phys-
iology, Biochemistry/Chemistry and Plant Science/Geography).

In addition, at Level II, from 1989, optional subjects offered by
the Faculty will be available to supplement the core units in var-
ious programs.

Full details of these new units and recommended program struc-
tures will be made available to students enrolled in program 6817
during Session 2 of 1988.

Marine Science

The Marine Science programs are designed to provide oppor-
tunities for students to specialize in selected areas of marine
science, yet ensure that they receive an adequate exposure to
other pertinent disciplines within this broad field. The programs
have been constructed from subjects currently available in the
faculties of Science, Biological and Behavioural Sciences and
Applied Science.

Introductory Marine Science is a subject common to all these
programs, and unique to them, having been designed for Marine
Science programs.

All students in the Marine Science programs must select *one
major sequence* from the following options: 6831 Physical
Oceanography: 6832 Biological Oceanography, 6833 Earth Sci-
ence Oceanography and 6834 Environmental Chemistry. In
addition, all students must select *two minor sequences* from the
Physical, Biological, Earth Science, and Chemical minor
sequences offered. A minor sequence in the same area as that
selected for the major sequence is excluded.

Physical Oceanography includes units of basic and advanced
Mathematics and Physics, as well as units in 10.292A Oceanog-
raphy and 10.212B Fluid Mechanics.

Biological Oceanography includes basic Mathematics, Chemis-
try and Biology as well as advanced courses in 45.111 Flower-
ing Plants, 45.201 Biology of Invertebrates, 45.172 Phycology
and Marine Botany, 45.112 Marine Ecology and 44.101 Introduc-
tory Microbiology. Further options include 17.012 General Ecol-
ogy, 10.331 Statistics and 41.101 Biochemistry.

Earth Science Oceanography consists of basic Geology and
Mathematics, and advanced units in Geology and Geography
leading to 25.631 Marine Geology, 25.632 Estuarine Geology,
25.6341 Marine Mineral Deposits and Resources, 25.6342
Exploration & Seismic Methods and 25.622 Hydrological and
Coastal Surveying.

Environmental Chemistry includes basic Chemistry and Mathe-
matics, and 2.102A Physical Chemistry, 2.102D Analytical
Chemistry, 2.123E Environmental Chemistry and 2.103D Ana-
lytical Chemistry.

All programs offer some optional units to allow students a degree
of freedom of choice of subjects. A fourth (Honours) year in
Marine Science is available in all programs.

6831
Marine Science
(Physical Oceanography)

General Education: *see Contents*

Year 1

1.001	*Physics*
1.041 *or* 6.711	*Computer Science*
10.001	*Mathematics*

Choose 2 units from 1 of the strands:
1. 2.141 *or both* 2.121 *and* 2.131 *or*   *Chemistry*
2. 17.031, 17.041 *or*   *Biology*
3. 25.110, 25.120   *Geology*
10.081 or choose 1 further unit from the above strands

Year 2
10.1113, 10.1114, 10.2111, 10.2112
1.002
68.302
10.2115 *or* 10.2215, 10.2116 *or* 10.2216
Continue the strand chosen in Year 1:
1. 2.102A *or*
2. at least 1 unit from: 17.012 or 17.050, 45.152, 45.111 *or*
3. 25.621
Choose 2 additional units from Table 1 to give a total of 8
1 General Education subject

Year 3
10.292A
10.292A
10.212D *or* 10.222D
10.212B *or* 10.222B
10.2922
68.313
Choose 2½ units from: 1.022, 1.032, 1.3533, 1.062, 1.133, 10.212A, 10.212N, 10.262A, 10.2921, 25.6342, 45.112 *or* 25.631 *or* 25.632 *or* 2.043A *or* 45.172 *or* 25.635
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units

Year 4 (Honours)
68.304

6832
Marine Science
(Biological Oceanography)

General Education: *see Contents*

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 units from 1 of the strands:
1. 1.001 *or* 1.021 *or*   *Physics*
2. 25.110, 25.120   *Geology*

Year 2
2.102A
45.111
44.101
45.201
68.302
Choose 1 unit from the subjects related to the strand chosen in Year 1:
1. 10.031 *or* 10.331 *or* 10.301 *or*
2. 25.622

Choose units from: 17.012 or 17.050, 17.601, 41.101, 45.101, 45.301 to given a total of 8 for the year
1 General Education subject

Year 3
45.172
45.112
Choose 2 Level III units from Table 1 which may include the subjects corresponding to the strand chosen in Years 1 and 2:
1. 10.032, 68.313 *or*
2. 25.632
Choose 3 units from Table 1
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete at least 6 Level III units.

Year 4 (Honours)
68.304

6833
Marine Science (Earth Science
Oceanography)

General Education: *see Contents*

Year 1

10.001 *or both* 10.021B and 10.021C	*Mathematics*
25.110, 25.120	*Geology*

Choose 4 units from 2 of the strands:
1. 1.001 *or* 1.021 *and/or*   *Physics*
2. 17.031, 17.041 *and/or*   *Biology*
3. 2.141 *or both* 2.121 *and* 2.131   *Chemistry*

Year 2
68.302
25.621, 25.622
Continue both of the strands chosen in Year 1:
1. 10.031 *or* 10.331 *or* 10.301 *and/or*
2. At least 1 unit from: 17.012 or 17.050, 45.111, 45.201 *and/or*
3. 2.102A
Choose additional units from Table 1 to give a total of 8
1 General Education subject

Year 3
25.631, 25.632, 25.6341, 25.6342
Choose 3 Level III units from Table 1 which may include the subjects corresponding to the strands chosen in Years 1 and 2:
1. 68.313, 10.032 *and/or*
2. 45.172, 45.112 *and/or*
3. 2.123E
Choose 1 unit from Table 1
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)
68.304

6834
Marine Science (Environmental Chemistry)

General Education: *see Contents*

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001	*Mathematics*

Choose 4 units from 2 of the strands:

1. 1.001 *and/or*	*Physics*
2. 17.031, 17.041 *and/or*	*Biology*
3. 25.110, 25.120	*Geology*

Year 2

2.102A, 2.102D
68.302

Continue both of the strands chosen in Year 1:

1. 10.031 *or* 10.331 *and/or*
2. At least 1 unit from: 17.012 or 17.050, 45.111, 45.201 *and/or*
3. 25.622

Choose additional units from Table 1 to give a total of 8
1 General Education subject

Year 3

2.123E, 2.103D

Choose 2 Level III units from Table 1 which may include the subjects corresponding to the strands chosen in Years 1 and 2:

1. 68.313, 10.032 *and/or*
2. 45.172, 45.112 *and/or*
3. None

Choose 3 units from Table 1
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)
68.304

Genetics

The Genetics program is designed to provide students with a firm foundation of genetical knowledge and also to give them experience in pertinent related areas.

Because the subject matter of Genetics ranges from the structure of viruses to the co-evolution of populations, students are encouraged to choose between three sequences: molecular and microbial, population and ecological, and classical and organismal. The three groups of subjects in second year correspond to these sequences; the combination of subjects chosen then will determine the choices available in Year 3.

The choice of Year 1 subjects available include Physics, Psychology and Geography.

Entry into a fourth (Honours) year is available, for above-average students, upon application to the Genetics Program Committee.

6840
Genetics

General Education: *see Contents*

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1

Year 2

17.050, 17.601
41.101
Choose 1 unit from: 43.131, 44.121, 10.331 *or* 45.101, 45.111 45.201, 45.301, 45.402
Choose 2 further units from one of the following groups:
1. 2.102B, 44.121
2. 6.711 and either 9.801 or 68.601
3. 43.131 *or* 45.111 45.201 *or* 45.402 *or* 45.301, 9.801, 62.208U or 68.601
1 General Education subject

Year 3

Choose 8 units from: 6.712, 9.802, 9.811, 41.102, 41.132, 41.142, 42.102A, 42.102C, 44.102, 44.122, 45.121, 68.602, 79.201, 79.202, 79.302.
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
68.404

Ecology

The ecology programs are designed to allow students to obtain a specialization in selected areas of Ecology while at the same time providing the opportunity to obtain experience in a wide range of cross disciplinary subjects that reflect the related disciplines contributing to the science of ecology. Three programs have been devised from subjects currently available in the Faculties of Science, Biological & Behavioural Sciences and Applied Science. Program 6851 Geographical Ecology provides for a concentration of subjects in Plant Science, Animal Science, and Geography; Program 6852 Mathematical Ecology provides for a concentration of subjects in Plant Science, Animal Science and Statistics and Program 6853 Biological Ecology provides for its major concentration within the Biological Sciences but includes contributions from other faculties. Some optional subjects are available in each program to allow students to choose subjects which match their own interests and career aspirations. The selection of these subjects should be discussed with a program adviser. A fourth (Honours) year in Ecology is available in all programs. Additional optional subjects may be available in 1990 when course restructuring within the Faculty of Biological and Behavioural Sciences is completed.

Geographical Ecology (6851) includes mathematics, biology and geography with a choice of chemistry, geology or computer science in Year 1 as well as advanced subjects in ecology, geography and biological science.

Mathematical Ecology (6852) includes mathematics, biology and computer science with a choice of chemistry, physics or geography in Year 1 as well as advanced subjects in ecology, geography, biological science and statistics.

Biological Ecology (6853) includes chemistry, mathematics and biology with a choice of physics, computer science or geography in Year 1. In Year 2 the three biological science core subjects (17.050, 17.601 and 41.101) are included together with ecology, microbiology and animal science. Year 3 includes advanced subjects in geography and biological science.

6851
Geographical Ecology

Year 1

10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*
27.010, 27.030, 27.040	*Geography*

Choose 1 of the strands:

1. 2.141 *or both* 2.121 *and* 2.131	*Chemistry*
2. 6.711, 1.041.	*Computer Science*
3. 25.110, 25.120	*Geology*

Year 2*

17.012
27.050
45.111
45.101
45.201 or 45.301
Choose at least 2 units from:
17,050, 17.601, 25.212, 25.622, 27.153, 27.175, 27.176, 27.183, 27.193, 44.101, 45.201, 45.301
1 General Education subject

Year 3

27.133, 27.143
43.152
45.152, 45.302
Choose further units from:
27.153, 27.175, 27.176, 27.183, 27.193, 43.112, 43.142, 43.172, 45.112, 45.121, 45.122, 45.132, 45.042, 45.422
to give a total of 23 for the complete program
1 General Education subject
Students proposing to proceed to Year 4 (Honours) must complete at least 7 Level III units

Year 4 (Honours)

To be determined

*Students should make sure they are able to satisfy prerequisites and should consult with advisers from the Ecology Program Committee.

6852
Mathematical Ecology

Year 1

6.711, 1.041	*Computer Science*
10.001	*Mathematics*
17.031, 17.041	*Biology*

Choose 1 of the strands:

1. 1.001 *or* 1.021	*Physics*
2. 2.141 *or both* 2.121 *and* 2.131	*Chemistry*
3. 27.010, 27.030, 27.040	*Geography*

Year 2*

10.311A, 10.311B, 10.111A, 10.1113
17.012
45.111
45.201 *or* 45.301
Choose at least 1 unit from:
10.3111, 10.3112, 17.050, 44.101, 45.201, 45.301, 45.601
1 General Education subject

Year 3

27.143
43.152
45.152
Choose at least 3 units from:
10.3111, 10.3112, 10.312A, 10.312C, 10.312F, 10.3121, 10.3122, 10.3123, 10.3124
Choose at least 1 unit from:
43.112, 43.142, 43.172, 45.112, 45.121, 45.122, 45.301, 45.402, 45.422
Choose further units from Table 1 to give a total of 23 for the complete program
1 General Education subject
Students proposing to proceed to Year 4 (Honours) must complete at least 7 Level III units

Year 4 (Honours)

To be determined

*Students should make sure they are able to satisfy prerequisites and should consult with advisers from the Ecology Program Committee.

6853
Biological Ecology

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 1 of the strands:

1. 1.001 *or* 1.021	*Physics*
2. 6.711 1.041	*Computer Science*
3. 27.010, 27.030, 27.040	*Geography*

Year 2*

17.012, 17.050, 17.601
41.101
45.101
Choose at least 1 unit from:
45.111, 44.121, 45.201, 45.301
1 General Education subject

Year 3

27.143
43.152
45.152
Choose further units including at least 1 at Level III from:
27.050, 27.133, 27.153, 43.112, 43.142, 43.172, 45.112, 45.121, 45.122, 45.132, 45.201, 45.301, 45.402, 45.422
to give a total of 23 for the complete program

1 General Education subject
Students proposing to proceed to Year 4 (Honours) must complete at least 7 Level III units

Year 4 (Honours)

To be determined

Students should make sure they are able to satisfy prerequisites and should consult with advisers from the Ecology Program Committee.

Anatomy

Entry to Anatomy programs is limited to a quota of approximately 60. Students in Year 1 must enrol in Program 6801, and apply in October for entry to Anatomy the following year. Selection is determined by academic merit, based on a weighted aggregate of marks obtained in Year 1. Allowance is made for the relative difficulty of first year subjects in Mathematics and Physics, the more difficult subjects being given a greater weight. Introductory Chemistry is included in the aggregate even though not counting for a degree. The quota does not apply to the Science/Medicine course (course 3820).

Anatomy subjects are, in general, only available to students who have been admitted to the Anatomy quota. However, students in programs 4400 (Microbiology-Immunology strand) and 6840 (Genetics) may apply to take 70.011A, 70.011C, 70.304, and 70.3041.

Students enrolled in programs for which Anatomy or Histology is relevant (eg Biochemistry, Physiology, Psychology) and who wish to study one or more Anatomy units should consult the Head of School.

A major in Anatomy may suitably be combined with a major in Biochemistry (70.304 or 70.3041 recommended), Physiology or Psychology. Owing to timetabling difficulties, the double major with Biochemistry may be impossible to complete in the minimum time.

72.301 Basic and Applied Pathology may be counted as a Level III Anatomy unit.

7000
Anatomy

General Education: *see Contents*

Year 1*
10.001 *or both* 10.021B *and* 10.021C   *Mathematics*
17.031, 17.041   *Biology*
Choose 4 Level I units from Table 1
Apply for entry to the Anatomy quota for following year

Year 2
70.011A, 70.011C
Choose 5 or 6 units from:
1. Table 1 *and/or*
2. Anatomy units in Table 2 (70.011B is recommended)
1 General Education subject

Year 3
Choose at least 4 Level III Anatomy units (may include 72.301)
Choose further units from Table 1 to give a total of 23 for the complete program
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)
70.013

In Year 1 students must enrol in program 6801. Enrolment in Year 2 is based on academic performance in Year 1.

Recommended Double Majors

Anatomy/Animal Science
Anatomy/Biochemistry
Anatomy/Physiology
Anatomy/Psychology

Physiology and Pharmacology

Physiology, the study of the processes and mechanisms which serve and control the various functions of the body, begins at the second year level with the full year subject Physiology 1 (the core subject for students who intend to proceed to the study of Physiology at a higher level).

Prior to commencing these subjects, students are required to have satisfactorily completed Level I courses in Mathematics, Cell Biology and Chemistry, as a background in these subjects is considered essential to an understanding of how the body functions. Students intending to major in Physiology should note Physiology 2 prerequisites.

Physiology 2 is a major (third year level) subject in Physiology and in this subject various systems of the body are treated in considerable detail. Progression to this full year subject normally requires the satisfactory completion of Physiology 1 and the Level II Biochemistry subject. Physiology 2 provides the 4 units at third year level required for a degree with a single major in Physiology. Alternatively it may be undertaken concurrently with a Level III subject offered by other schools in allied disciplines, such as Chemistry, Psychology, Animal Science, Biochemistry or Anatomy, to form a program leading to the award of a degree with a double major. Students who wish to take Physiology as a major subject should follow Strand **1.** of the program 7300.

The School also offers the third year level subject Pharmacology, which includes a study of the uptake, distribution and excretion of drugs within the body, and of mechanisms by which drugs, and various endogenous chemicals, alter body function. This 2 unit subject is normally taken concurrently with Physiology 2, or with Level III Biochemistry or Chemistry subjects. Pharmacology is also a full year subject. Students who wish to

form a major with Pharmacology should follow Strand **2**.

Physiology 2 and Pharmacology are the most advanced undergraduate courses offered by the School which are conducted by way of formal lectures, tutorials and laboratory practical classes. Selected students who have satisfactorily completed one of these subjects may be permitted to enrol in a further year of study of either Physiology or Pharmacology which normally leads to their being awarded their degree with Honours.

The Honours year program, as presently conducted in this School, requires the student to complete a full year research project on a specific topic under the supervision of a member of staff, and to submit a thesis based on this work. The level of honours awarded is determined chiefly on the basis of the thesis, and on course work activities such as the preparation of literature reviews, and participation in seminar programs, but also takes account of the student's overall academic record.

Recommended Double Majors

Physiology/Anatomy
Physiology/Animal Science
Physiology/Biochemistry
Physiology/Chemistry
Physiology/Psychology

7300
Physiology and Pharmacology

General Education: *see Contents*

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 Level I Units from Table 1

Year 2*
73.111
Either
1. 41.101
or
2. Choose 3 Level II units (should normally include prerequisite subjects for one of the Pharmacology co-requisite subjects shown for year 3)
Choose 4 units from Table 1
1 General Education subject

Year 3
Continue the strand chosen in Year 2:
Either
1. 73.012
or
2. 73.022
and either
2 Level III Chemistry units
or
41.102 *and* 41.122
or
73.012

Choose further units from Table 1 to give a total of 23 for the complete program.
1 General Education subject

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
73.013 *or* 73.023

*For an explanation of the division into strands **1.** and **2.** refer to the preamble.

Undergraduate Study
Board of Studies in Science and Mathematics
and the Faculty of Engineering

3611
Combined Science/
Aeronautical Engineering Course

3661
Combined Science/
Industrial Engineering Course

3681
Combined Science/
Mechanical Engineering Course

3701
Combined Science/
Naval Architecture Course

For details of the Combined Science/Aeronatical Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture Courses refer to the Faculty of Engineering Handbook.

Undergraduate Study
Board of Studies in Science and Mathematics
and the Faculty of Engineering

3725
Combined Science/
Electrical Engineering Course

For details of the Combined Science/Electrical Engineering Course
refer to the Faculty of Engineering Handbook.

Undergraduate Study
Board of Studies in Science and Mathematics
and the Faculty of Engineering

3730
Programs in the
Combined Science/
Civil Engineering
Course

For details of the combined Science/Civil Engineering Course
refer to the Faculty of Engineering Handbook.

Undergraduate Study
Board of Studies in Science and Mathematics
and the Faculty of Medicine

3820
Combined Science and
Medicine Course
(BSc MB BS)

For details of the Combined/Science Medicine Course refer to
the Faculty of Medicine Handbook.

3995
Combined Science/
Commerce Course

Finance and Mathematics

For details of the Combined Science/Commerce Course refer to
the Faculty of Commerce Handbook.

Undergraduate Study
Board of Studies in Science and Mathematics
and the Faculty of Professional Studies

4070
Mathematics Education Course

4080
Science Education Course

4070
Mathematics Education Course

Bachelor of Science Diploma in Education
BSc DipEd

The Mathematics Education Course is a concurrent course leading to the award of the qualification BSc DipEd and is designed primarily to prepare students for entry into the teaching profession as teachers of mathematics in secondary schools.

An important feature of the course is that students take education subjects along with mathematics subjects in second, third and fourth years. The Mathematics component is based on programs offered in the Science and Mathematics course. Students may proceed to honours level in either mathematics or in education.

No new enrolments have been accepted into this course as of 1987. Students already enrolled in the course may continue with their studies until completion of requirements for the award. The following arrangements apply:

1. Students in this course (4070) who have completed the Science component should enrol in the Year 4 Education program in 1989. Those who have not quite completed the Science component should discuss their 1989 enrolment with an appropriate member of the School of Education.

2. All other pass degree students in this course should enrol in 1989 with a view to completing the Science component of the course. The Education component will be available only in the first year of the course after completion of all or most of the Science component.

For additional details about the Mathematics Education course in its current form, refer to the following information in the Program Section.

Objectives of the Course

The objectives of the Mathematics components broadly aim: to develop a comprehensive knowledge and interest in mathematical techniques and problem solving, to develop an ability to reason mathematically and to present mathematical reasoning clearly and persuasively, and to ensure the student's understanding of the applications of mathematics.

Objectives related to the education component seek: to develop skills in teaching mathematics, to provide an understanding of the major disciplines which contribute to educational theory, to develop a knowledge of the latest innovations in educational practice and theory and to clarify the methodologies and curriculum materials relevant to secondary mathematics teaching.

Honours and Pass Degree Requirements

The course is offered at both pass and honours levels.

1. The pass course requires successful completion of a four-year program.

2. The honours course requires successful completion of a five-year programn in which the fifth year is devoted to an approved honours program in one of the following options.

Pure Mathematics, Applied Mathematics, Mathematical Statistics, or Education*.

The grades in this program are Honours Class I, II/1, II/2 and III.

Students who wish to proceed to the honours year should apply in writing to the Head of the School of Education. A letter of acceptance from the Head of the School in which they wish to study during the honours year should be included with this application.

*Students proceeding to the honours year in Education must have completed the Advanced Education subjects in Year 4 in addition to those Education subjects prescribed for the degree at pass level.

Components of the Course

The Mathematics Education Course consists of Mathematics, Education and General Education components.

1. Mathematics Component

Alternative programs are available to students in the course in 1989. The programs consist of subjects ranked as Level I, Level II, Level II/III, Level III and Level IV. The unit values vary from 56 to 84 hours in duration. The terms Levels I, II and III do not necessarily refer to the years in which the subject must be studied. Subjects at the various levels may be taken in other years provided the prerequisites are met. Level II/III subjects have only Level I prerequisites.

Students should select one of the following programs or one of the programs available in the Science and Mathematics course (3970) which will allow them to major in mathematics.

5811 The Mathematics and Science Program

The pass course requires at least 23 units in addition to Education and General Studies subjects.

or

5812 The Mathematics and Liberal Studies Program

The pass course requires at least 24 units in addition to Education subjects.

For both programs the selection of subjects is subject to the requirements listed below:

(1) Not less than 8 units, nor more than 10 units selected from Level I. Except with the approval of the Head of the School of Mathematics and the Director of Science Teacher Courses, not more than 2 Level I units may be taken in any one discipline other than Mathematics.

(2) The following subjects or their higher equivalents shall be included:
10.001, 10.111A, 10.1113, 10.1114, 10.2111, 10.2112.

(3) Subjects amounting to at least 2 full units chosen from:
10.1111, 10.1112, 10.1121, 10.1123, 10.1127, 10.1128, provided that a student may substitute for any of the above subjects such higher subjects as are deemed equivalent (for the purposes of satisfying this rule) by a professor of Pure Mathematics.

(4) Not less than 2 units from the following:
10.1127, 10.2113, 10.2115, 10.212L, 10.212M, 10.331, 10.311A, 10.311B, 10.3111, 10.3112, 10.312A, 10.312C, 10.2116, 10.292A, provided that a student may substitute for any of the above subjects such higher subjects as are deemed equivalent (for the purposes of satisfying this rule) by the Head of the School of Mathematics.

(5) Not less than 8 Level II or Level III Mathematics units from Table 1 (see below) and of these not less than four shall be Level III units of which only one may be Level II/III.

(6) For the award of honours the student must complete 10 units as specified in an individual program and must meet prerequisite requirements set out in Table 3 (see below).

(7) In order to graduate a student must pass all the subjects specified in the program of his/her choice.

Students in the second and third years of the course should choose a program available in the Science and Mathematics course (3970) which will allow them to major in Mathematics.

2. Education Component

The Education component is one of the major sequences in the course. It consists of subjects grouped as follows:

Theory of Education	58.702,	58.703,	58.704
Mathematics Curriculum and Instruction	58.742,	58.743,	58.744
Teaching Practice	58.712	58.713	58.714
Honours		58.793,	58.794
	58.795,	58.799	

From 1988 all Mathematics Education students enrolled in the pass degree course should enrol, in their fourth year, in the subjects
58.013 Theory of Education,
58.014 Curriculum and Instruction and
58.015 Teaching Experience

Successful completion of these will be considered to fulfil the requirements of the pass Education subjects in the course.

Students wishing to undertake honours in Education should successfully complete, in addition to the pass subjects, 58.793 and 58.794 in the fourth year, and 58.795 and 58.799 in the fifth year of the course.

3. General Education Component

(1) The General Education component involves 56 hours in the pass course.

(2) In the Mathematics and Liberal Studies Program the Liberal Studies subjects provide the General Education component.

Enrolment Requirements

1. No new student shall be enrolled in the first year of the Mathematics Education course (4070) in 1989. Students proceeding to all but the fourth year of the course should be enrolled in one of the Mathematics Education programs or one of the Mathematics programs for Science and Mathematics (3970) and, where appropriate, general studies. Fourth year students in 1989 must be enrolled in the Education program.

2. A student may with the approval of the Head of the School of Education and in consultation with the Head of the School of Mathematics, change from one selected Mathematics program to another. A written application to make the change must be lodged, including details of optional subjects selected in the new program, at the Science Education Office, Room 41, Building G2, Western Campus.

3. A student must take care to satisfy the requirements of sequences of subjects such as prerequisites and co-requisites. A prerequisite subject is one which must be completed prior to enrolment in the subject for which it is prescribed. A co-requisite subject is one which must either be completed successfully before or be studied concurrently with the subject for which it is prescribed. In exceptional circumstances, on the recommendation of the Head of the School of Mathematics, the particular prerequisite or co-requisite may be waived by the Head of the School of Education.

Programs

The course taken by each student has three component programs:

1. Education Program

Students enrolled in the pass course in 1989 and 1989 will study education only in the fourth year of their course. Students enrolled in the education honours course will also study education in their fifth year. In 1989 the subjects available are as follows:

Year	Subject†	Hours/week*
4	58.013	7.5
	58.014	6.7
	58.015	††
Honours in Education		
4	58.793	1
	58.794	1
5	58.795	4
	58.799	

†for details see the information about the Education component
*for 20 weeks
††for 8 weeks

2. General Education Program

(1) For students electing the Mathematics and Science Program or a mathematics program from the Science and Mathematics course (**3970**):

The equivalent of 56 hours of General Education should be completed.

(2) For students electing the Mathematics and Liberal Studies Program:

No specific General Education subjects are required.

3. Mathematics Program

Students should choose a program available in the Science and Mathematics course (**3970**) which will allow them to major in mathematics or one of the following programs.

5811
Mathematics and Science

Year 1
10.001
Choose 6 units from:
Table 1 &/or
The BA course*† &/or
Table 2† for program 5811 except 14.501

Year 2
10.111A, 10.1113, 10.1114, 10.2111, 10.2112**
Choose 5 units from:
Table 1 &/or
The BA course*† &/or
Table 2† for program 5811

Year 3
Choose 4 Level III Mathematics units from Table 1**
Choose a further Level II or III Mathematics unit if needed to make up the required 8
Choose 2 or 3 units from:
Table 1 &/or
The BA course*† &/or
Table 2† for program 5811

Year 4
Education subjects

Year 5
10.123 or 10.223 or 10.323 or 10.623

*Up to 5 units of this program may be replaced by subjects offered in the BA degree course (6 credit points at Level I, or 4 credit points at Upper Level are equivalent to 1 science unit). The BA degree subjects are limited to those offered by the following schools: Economics, English, French, German, History, Music, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre Studies. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273.
†Not more than 8 units that are not in Table 1 may be taken without the approval of the Head of School of Education.
** Students are encouraged to select Higher Level Mathematics subjects where applicable.

5812
Mathematics and Liberal Studies

Year 1
10.001
Choose 4-6 units from:
Table 1† &/or
Table BA course*

Year 2
10.111A, 10.1113, 10.1114, 10.2111, 10.2112
Choose 5 units from:
Table 1† &/or
The BA course*

Year 3

Choose 4 Level III Mathematics units from Table 1
Choose a further Level II or III Mathematics unit if needed to make up the required 8
Choose 2 or 3 units from:
Table 1† &/or
The BA course*

Year 4

Education subjects

Year 5

10.123 or 10.223 or 10.323 or 10.623

†Units in Geography, Science and Technology Studies and Philosophy shall be those from the BA degree course.
*At least 6 units of this program must come from subjects offered in the BA degree course (6 credit points at Level I, or 4 credit points at Upper Level are equivalent to 1 science unit). The BA degree subjects are limited to those offered by the following Schools: Drama, Economics, English, French, Geography, German, History, Music, Philosophy, Political Science, Russian, Science and Technology Studies, Sociology, Spanish and Latin American Studies. Upper Level subjects from the School of Economics are restricted to all those in Economic history plus 15.062, 15.072, 15.263 and 15.273.

4080
Science Education Degree Course

Bachelor of Science Diploma in Education
BSc DipEd

The Science Education Course is a concurrent course leading to the award of the qualifications BSc DipEd and is designed primarily to prepare students for entry into the teaching profession as teachers of science in secondary schools.

An important feature of the course is that students take education subjects along with science subjects in second, third and fourth years. The science component is based on programs offered in the Science and Mathematics Course. Students may proceed to honours in a science or in education. One of the science units is a Science and Technology Studies subject. this is included to give students an understanding of the nature of science and of its relationship to society, which is especially important to prospective teachers of science.

No new enrolments have been accepted into this course as of 1987. Students already enrolled in the course may continue with their studies until completion of requirements for the award. The following arrangements apply:

1. Students in this course (4080) who have completed the Science component should enrol in the Year 4 Education program in 1989. Those who have not quite completed the Science component should discuss their 1989 enrolment with an appropriate member of the School of Education.

2. All other pass degree students registered in this course should enrol in 1989 with a view to completing the Science component of the course. The Education component will be available only in the fourth year of the course after completion of all or most of the Science component.

For additional information about the Science Education course in its concurrent form, refer to the following information in the Program Section.

Objectives of the Course

The objectives of the course are those of the Science and Mathematics Course (3970) together with others which are essential for a course which is designed to prepare science teachers.

In summary, the objectives of the Science and Mathematics Course broadly aim to develop a working knowledge of scientific methods of investigation and to promote an understanding of the significance of science, technology, economics and sociological factors in modern society. The objectives seek to develop in the student the ability and disposition to think logically, to communicate clearly by written and oral means and to read critically. Students are encouraged to develop the habit of seeking and recognizing relationships between phenomena, principles, theories, conceptual frameworks and problems.

The education component of the course seeks to provide a knowledge of theories of education and the latest innovations in educational practice and theory, and the development of skills in teaching science.

Honours and Pass Degree Requirements

There are both pass and honours programs available in the course leading to the award of the qualifications Bachelor of Science and Diploma in Education (BSc DipEd).

1. The pass course requires successful completion of a four-year program.

2. The honours course requires successful completion of a five-year program in which the fifth year is devoted to an approved honours program in one of the following disciplines:

Physics, Chemistry, Geology, Biochemistry, Biotechnology, Plant Science, Microbiology, Animal Science, Education*, Physiology.

The grades in this program shall be Honours Class I, II/1, II/2 and III.

Students who wish to proceed to the honours year should apply in writing to the Head of School of Education. A letter of acceptance from the Head of the School in which they wish to study during the honours year should be included with this application.

*Students proceeding to the honours year in Education must have completed the Advanced Education subjects in Year 4 in addition to those Education subjects prescribed for the degree at pass level.

Components of the Course

The Science Education course consists of Science, Education and General Studies components.

1. Science Component

The Science component is based on the prescribed programs from the Science and Mathematics course (3970) and should normally be completed in the first three years of the course. The Science programs in the Science Education course are composed of subjects ranked as Level I, Level II, Level II/III, Level III, and Level IV, with each unit value varying from 56 to 84 hours. The terms Levels I, II and III do not necessarily refer to the years in which the subject must be studied. Subjects at the various levels may be taken in other years provided the prerequisites are met. Level II/III subjects have only Level I prerequisites. For the pass course the science component requires at least 23 units with the following requirements:

(1) There shall be ten units from Level I and these must come from the following subjects: 1.001 (or 1.021 for biological science programs from the Science and Mathematics Course), 2.121, 2.131, 10.001 or 10.021B and 10.021C, 17.031, 17.041, 25.110, 25.120.

(2) Not less than four units from Level III. For purposes of this clause Level II/III units are counted as Level III units.

(3) Not less than two units beyond Level I in science disciplines in any of the teaching areas physics, chemistry, (including biochemistry), biology and geology other than that of the student's major. In special circumstances this requirement may be waived with the permission of the Head of the School of Education or as specified in individual programs.

(4) One unit shall be a Science and Technology Studies subject selected from a list of subjects approved by the Head of the School of Education. In special circumstances this requirement may be waived with the permission of the Head of the School of Education or as specified in individual programs.

(5) For the honours program with honours in a science discipline there shall be at least six Level III units and students must meet prerequisite requirements set out in Table 3.

(6) For the award of honours in a science discipline the student must complete at least ten Level IV units as specified in an individual program.

(7) In order to graduate a student must pass all the subjects specified in the program of his/her choice.

2. Education Component

The Education Component is one of the major sequences in the course. It consists of subjects grouped as follows:

Theory of Education	58.702,	58.703,	58.704
Science Curriculum and Instruction	58.732,	58.733,	58.734
Teaching Practice	58.712,	58.713,	58.714
		58.793,	58.794
Honours	58.795,	58.799	

From 1988 all Science Education students enrolled in the pass course should enrol, in their fourth year, in the subjects.

58.013 Theory of Education
58.014 Curriculum and Instruction
58.015 Teaching Experience

and successful completion of these will be considered to fulfil the requirements of the pass Education subjects in the course.

Students wishing to undertake honours in Education should successfully complete, in addition to the pass subjects, 58.793 and 58.794 in the fourth year, and 58.794 and 58.799 in their fifth year of the course.

3. General Education Component

The General Education component involves 56 hours in the pass course.

Enrolment Requirements

1. No new student shall be enrolled in the first year of the Science Education course (4080) in 1989. Students proceeding to all but the fourth year of the course should be enrolled in one of the Science Education programs listed below, and general studies.

Fourth year students in 1989 must be enrolled in the Education program.

2. A student may, with approval of the Head of the School of Education change from one selected Science program to another. A written application to make the change must be lodged, including details of any optional subjects selected in the new program, at the Science Education Office, Room 41, Building G2, Western Campus.

3. The allowed specific programs are made up of sequences of subjects. Where a choice is indicated care must be taken to satisfy the requirements such as prerequisites and co-requisites.

4. A prerequisite subject is one which must be completed prior to enrolment in the subject for which it is prescribed. A co-requisite subject is one which must either be completed successfully before or be studied concurrently with the subject for which it is prescribed. An excluded subject is one which cannot be counted together with the subject which excludes it towards the degree of qualification. In exceptional circumstances, on the recommendation of the head of the appropriate school, the particular prerequisite or co-requisite may be waived by the Head of the School of Education.

5. Students lacking the HSC prerequisites for 1.001 Physics 1 *and/or* 2.121 Chemistry 1A may satisfy prerequisites by completing the respective introductory subjects 1.021 Introductory Physics for Health and Life Scientists *or* 2.111 Introductory Chemistry. Students requiring 10.001 Mathematics 1 for Physics programs may satisfy prerequisites by completing 10.021B where appropriate. Under these circumstances these introductory subjects are not counted among the units required for the degree course.

Programs

The Course followed by a particular student has three component programs.

1. Education Program

Students enrolled in the pass course in 1989 and 1989 will study education only in the fourth year of their course. Students enrolled in the education honours course will also study education in their fifth year. In 1989 the subjects available are as follows:

Year	Subject*	Hours/week*
4	58.013	7.5
	58.014	9.2
	58.015	††

Honours in Education

4	58.793	1
	58.794	1
5	58.795	4
	58.799	

†see the information about the Education component.
*for 20 weeks
††for 8 weeks

2. General Education Program

The equivalent of 56 hours of General Education should be completed.

3. Science Program

Each Science program listed below is available to students in the fourth year of the course and is based on a program in the Science and Mathematics Course. Each one has an identifying number. The Science Education programs have 58 as the first two digits of the identifying number.

Students in the second and third years of the course should choose the science program in the Science and Mathematics Course which is appropriate to their major area of study.

5801†† Physics

Year 1
1.001
2.121 & 2.131, *or* 2.141
10.001 †
17.031, 17.041
or
25.110, 25.120

Year 2
1.002, 1.012, 1.022, 1.032
10.1113, 10.1114, 10.2111, 10.2112†
17.031, 17.041
or
25.110, 25.120

Year 3
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043
Choose 1 Science and Technology Studies unit
Choose 2 units from Table 1*†

Students proposing to proceed to Year 5 (Honours) year must take 6 Level III units

Year 4
Education subjects.

Year 5 (Honours)
1.104 *or* 1.304 *or* 1.504

*Subjects available for choice from Table 1 in this program are those from schools other than Mechanical and Industrial Engineering, Electrical Engineering, Mathematics, Psychology, Geography, Philosophy.
†Students are encouraged to select Higher level Mathematics units where applicable.
††Students should read carefully the notes accompanying program 0100 Physics and seek advice from the School of Physics regarding choice of subjects. For students proceeding to Year 5 consideration is given in Year 4 to students wishing to include further subjects of Mathematics.

5820 Chemistry

Year 1
1.001
2.141 *or both* 2.121 *and* 2.131
10.001 *or both* 10.021B & 10.021C
17.031, 17.041
or
25.110, 25.120

Year 2
2.102A, 2.102B, 2.102C, 2.102D
17.031, 17.041
or
25.110, 25.120
Choose 1 Science & Technology Studies unit
Choose 1 unit from: Table 1*

Year 3

Choose 4 Level III Chemistry units
Choose 3 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take
7 Level III units

Year 4

Education subjects

Year 5

2.004

*See this footnote to program 5801.

5825
Geology

Year 1
1.001
2.121 *and* 2.131, *or* 2.141
10.001 *or both* 10.021B & 10.021C
25.110, 25.120

Year 2
17.031, 17.041
25.211, 25.212, 25.221
Choose 1 Science & Technology Studies unit
Choose 2 units from Table 1*

Year 3
25.311, 25.312
Choose 2 Level III Geology units
Choose 3 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take
7 Level III units

Year 4
Education subjects

Year 5 (Honours)
25.434

*See this footnote to program 5801.

5841
Biochemistry

Year 1
1.001 *or* 1.021
2.121 *and* 2.131, *or* 2.141
10.001 *or both* 10.021B & 10.021C
17.031, 17.041

Year 2
2.102B
25.110, 25.120
41.101
Choose 1 Science and Technology Studies unit
Choose 1 unit from Table 1*

Year 3
41.102
Choose at least 2 units from: 41.122, 41.132
Choose 3 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must complete 7 Level III units

Year 4
Education subjects

Year 5 (Honours)
41.103

*See this footnote to program 5801.

5843
Plant Science

Year 1
1.001 *or* 1.021
2.121 *and* 2.131, *or* 2.141
10.001 *or both* 10.021B & 10.021C
17.031, 17.041

Year 2
25.110, 25.120
45.111
Choose 1 Science & Technology Studies unit
Choose 4 units from Table 1*

Year 3
Choose 4 Level III Plant Science units
Choose 3 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take
7 Level III units

Year 4
Education subjects

Year 5 (Honours)
43.103

*See this footnote to program 5801

5844
Microbiology

Year 1
1.001 *or* 1.021
2.121 *and* 2.131, *or* 2.141
10.001 *or both* 10.021B & 10.021C
17.031, 17.041

Year 2

25.110, 25.120
41.101
44.101, 44.121
Choose 1 Science and Technology Studies unit
Choose 1 unit from Table 1*

Year 3

44.102, 44.122
Choose 3 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take
7 Level III units

Year 4

Education subjects

Year 5 (Honours)

44.103

*See this footnote to program 5801.

5845
Animal Science

Year 1
1.001 or 1.021
2.121 and 2.131, or 2.141
10.001 or both 10.021B & 10.021C
17.031, 17.041

Year 2
25.110, 25.120
45.101, 45.201, 45.301
Choose 1 Science and Technology Studies unit
Choose 2 Level II units of Biochemistry, Chemistry, Physics or
Mathematics

Year 3
Choose 3 units from 45.121, 45.122, 45.142, 45.402
Choose 1 further Animal Science unit
Choose 1 Science and Technology Studies unit
Choose 2 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take
6 Level III units

Year 4
Education subjects

Year 5 (Honours)
45.103
*See this footnote to program 5801.

5873
Physiology

Year 1
1.001 or 1.021
2.121 and 2.131, or 2.141
10.001 or both 10.021B & 10.021C
17.031, 17.041

Year 2
25.110, 25.120
41.101
73.111
Choose 1 Science and Technology Studies unit

Year 3
73.012
Choose 3 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take
7 Level III units

Year 4
Education subjects

Year 5 (Honours)
73.013
*See this footnote to program 5801.

Undergraduate Study
Board of Studies in Science and Mathematics
and the Faculty of Law

4770
Programs in the
Combined Science/Law
Course

For details of the combined Science/Law Course refer to the
Faculty of Law Handbook.

Table 1

Information Key
The following is the key to the information supplied about each subject in the table below: F (Full year, ie both sessions): S1 (Session 1); S2 (Session 2); SS (single session, ie *one* only); I, II, III (Levels, I, II, III); Hpw (Hours per week); C (Credit).

Physics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Physics Level 1								
1.001	Physics 1	I	2	F	6	See Subject Descriptions later in this Handbook	10.021C, *or* 10.001	
1.021	Introductory Physics 1⁶ (For Health and Life Scientists)	I	2	F	6		10.021B *and* 10.021C *or* 10.001 *or* 10.011	
1.041	Laboratory Computers in Physical Science	I	1	S2	6		10.021B *and* 10.021C *or* 10.001 *and* 1.021 *or* 1.001	Programs 0600, 6806
1.061	Computer Applications in Experimental Science 1	I	1	S2	6	6.611 *or* 6.711	1.001 *or* 1.021 10.001	1.041
Physics Level II*								
1.002	Mechanics, Waves and Optics	II	1	S1	4	1.001, 10.001	10.2111	10.4111, 10.4211, 1.992

Physics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.012	Electromagnetism and Thermal Physics	II	1	S2	4	1.001, 10.001	10.2111	1.972, 1.992
1.022	Modern Physics	II	1	F	2	1.001, 10.001	10.2112	1.9322, 1.982
1.032	Laboratory	II	1	F	3	1.001, 10.001		1.9222
1.0522††	Methods in Mathematical Physics	II	½	S2	2	1.001, 10.001	10.2111, 10.2112, 10.1113	
1.062	Computer Applications in Experimental Science 2	II	1	S1	5	1.061		
1.9222	Electronics	II	½	S1	3	1.021		1.032
1.9422	Introduction to Physics of Measurement	II	½	S1	3	1.001		

Physics Level III*

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.0133	Quantum Mechanics	III	½	S1	2	1.022, 10.2112		2.023A, 10.222F
1.0143	Nuclear Physics	III	½	S2	2		1.0133	
1.023	Statistical Mechanics and Solid State Physics	III	1	S1	4	10.2112	1.012, 1.022,	
1.0333	Electromagnetism	III	½	S1	2	1.012, 10.2111, 10.2112		10.222C
1.0343	Advanced Optics	III	½	S2	2		1.002	
1.043	Experimental Physics A	III	1	F	4	1.032		
1.0533	Experimental Physics B1	III	½	S1	4	1.032		
1.0543	Experimental Physics B2	III	½	S2	4	1.032		
1.1133	Advanced Quantum Mechanics	III	½	S2	2		1.0133	2.023A 10.222F
1.133	Electronics	III	1	S1	6	1.032 or 1.9222		
1.1433	Biophysics	III	½	S1	3	1.012, 1.022		
1.1633	Astrophysics	III	½	S2	2	1.022		
1.3033	Mechanical Properties of Materials	III	½	S1	2		1.023	4.403

Physics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.3133	Physics of Solid State Devices	III	½	S2	2		1.023	
1.3143	Topics in Condensed Matter Physics	III	½	S2	2		1.023	
1.3533	Marine Acoustics	III	½	S2	2			
1.5133	Classical Mechanics and Field Theory	III	½	S1	2	1.002 (or 10.4111) 10.1113, 10.2111 10.2112		
1.5233	Electrodynamics	III	½	S2	2	1.022, 10.1113 10.2111, 10.2112	1.0333	10.222C
1.5333	Radiation and Matter	III	½	S2	2	1.012, 1.022 10.2111, 10.2112	1.0133 or 10.222F or 2.023A 1.0333 (or 10.222C)	
1.5433††	Plasmas and Laser Fusion	III	½	S1	2	1.012, 1.022		
1.5533	General Relativity	III	½	S2	2	1.012, 1.022 10.1113, 10.2111 10.2112		
1.7113**	Lasers and Applications	III	½	S1‡	2		1.002	
1.7123**	Optoelectronics	III	½	S1‡‡	2		1.002	
1.7613**	Laser and Optoelectronics Laboratory	III	½	S2	4		1.032	

†For students who enrol in and successfully complete the subjects 1.021 Introductory Physics 1 (2 units) and 1.001 Physics 1 (2 units) the total unit value of the combined subjects will be counted as 3 units.
*Where mathematics subjects are specified as prerequisites or as co-requisites, the higher levels of such subjects are acceptable and preferable. Similarly Physics 1.001 is acceptable in place of 1.021. Students are also advised that other subjects may be acceptable equivalent prerequisites or co-requisites to those listed, eg Unit 1.982 of course 3640 may be acceptable in place of 1.022. Enquiry should be made to the School of Physics.
**Students wishing to enrol in the subjects 1.7113, 1.7123 or 1.7613 without the stated prerequisites or co-requisites should enquire from the School of Physics as to the suitability of their previous studies.
††Not offered in 1989.
‡ Offered in odd-numbered years only.
‡‡ Offered in even-numbered years only.

Chemistry

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.121	Chemistry 1A	I	1	S1 or S2	6	See Subject Descriptions later in this Handbook		2.141
2.131	Chemistry 1B	I	1	S1 or S2	6	See Subject Descriptions later in this Handbook		2.141

Chemistry (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.141	Chemistry 1M‡	I	2	F	6	See Subject Descriptions later in this Handbook		2.121, 2.131
2.102A	Physical Chemistry	II	1	S1 or S2	6	2.121 and 2.131, or 2.141, 10.001 or 10.011 or 10.021B & 10.021C		2.002A
2.102B	Organic Chemistry	II	1	F or S2	6	2.131 or 2.141		2.002B
2.102C	Inorganic Chemistry and Structure	II	1	S1 or S2	6	2.121 & 2.131, or 2.141		2.042C
2.102D	Chemical and Spectroscopic Analysis	II	1	S1 or S2	6	2.121 & 2.131, or 2.141 10.001 or 10.011 or 10.021B & 10.021C		2.002D, 2.003H
2.103A	Physical Chemistry	III	1	S1	6	1.001, 2.102A, 2.102C		2.013A
2.103B	Organic Chemistry	III	1	S1	6	2.102B		2.003B
2.103C	Inorganic Chemistry	III	1	S1	6	2.102C		2.003C
2.103D	Analytical Chemistry	III	1	S1	6	2.102D		2.003D
2.113A	Kinetics and Mechanism of Chemical Change	III	1	S2	6	2.103A		2.053A
2.113B	Synthetic Organic Chemistry	III	1	S2	6	2.103B		2.013B
2.113C	Advanced Inorganic Chemistry	III	1	S2	6	2.102C	2.103C	2.013C
2.113D	Advanced Instrumental Analysis	III	1	S2	6	2.102D	2.103D	2.013D
2.113E	Nuclear & Radiation Chemistry	III	1	S2	6	2.102A or 2.102B or 2.102C or 2.102D		2.003E
2.123A	Biophysical and Interfacial Chemistry	III	1	S2	6	2.102A		2.033A
2.123B	Biological Organic Chemistry	III	1	S2	6	2.103B		2.023B
2.123E	Environmental Chemistry	III	1	S2	6	2.102A, 2.102D		2.043A
2.133B	Applied Organic Chemistry	III	1	S2	6	2.102B	2.103B	2.003L
2.1813	Quantum Chemistry and Symmetry	III	½	S2	3	2.102C, 10.111A or 10.031		2.023A
2.1823	Computers in Chemistry	III	½	S2	3	2.102A, 2.102D		
2.1833	Molecular Structure Determination	III	½	S2	3	2.102C, 2.102D		
2.1843	Organometallic Chemistry	III	½	S2	3	2.102B, 2.102C		2.003M

‡Students majoring in Chemistry may take 2.141 in lieu of 2.121 and 2.131.

Mechanical and Industrial Engineering

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
5.0011	Engineering Mechanics I			S1 or S2	4			5.010 5.0101 5.0201
5.0012	Introductory Engineering Design & Materials Science	I	1	S1 or S2	2			5.0016 5.010
5.0011	Engineering Mechanics I	I		S1 or S2	4			5.010 5.0101 5.0201
5.0016	Introductory Engineering Design & Drawing Practice	I	1	S1	2	See Subject Descriptions later in this Handbook		5.0012 5.030 5.0302 5.010
5.0300	Graphical Analysis and Communications	I		S2	3			5.0016 5.030 5.0302
5.0305	Manufacturing Technology	I	1	S2	3			5.030

Electrical Engineering and Computer Science

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
6.711	Computing 1A	I	1	S1	6	HSC Mathematics as for 10.001	10.001 or 10.011	6.611 6.021D
6.712	Computing 1B	II	1	S2	6	6.711		6.620 6.621 6.021D
6.621	Computing 2A	II	1	S1	5	6.611 10.001 or 10.011		6.620 6.021D
6.631	Computing 2B	II	1	S1 or S2	5	6.621 or 6.021D		6.021E
6.641	Computing 2C	II	1	S1 or S2	5	6.621 or 6.021D		
6.646	Computer Applications	III	1	S1	5	6.621 or 6.712 or 6.021D 10.331 or 10.351 or 10.361 or both 10.311A and 10.311B.		6.622

Mathematics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.001	Mathematics 1	I	2	F	6	See Subject Descriptions later in this Handbook		10.011 10.021B 10.021C
10.011	Higher Mathematics 1	I	2	F	6	See Subject Descriptions later in this Handbook		10.001 10.021B 10.021C
10.021B	General Mathematics 1B	I	1	S1	6	See Subject Descriptions later in this Handbook		10.001 10.011
10.021C	General Mathematics 1C	I	1	S2	6	10.021B		10.001 10.011
10.081	Discrete Mathematics	I	1	S1 or S2	6	As for 10.001	10.001 or 10.011	
10.031‡	Mathematics	II	1	F	2	10.001 or 10.021C (CR)		‡
10.032§	Mathematics	III	1	F	2	10.031		§

Pure Mathematics

Pure Mathematics Level II

10.111A	Linear Algebra	II	1	F	2½	10.001 or 10.011		10.121A
10.1113	Multivariable Calculus	II	½	S1 or S2	2½	10.001 or 10.011		10.1213
10.1114	Complex Analysis	II	½	S1 or S2	2½	10.001 or 10.011		10.1214
10.1115	Finite Mathematics A	II	½	S1	2	10.001 or 10.011		
10.1116	Finite Mathematics B	II	½	S2	2	10.1115 (or any other level II Mathematics half unit)		

Higher Pure Mathematics Level II††

10.121A	Algebra	II	1	F	2½	10.011 or 10.001 DN		10.111A 10.1111
10.1213	Multivariable Calculus	II	½	S1	2½	10.011 or 10.001 DN		10.1113
10.1214	Complex Analysis	II	½	S2	2½	10.1213		10.1114

‡Mathematics 10.031 in included for students desiring to attempt only one Level II Mathematics unit. If other Level II units in Pure Mathematics, Applied Mathematics are taken, 10.031 Mathematics will not be counted.

§Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics or Applied Mathematics are taken, 10.032 Mathematics will not be counted except that 10.292A may be taken with 10.032.

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Pure Mathematics Level III***								
10.1111	Group Theory	III	½	S1	2	***		10.121A
10.1112	Geometry	III	½	S2	2	***		10.1424
10.1121	Number Theory	III	½	SS	2	***	·	10.1421
10.1123	Logic and Computability	III	½	SS	2	***		
10.1124	Combinatorial Topology	III	½	SS	2	***		
10.1125	Ordinary Differential Equations	III	½	S1	2	10.111A, ***		10.1425
10.1126	Partial Differential Equations	III	½	S2	2	10.1113, 10.1114 ***	10.1125	10.1426
10.1127	History of Mathematics	III	½	S2	2	***		
10.1128	Foundations of Calculus	III	½	S1	2	***		10.122B
10.1521	Combinatorics and its Applications	III	½	SS	2	***		
10.1522	Differential Geometry	III	½	SS	2	10.1113 ***		10.1325
10.1523	Functional Analysis and Applications	III	½	SS	2	10.111A 10.2112 ***	*	10.122B
Higher Pure Mathematics Level III†††								
10.122B	Real Analysis and Functional Analysis	III	1	F	2	10.121A *or* 10.111A DN 10.1213 *or* 10.1113 DN †††		10.1128 10.1523
10.1321	Rings and fields	III	½	S1‡	2	10.121A *or* 10.111A DN †††		
10.1322	Galois Theory	III	½	S2‡	2	†††	10.1321	
10.1323	Complex Analysis	III	½	S1‡‡	2	10.1214 *or* 10.1114 DN †††	†	
10.1324	Integration and Fourier Analysis	III	½	S2‡	2	†††	10.122B	
10.1325	Differential Geometry	III	½	S1‡	2	10.121A *or* 10.111A DN 10.1213 *or* 10.1113 DN †††		10.1522
10.1326	Calculus on Manifolds	III	½	S2‡	2	†††	10.1325	
10.1421	Number theory	III	½	S1‡‡	2	†††		10.1121
10.1422	Groups and Representations	III	½	S2‡‡	2	10.121A *or* both 10.111A DN and 10.1111 DN †††		
10.1423	Topology	III	½	S1‡	2	10.1213 *or* 10.1113 DN †††		

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.1424	Geometry	III	½	S2‡‡	2	10.121A or both 10.111A DN and 10.1111 DN †††		10.1112
10.1425	Ordinary Differential Equations	III	½	S1‡‡	2	10.121A or 10.111A DN 10.1213 or 10.1113 DN †††	†	10.1125
10.1426	Partial Differential Equations	III	½	S2‡‡	2	†††	10.1425	10.1126

Applied Mathematics Level II

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.2111	Vector Calculus	II	½	S1 or S2	2½	10.001 or 10.011		10.2211
10.2112	Mathematical Methods for Differential Equations	II	½	S1 or S2	2½	10.001 or 10.011		10.2212
10.2113	Linear Programming	II	½	S1 or S2	2	10.001 or 10.011	10.111A or 10.121A	10.2213
10.2115	Discrete-Time Systems	II	½	S1 or S2	2	10.001 or 10.011	10.111A or 10.121A	10.2215
10.2116	Continuous-Time Systems	II	½	S2	2	10.001 or 10.011		10.2216
10.261A	Mathematical Computing	II	1	S1	4	10.001 or 10.011		

Higher Applied Mathematics Level II

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.2211	Vector Analysis	II	½	S1	2½	10.011 or 10.001 CR		10.2111
10.2212	Mathematical Methods for Differential Equations	II	½	S2	2½	10.011 or 10.001 CR		10.2112
10.2213	Linear Programming	II	½	S1 or S2	2	10.011 or 10.001 CR	10.111A or 10.121A	10.2113
10.2215	Discrete-Time Systems	II	½	S1 or S2	2	10.011 or 10.001 CR	10.111A or 10.121A	10.2115
10.2216	Continuous-Time Systems	II	½	S2	2	10.011 or 10.001 CR		10.2116

*10.1128 is highly recommended.

†10.122B is highly recommended.

†††1. Students who gain good grades in Year 1 may be allowed to take Higher Pure Mathematics 2 units subject to the approval of the Head of Department. 10.081 Discrete Mathematics is highly recommended.

2. Students majoring in Physics who wish to take Higher Pure Mathematics 2 should attempt 10.121A, 10.1213, 10.1214, either 10.2211 or 10.2111 and either 10.2212 or 10.2112.

3. Students considering doing Higher Pure Mathematics in years III or IV should take 10.121A, 10.1213, 10.1214 and 10.2211 or 10.2111, and 10.2212 or 10.2112; 10.1115 and 10.1116 are also advised.

***Normal prerequisites for attempting Level III Pure Mathematics subjects are at least two Level II Mathematics units, including any course prerequisites. For any listed prerequisite or co-requisite subject, an appropriate higher degree subject may be substituted.

†††Students wishing to enrol in Level III Higher Pure Mathematics subjects should consult with the Department before enrolling. Normal prerequisites for attempting Level III Higher Pure Mathematics subjects are at least two Level II Mathematics units, including any course prerequisites, at an average of distinction level, or their higher equivalents. Subject to the approval of the Head of Department, these may be relaxed.

‡These subjects are offered in odd numbered years.

‡‡These subjects are offered in even numbered years.

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Applied Mathematics Level III								
10.0331	Transform Methods III			S1 *or* S2		10.1114, 10.2111		10.033 10.2921
10.212A	Numerical Analysis	III	1	S2	4	10.2112, 10.111A		10.222A
10.212B	Fluid Dynamics	III	1	S2	4	10.2111, 10.2112		10.222B 10.422A
10.212D	Mathematical Methods	III	1	S1	4	10.2112, 10.111A, 10.1113, 10.1114		10.0331 10.033 10.222D 10.412D 10.422D 10.4331 10.2921
10.212L	Optimization Methods	III	1	S1	4	10.111A, *and* 10.2111 *or* 10.1113		10.222L
10.212M	Optimal Control	III	1	S2	4	10.1113 *and* 10.1114 10.111A		10.222M
10.212N	Dynamical Systems	III	1	S1	4	10.111A, 10.2112, 10.1125		10.222N
10.262A	Mathematical Software	III	1	S2	4	10.2112, 10.111A, *and either* 6.621 *or* 10.211E *or* 10.261A *or* equivalent		10.612
10.292A	Oceanography	III	1	S1	4	10.2111, 10.2112 *or* 10.031 1.001		10.412A
10.2922	Applied Time Series Analysis	III	½	S2	2	10.022 *or* 1 Level II Pure or Applied Maths unit		10.4129

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Higher Applied Mathematics Level III								
10.222A	Numerical Analysis	III	1	S2	4	10.2212 *or* 10.2112 CR, 10.121A *or* 10.111A CR		10.212A
10.222B	Fluid Dynamics	III	1	S2	4	10.2211 *or* 10.2111 CR, 10.2212 *or* 10.2112 CR		10.212B 10.422A
10.222C	Maxwell's Equations and Special Relativity	III	1	S2	4	10.2211 *or* 10.2111 CR, 10.2212 *or* 10.2112 CR, 10.1214 *or* 10.1114 CR, 1.001		1.0333
10.222D	Mathematical Methods	III	1	S1	4	10.2212 *or* 10.2112 CR, 10.121A *or* 10.111A CR, 10.1213 *or* 10.1113 CR, 10.1214 *or* 10.1114 CR		10.0331 10.033 10.212D 10.412D 10.422D 10.4331 10.2921
10.222L	Optimization Methods	III	1	S1	4	10.121A *or* 10.111A CR, 10.2211 *or* 10.2111 CR, 10.1213 *or* 10.1113 CR		10.212L
10.222M	Optimal Control	III	1	S2	4	10.1213 *or* 10.1113 CR, 10.1214 *or* 10.1114 CR, 10.121A *or* 10.111A CR		10.212M
10.222N	Dynamical Systems	III	1	S1	4	10.121A *or* 10.111A CR, 10.1425 *or* 10.1125 CR, 10.2212 *or* 10.2112 CR		10.212N
Theory of Statistics Level II								
10.311A	Probability and Random Variables	II	1	S1‡	4	10.001 *or* 10.011 *or* 10.021C CR		10.321A 10.331 10.301 45.101

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.311B	Basic Inference	II/III	1	S2	4	10.311A		10.321B 10.331 10.301 45.101
10.3111	Statistical Computing and Simulation	II	½	S1	2	10.001 or 10.011 or 10.021C CR	10.311A	
10.3112	Nonparametric Statistical Inference	II	½	S2	2	10.311A	10.311B	
10.331	Statistics SS	II	1	F	2	10.001 or 10.021C CR		10.311A 10.311B 10.321A 10.321B 10.301 45.101

Higher Theory of Statistics Level II

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.321A	Probability and Random Variables	II	1	S1	4	10.001 or 10.011		10.311A 10.331 10.301 45.101
10.321B	Basic Inference	II/III	1	S2	4	10.321A		10.311B 10.331 10.301 45.101
10.3211	Statistical Computing and Simulation	II	½	S1	2	10.001 or 10.011	10.321A	
10.3212	Nonparametric Statistical Inference	II	½	S2	2	10.321A	10.321B	

Theory of Statistics Level III**

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.312A	Stochastic Processes	III	1	S1	4	10.311A, 10.111A, 10.1113		10.322A 10.3322
10.312C	Linear Models	III	1	S1	4	10.311B, 10.111A, 10.1113		10.322C 10.3321
10.312F	Statistical Computation	III	1	SS	4	10.311B or 10.321B, 10.3111 or 10.3211.		
10.3121	Sample Survey Theory	III	½	S1	2	10.311B		10.3221
10.3122	Design and Analysis of Experiments	III	½	S2	2	10.311B 10.312C		10.3222
10.3123	Statistical Inference	III	½	SS	2	10.311B		10.3223 10.3321

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.3124	Nonparametric Methods	III	½	SS	2	10.311B 10.3112		10.3224
10.3321	Regression Analysis and Experimental Design	III	½	S1	2	10.331 *or* 10.311B *or* 10.321B		10.3122 10.3222 10.312C 10.322C
10.3322	Applied Stochastic Processes	III	½	S2	2	10.331 *or* 10.311A *or* 10.321A		10.312A 10.322A

Higher Theory of Statistics Level III

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.322A	Stochastic Processes	III	1	S1	4½	10.111A, 10.1113, 10.321A		10.312A 10.3322
10.322C	Linear Models	III	1	S1	4½	10.321B, 10.111A, 10.1113		10.312C 10.3321
10.322D	Probability Theory	III	1	S2	4	10.321A, 10.111A, 10.1113		
10.3221	Sample Survey Theory	III	½	S1	2	10.321B		10.3121
10.3222	Design and Analysis of Experiments	III	½	S2	2	10.321B 10.322C		10.3122 10.3321
10.3223	Statistical Inference	III	½	S2	2	10.321B		10.3123
10.3224	Nonparametric Methods	III	½	S2	2	10.321B 10.3212		10.3124
10.3225	Statistics Project	III	½	F		10.321A 10.321B	*	

**For a student taking four of the higher units 10.322A, 10.322C, 10.322D, 10.3321, 10.3322, 10.3223, 10.3224, 10.312F is required to take 10.3225.
*At least four units from 10.322A, 10.322C, 10.3221, 10.3222, 10.3223, 10.3224, 10.322D, 10.312F.

Psychology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded

Psychology Level I

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.100	Psychology 1	I	2	F	5			26.433 26.505

* Psychology Level II See Notes

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.200	Research Methods 2	II	1	Not offered in 1989.	3	12.100		
12.201	Biological Basis of Psychology 2	II	1	Not offered in 1989.	4	12.100		

Psychology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.202	Social and Cognitive Psychology 2	II	1	Not offered in 1989.	4	12.100		
12.204	Human Relations	II	1	S1	4	12.100		
12.205	Individual Differences 2	II	1	Not offered in 1989.	4	12.100		
12.206	Research Methods	II	1	S1	4	12.100		12.200
12.207	Psychological Assessment	II	1	S2	3	12.206		12.200
12.208	Attention, Memory and Thought	II	1	S1	4	12.100		12.202
12.209	Personality and Social Psychology	II	1	S2	4	12.100		12.202

Psychology Level III: Group A See Notes

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.300	Research Methods 3A	III	1	S1	4	12.200		
12.305	Learning and Behaviour 3	III	1	S1 or S2	4	12.200 and 12.201		

Psychology Level III: Group B See Notes

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.301	Research Methods 3B	III	1	S2	4	12.200 and 12.300		
12.304	Personality and Individual Differences 3	III	1	S1	4	2 Psychology Level II subjects		
12.310	Physiological Psychology 3	III	1	S1	4	12.200 and 12.201		
12.311	Perception 3	III	1	S2	4	12.200 and 12.201		
12.312	Language and Cognition 3	III	1	S2	4	12.200 and 12.202		
12.314	Motivation and Emotion 3	III	1	S2	4	12.200 and 12.201		
12.315	Theories of Associative Learning 3	III	1	Not offered in 1989.	4	12.305		
12.316	Psychophysiology 3	III	1	Not offered in 1989.	4	12.200 and 12.201		
12.320	Social Psychology 3	III	1	S1	4	12.200 and 12.202		
12.321	Developmental Psychology 3	III	1	S1	4	12.200 and 12.202		
12.322	Abnormal Psychology 3	III	1	S1	4	12.200 and 12.201		
12.324	Experimental Psychopathology 3	III	1	S2	4	12.322		
12.325	Social Behaviour 3	III	1	S2	4	12.200 and 12.202		
12.330	Psychological Assessment 3	III	1	Not offered in 1989.	4	12.200, and 1 other Psychology level II subject		

Psychology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.331	Counselling Psychology 3	III	1	S1	4	2 Psychology Level II subjects		12.203
12.332	Behavioural Change 3	III	1	Not offered 1989	4	12.200 and 12.201		
12.333	Ergonomics 3	III	1	Not offered 1989	4	12.200		
12.334	Behaviour in Organizations 3	III	1	S1	4	2 Psychology Level II subjects		
12.335	Behavioural Evaluation and Assessment 3	III	1	S2	4	12.200		
12.340	Special Topic 3	III	1	Not offered 1989.	4	12.200 and 12.202		

*The Psychology Level III program is being revised for 1990 and students should check with the School for details of the changes before deciding on their Psychology Level II subjects for 1989.

Notes:
1. A student may not enrol in more than four Level II Psychology units.
2. A student may not enrol in more than three Level III Psychology units unless 12.206 Research Methods has been passed.
3. A student may not enrol in more than six Level III Psychology units unless 12.300 Research Methods 3A has been passed.
4. A major in Psychology is 12.100, 12.206 and two other Psychology Level II units, including 12.200 and four Psychology Level III units.
5. A student may not enrol in more than three Psychology Level III units selected from 12.304 Personality and Individual Differences 3, 12.322 Abnormal Psychology 3, 12.324 Experimental Psychopathology 3, 12.331 Counselling Psychology 3, and 12.335 Behavioural Evaluation and Assessment 3.
6. A student may not enrol in more than two Psychology Level III units selected from 12.320 Social Psychology 3, 12.325 Social Behaviour 3 and 12.334 Behaviour in Organizations 3.
7. A student may not enrol in more than eight Level III Psychology units in course **3970.**

Biological and Behavioural Sciences

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
17.031	Biology A	I	1	S1	6	See Subject Descriptions later in this Handbook		
17.041	Biology B*	I	1	S2	6	17.031†		
17.012	General Ecology	II	1	Not offered 1989	6	17.031 and 17.041		
17.050	Functional Adaptation in Biology	II	1	S2	6	17.031 and 17.041		
17.601	Introductory Genetics	II	1	S2	6	17.031 and 17.041	41.101	45.601

*Students with percentile range 65-100 in HSC Examination 4 unit Science with Biology, or 2 unit Biology may apply to enrol in 45.201 or 45.301 in lieu of 17.041 after completion of 17.031. Students are selected by the Head of School for enrolment in these units. If successful, students will have met the prerequisite requirement of 17.041 Biology B for all units.
†Students without this prerequisite may seek the permission of the Director of First Year Biology to enrol in 17.041.

Applied Geology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
25.110	Earth Materials and Processes**	I	1	S1	6	See Subject Descriptions later in this Handbook		
25.120	Earth Environments and Dynamics****	I	1	S2	6	25.110		

Applied Geology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
25.211	Earth Materials 1**	II	1	S1	6	25.120		25.632
25.221	Earth Materials 2****	II	1	S2	6	25.211		
25.212	Earth Environments 1[7]	II	1	S1	6	25.120		
25.223	Earth Physics**	II	1	S2	6	25.110		
25.2261	Mathematical Geology 1	II	½	S2	3	25.120		
25.621	Marine Geology 1**	II	1	F	3	25.601 or 25.110 and 25.120		Program 2500, 2503 ††
25.622	Hydrological and Coastal Surveying[7]	II/III	1	F	3			Program 2500, 2503 ††
25.311	Earth Materials 3	III	1	S1	6	25.221		
25.321	Earth Materials 4****	III	1	S2	6	25.221		
25.312	Earth Environments 2[77]	III	1	S1	6	25.212[666]		
25.314	Mineral and Energy Resources 1***	III	1	S1	6	25.221		
25.3162	Mathematical Geology 2	III	½	S1	3	25.2261		
25.324	Mineral and Energy Resources 2****	III	1	S2	6	25.212 or 25.5212		
25.325	Engineering and Environmental Geology***	III	1	S2	6			
25.3261	Geochemical Analytical Techniques	III	½	S1	2	25.311		
25.3271	Advanced Structural Geology****	III	½	S2	2	25.221		
25.333	Exploration Geophysics***	III	1	F	3S1 2S2	25.120		
25.6342	Exploration and Seismic Methods*	III	½	S2	3			25.9321
25.9311	Gravity and Magnetic Methods*	III	½	S1	3	1.001 10.001		
25.9312	Seismic Methods*	III	½	S1	3	1.001 10.001		
25.9313	Electrical Methods*	III	½	S1	3	1.001 10.001		

Field tutorials are an essential part of the subject, and are held during weekends and/or recesses. Dates and costs are available during the first week of the subject. Attendance is compulsory.
*Field work of up to 1 day.
**Field work of up to 2 days.
***Field work of up to 3 days.
****Field work of up to 4 days.
‡Field work of up to 5 days.
‡‡Field work of up to 8 days.
††Not available for programs 2500, 2503 nor in Geology program of Course **4770**, nor in Geology with some Mathematics program of Course **3730**.
†††It is desirable that students taking 25.312 should also have taken 25.223.

Geography

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
27.010	Land Studies	I	1	S1	4			27.801 27.818 27.811 27.828 27.111
27.030	Environmental Processes	I	1	S2	4			27.818 27.111
27.100	Field Project 1	I	0	S1	3		27.010	
27.818	Australian Environment and Human Response**	I	1	S1	4			27.030 27.801 27.111
27.819	Technology and Regional Change*	I	1	S2	4			27.802, 27.302
27.050	Geographical Data Analysis	II	2	F	4	27.111 or both 27.010 and 27.030		27.813 27.884
27.175	Introduction to Remote Sensing	II	1	S1	4	See Subject Descriptions later in this Handbook		27.1711
27.193	Environmental Impact Assessment	III	S2	4		27.818 or 27.030		27.818 or 27.030
27.813	Geographic Methods***	II	1	S2	4	27.010 and 27.030 or 27.818 and 27.819		27.050 27.2813
27.828	Australian Natural Environments***	II	1	S2	4	27.030 or 27.818		27.811 27.111 27.030 27.183
27.829	Australian Social Environments***	II	1	S1	4	27.010 or 27.819		27.030 27.812
27.133	Pedology†	III	1	S1	5	27.030 or any 2 units from: 2.111, 2.121, 2.131, 2.141 or 27.828 or 25.012 or 25.022		
27.143	Biogeography†	III	1	S1	5	27.030 or 17.031 and 17.041 or 27.828		

Geography (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
27.153	Climatology	III	1	S2	5	1.001, or 27.828, or 25.110 and 25.120, or 17.031 and 17.041†, or 27.010 and 27.030		
27.176	Remote Sensing Applications	III	1	S2	4	27.175		27.1712
27.183	Geomorphology	III	1	S2	5	25.110 and 25.120, or 27.828, or 27.030		27.860
27.213	Soils and Landforms	III	1	S1	4	Two of: 27.133, 27.183, 27.828; or by permission of Head of School		
27.223	Environmental Change	III	1	S2	4	See Subject Descriptions later in this Handbook		
27.300	Field Project 3	III	0	S2	3	27.133 or 27.183 27.143 or 27.828 or		
27.432	Computer Mapping and Display	III	1	S1	4	See Subject Descriptions later in this Handbook		
27.652	Geographic Information Systems	III	1	S2	4	See subject Descriptions later in this Handbook		
27.753	Social Welfare and Urban Development	III	1	S2	4	27.829 or 27.010		
27.824	Spatial Population Analysis	III	1	S2	4	27.829 or 27.010		
27.825	Urban Activity Systems	III	1	S1	4	27.829		27.010 27.812
27.826	Urban and Regional Development	III	1	S2	4	27.829 or 27.010		27.836 27.812
27.862	Australian Environment and Natural Resources**	III	1	S1 Not offered in 1988	4**	27.010 and 27.030, or 27.828 or 27.829 or 27.811 or 27.812, or 27.010 and 27.030		
27.884	Advanced Geographic Methods	III	1	S 1	4	27.813		27.880 27.050
27.883	Special Topic	III	1	S1 or S2	4	See Subject Descriptions later in this Handbook		

*A field excursion, equivalent to 8 tutorial hours, is a compulsory part of the subject.
**Two field tutorials, equivalent to 16 tutorial hours, are compulsory.
***Three days fieldwork, equivalent to 24 tutorial hours, is compulsory.

Biochemistry

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
41.101	Principles of Biochemistry and Molecular Biology	II	2	F	6	17.041, 2.121 *and* 2.131 *or* 2.141		2.003J
41.102	Biochemistry of Macromolecules	III	2	S1	12	41.101, 2,102B *or* 2.102D		41.102A
41.112	Human Biochemistry	III	1	S2	6	41.101		
41.122	Cellular Biochemistry and Control	III	1	S2	6	41.101		41.102B
41.132	Molecular Biology of Higher Organisms	III	1	S2	6	41.102		41.102E
41.142	Biochemistry and Genetic Engineering of Plants	III	1	S2	6	41.101		

Biotechnology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
42.102A	Biotechnology A	III	1	S1	6	41.101 42.101 *or* 44.101		
42.102B	Biotechnology B	III	1	S2	6	42.102A		
42.102C	Microbial Genetics	III	1	S1	6	41.101 *or* 44.101		43.102

Biological Science — Plant Science

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
17.050	Functional and Adaptational Biology					See under Biological Sciences		
43.121	Environmental Physiology	II	1	S2	6	17.031, 17.041, 2.141 *or* 2.121 *and* 2.131		43.122
43.131	Fungi and Man	II	1	S1	6	17.031 *and* 17.041		
43.112	Taxonomy and Systematics	III	1	S1	6	43.111		
43.132	Mycology-Plant Pathology	III	1	S2	6	43.131 or 44.101 or 44.121		
43.142	Environmental Botany	III	1	S1	6	17.031 *and* 17.041		
45.111	Flowering Plants	II	1	S1	6	17.031 *and* 17.041		
45.152	Plant Community Ecology	III	1	S2	6	43.111 & 17.012 *or* 27.111		
45.172	Phycology and Marine Botany	III	1	S2	6	43.111		
45.192	Ultrastructure and Function of Cells	III	1	S2	6	43.111 *or* 43.121 *or* 41.101 *or* 44.101 *or* 45.201 *or* 45.301		

Microbiology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
44.101	Introductory Microbiology	II	1	S1	6			
44.121	Microbiology 1	II	1	S2	6	17.050	41.101 and 17.601	
44.102	General Microbiology	III	2	S1	12	44.101, 44.121, 41.101		
44.112	Applied Microbiology	III	2	S2	12	44.102		
44.122	Immunology	III	1	S2	6	17.031 *and* 17.041, 41.101		
44.132	Virology	III	1	S2	6	44.102		

Biological Science — Animal Science

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
17.050	Functional and Adaptational Biology					See under **Biological Sciences**		
17.601	Introductory Genetics					See under **Biological Sciences**		
45.101	Biometry	II	1	S1	6	17.031 *and* 17.041		10.311A, 10.321A, 10.331
45.201	Biology of Invertebrates	II	1	S2	6	17.031 *and* 17.041		
45.301	Vertebrate Zoology	II	1	S1	6	17.031 *and* 17.041		
45.112	Marine Ecology§	III	1	S1	6	17.031 *and* 17.041, 45.201 *or* 25.621 *or* 2.102D		
45.121	Evolution and Population Genetics	III	1	S1	6	17.031 *and* 17.041		
45.122	Animal Behaviour	III	1	S2	6	45.101‡ *and* (45.201 *or* 45.301)		
45.132	Ecological Physiology	III	1	S2	6	45.201 *or* 45.301		
45.142	Comparative Animal Physiology	III	1	S2	6	45.201 *or* 45.301		
45.152	Population and Community Ecology	III	1	S1	6	17.041 *and* 10.001 *or* 10.011 *or* 10.021C		
45.302	Vertebrate Zoogeography and Evolution	III	1	S2	6	45.301		
45.402	Entomology	III	1	S1	6	17.031, 17.041, 45.201		
45.422	Economic Zoology	III	1	S1	6	45.201 *or* 45.402		

Note: A student will not be admitted to Level III Biological Science subjects without special permission of the Head of School, unless Chemistry 2.121 and 2.131, *or* 2.141, has been completed.

Students who wish to complete a major in the School of Biological Science must take Biometry 45.101 and at least two Level II units from one of the following Schools: Biochemistry, or Chemistry, or Physics, or Mathematics, except as detailed in an approved program.

†Level III courses conducted by the School of Biological Science are available only during the daytime.

§Students intending to enrol in this unit should register with the School of Biological Science for the February field trip by 13 January.

‡One of 10.311A; 10.321A; 10.331 may be substituted for 45.101 with special permission of the Head of School.

Philosophy‡

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.103	Introductory Philosophy A	I	1	S1	4			
52.104	Introductory Philosophy B	I	1	S2	4			
52.2001	The Nature of Mind	II/III	½	Not offered 1989	2	Level II status in Philosophy**		
52.2002	Contemporary Philosophy of Mind	II/III	½	S 1	2	Level II status in Philosophy**		

Philosophy (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.2003	Issues in the Philosophy of Psychology	II/III	½	S2	2	52.2001 or 52.2002		
52.2010	Reasoning Skills	II/III	½	S1 or S2	2	Any Level I Subject		52.233
52.2022	Body, Mind Knowledge and Freedom	II/III	½	S1	2	Level 2 Status in Philosophy		52.2020
52.220	Logic	II/III	1	S2	3	Any Level I Subject		52.2030 52.2031
52.2024	Reasons and the Passions: Descartes, Spinoza and Hume	II/III	½	S2	2	Level 2 Status in Philosophy		52.2021
52.2025	Images	II/III	½	Not offered 1989	2	Level 2 Status in Philosophy		
52.2040	Greek Philosophy: Thales to Plato	II/III	½	S2	2	Level II Status in Philosophy**		
52.2050	Classical Political Philosophy	II/III	½	S1	2	Level II Status in Philosophy**		
52.2060	Sartre	II/III	½	S1	2	Level II Status in Philosophy**		
52.2130	British Empiricism	II/III	½	S2	2	Level II Status in Philosophy**		
52.2140	Scientific Method	II/III	½	S1	2	Level II Status in Philosophy**		
52.2150	Philosophy of Law	II/III	½	S2	2	Level II Status in Philosophy**		
52.219	Philosophical Foundations of Marx's Thought	II/III	1	S2	3	Level II Status in Philosophy**		
52.2170	Hume	II/III	½	S1	2	Level II Status in Philosophy**		
52.2220	The Ethics of Plato and Aristotle	II/III	½	S1	2	Level II Status in Philosophy**		
52.2230	Theories in Moral Philosophy	II/III	½	S2 Not offered in 1989	2	Level II Status in Philosophy**		
52.2240	Philosophical Study of Woman	II/III	½		2	Level II Status in Philosophy**		
52.2260	Aesthetics	II/III	½	S2	2	Level II Status in Philosophy**		
52.2330	Psychoanalysis — Freud and Lacan	II/III	½	S2	2	Level II Status in Philosophy**		
52.2980	Seminar A	II/III	½	S2	2	Level II Status in Philosophy**		

Philosophy (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.2990	Reading Option A	II/III	½	S1 or S2	2	Level II Status in Philosophy**		
52.3010	Seminar B	II/III	½	S1	2	Level II Status in Philosophy**		
52.3020	Seminar C	II/III	½	S2	2	Level II Status in Philosophy**		52.443
52.3030	Reading Option B	II/III	½	S1 or S2	2	Level II Status in Philosophy**		
52.304	Advanced Philosophy of Science	III	1	S1	3	52.220 and 52.2140 or 62.202U		

**Level II status in Philosophy consists in 1. being in second or later year of university study, and 2. having taken and passed at least one Level I Philosophy unit. If the unit is composed of two half-units, these must have been passed in the same session. The prerequisite may be waived in certain cases by the School.
‡Due to the extra library work required in the preparation of essays a combination of three half-unit Philosophy subjects count as the equivalent of two Science units.

Science and Technology Studies

Students undertaking subjects in Science and Technology Studies are required to supplement the class contact hours by study in the Library.

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
62.101I	Science, Technology and Social Change†	I	1	S1	3			†, 62.110
62.102I	Man, Megalith and Cosmos†	I	1	S1	3			†, 62.111
62.104I	The Seventeenth Century Intellectual Revolution†	I	1	S2	3			62.211
62.115I†	Science: Good, Bad and Bogus — An introduction to the Philosophy of Science	I	1	S2	3			
62.201U	Materials Machines and Men	II/III	1	S2	3			26.251, 62.022
62.202U	The Scientific Theory	II/III	1	S2	3			62.032
62.203U	Scientific Knowledge and Political Power	II/III	1	S1	3	A pass in four Level I units from Table 1		62.052
62.204U	The Social System of Science	II/III	1	S2	3			62.062
62.205U	Historical Origins of the American Scientific Estate	II/III	1	S1	3			62.072
62.206U	Science, Technology and Developing Countries	II/III	1	S1	3			62.082
62.207U	The Discovery of Time	II/III	1	S1	3			62.103

Science and Technology Studies

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
62.208U	The Darwinian Revolution	II/III	1	S1	2			62.104
62.209U	Mind, Mechanism and Life	II/III	1	S1	3			62.106
62.210U	History of Medicine	II/III	1	S1	3	A pass in 4 level I units from Table 1		62.043 26.568, 26.2506, 62.109
62.211U	Relations Between Science and the Arts	II/III	1	S1	3			
62.212U	The New Biotechnologies and their Social Context	II/III	1	S2	3	62.101I, or by permission of the Head of School for 3rd and 4th Year students in the biological sciences		62.245
62.213U	Technological Development in Twentieth Century Australia	II/III	1	S2	3	62.101I		62.246
62.214U	Man, Woman and Deity	II/III	1	S2	3	A pass in four Level I units from Table 1		62.285
62.217U	Computers, Brains and Minds: Foundations of the Cognitive Sciences	II/III	1	S2	3	As for 62.201U		62.554
62.218U	Language and Minds: The Impact of Chomsky's Revolution in Linguistics and Philosophy	II/III	1	S1	3	As for 62.201U		62.570
62.219U	Knowledge and Belief in the Sciences	II/III	1	F	2	Completion of 3 set units with an average of credit or better, or by permission of Head of School		26.222 62.111 62.102I 62.211 62.104I 62.032 62.202U
62.220U	Technology and the Sociologogy of Risk	II/III	1	S1	3	62.101I or completion of Arts subjects carrying at least 24 credit points, or a Pass in 4 Level 1 science units.		
62.221U	Information and Communication Technologies in Society	II/III	1	S1	3	As for 62.220U		
62.222U	The Politics of Energy	II/III	I	S2	3	As for 62.222 or 62.220U		
62.224U	History of the Philosophy and Methodology of Science	II/III	1	S2	3	As for 62.201U		62.543 62.551 62.561 62.215U 62.216U

Science and Technology Studies (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
62.300U	Research Methods in Science and Technology Studies	III	1	S1	1½	Completion of 3 S&T units with an average of Credit or better, or by permission of Head of School		62.105
62.301U	Philosphical Problems in Evolutionary Biology	III	1	S1	3	62.202U or 62.208U		62.3001
62.3003	Innovation and the Modern Industrial Estate	II/III	1	S2	2	See Subject Descriptions later in this handbook		
62.3004	Measurement and Management of Science and Technology	II/III	I	S1	2	A¢s for 62.3003		
62.305U	Issues in the Philosophy of Science	III	1	S2	3	As for 62.300U		62.3005

†Note: only two Level 1 units may be counted towards Course 3970.

Board of Studies in Science and Mathematics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
68.302	Introductory Marine Science	II	1	S1	4			25.601
68.313	Physical Oceanography	III	1	S2	4	10.001 or 10.011 and 1.001		
68.601	Genetics of Behaviour 1	II	1	S1	5	17.031		
68.602	Genetics of Behaviour 2	III	1	S2	5	79.402 or 68.601		

Pathology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
72.301	Basic and Applied Pathology	III	1	F	3	70.011A 70.011C 73.111 or equivalent		

Physiology and Pharmacology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
73.111	Physiology 1*	II	2	F	6	2.121 and 2.131, or 2.141, 10.001 or 10.011 or 10.021B and 10.021C, 17.041		

Physiology and Pharmacology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
73.012	Physiology 2	III	4	F	12	73.111, 41.101		
73.012A	Membrane Biology	III	1	S1	6	Normally as for 73.012,		
73.012B	Neurophysiology	III	1	S1	6	but may be studied only		
73.012C	Organ Physiology	III	2	S2	12	with permission of Head of School		
73.022	Pharmacology	III	2	F	6	73.111	73.012 or 41.102 and 41.122 or 2 Level III Chemistry units	

Note: The above represent the normal prerequisites for the courses in Physiology, but the Head of School may recommend that students with a good academic record be granted exemption from them.
*Students intending to major in Physiology should note Physiology 2 prerequisites.

Community Medicine

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
79.201	Population Genetics	III	1	S1	5	See [6] below		
79.202	Human Genetic Analysis	III	1	S2	5	See [*] below		
79.302	Biochemical Genetics of Man	III	1	S1	6	41.101, 45.601 (or their equivalents)		

[6] One unit of statistical methods, or theory, as approved by the Head of School.
[*] A unit of genetics and a unit of statistical methods, or theory, as approved by the Head of School.

Course 3970
Units available in specific programs and double degree courses

Table 2

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded	Specific Programs
1.982	Solid State Physics (Electrical Engineering)	II	1	S1	½	1.001, 10.001	10.2111, 10.2112	1.022	Course 3681
2.111	Introductory Chemistry*	I	1	S1	6				0100, 1200, 2700
2.951	Chemistry 1 ME	I	1	S1	6	As for 2.121		2.121, 2.131, 2.141	Course 3681
2.991	Chemistry for Civil Engineers	I	1	S2	6	As for 2.121		2.121, 2.131, 2.141	Course 3730
4.412A	Physical Metallurgy 1A	II	1	S1	6		2.102A 4.732		Course 3681
4.413	Physical Metallurgy 2A	III	½	S1	2½	4.412A (Unit 1)			Course 3681
4.422B	Physical Metallurgy 1B	II	½	S2	2	—			Course 3681
4.432	Physical Metallurgy 1C	II	½	S2	4	4.412A			Course 3681
4.433C	Physical Metallurgy 2C	III	½	S2	4	4.412A			Course 3681
4.443	Physical Metallurgy 2D	III	½	S2	4	4.432			Course 3681
4.453	Physical Metallurgy 2E	III	½	S2	2½	4.432			Course 3681
4.642	Metallurgical Engineering 1D	II	½	S2	4	4.732			Course 3681
4.643	Metallurgical Engineering 2D	III	½	S1	3	4.412A, 4.732			Course 3681
4.713	X-ray Diffraction and Electron Microscopy	III	½	S2	4	4.412A			Course 3681
4.732	Mechanical Properties of Materials	II	½	S2	4	5.0011	4.412A		Course 3681
4.742	Physics of Materials	II	½	S2	3	1.001 or 1.011			Course 3681
5.1010	Mechanical Engineering Design	I	½	S2	3		5.0010	5.0012	Course 3681
5.0721	Computing 1	I	½	S1	3		10.001	10.211E	Course 3681
5.302B	Engineering Mechanics 2B	II	½	S2	2	1.001, 5.3021, 10.001	5.0201, 10.001		Course 3681
5.3021	Engineering Mechanics 2A	I	½	S1 or S2	3	1.001, 5.0011, 10.001			Course 3681
5.421	Mechanics of Solids 1	I	½	S2	3		5.010 or 5.0011		Course 3681
5.4220	Mechanics of Solids 2	II	1½	F	4½	5.020 or 5.421 or 8.171, 10.001		4.402, 4.442, 5.4221	Course 3681

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded	Specific Programs
5.4221	Mechanics of Solids 2/ Materials	II	1½	F	3½	5.020 or 5.421 or 8.171, 10.001		5.4220	Course 3681
5.620	Fluid Mechanics 1	II		F	2	1.001, 5.0011,			Course 3681
5.626	Thermodynamics 1	II	1½	F	2	10.001			Course 3681
6.010	Electrical Engineering	I	1	S2	6	Electrical and magnetism section of 1.001			0100, 0600, 1000
6.021A	Basic Circuit Theory	II	½	SS	4	6.010, 1.001, 10.001			0600
6.021C	Electronics	II	½	SS	4	6.021A, 1.982 or equiv.			0600
6.613	Computer Organization and Design	III	1	S2	5	6.631 or 6.021E, 6.021D or 6.620 or 6.621		6.0318	0600 or in the Computer Science Quota. Courses 3611 3661 3681 3701 3725 3730 4770
6.632	Operating Systems	III	1	S1	5	6.631 or 6.021E, 6.641		6.672	
6.633	Data Bases and Networks	III	1	S2	5	6.641		6.622, 14.607, 14.608	
6.642	Design and Analysis of Algorithms	III	1	S1	5	6.641			
6.643	Compiling Techniques and Programming Languages	III	1	S1	5	6.641		6.672	
6.647	Business Information Systems	III	1	S2	5	6.641 14.501			
8.2410	Mechanics of Solids 1	I	½	SS	3	5.0011		5.020, 5.421	Course 3681
9.801	Genetics 1	II	1	F	3				6840
9.811	Biostatistics 1	III	1	S1	4	10.301 or 45.101			6840
9.802	Genetics 2	III	1	F	4	9.801			6840
10.022	Engineering Mathematics 2	II	1	F	4	10.001			Courses 3681, 3730
10.301	Statistics SA	II	1	F	2	10.001 or 10.021C CR			6832, 6833
10.351	Statistics SM	II	1	F	2	10.001		10.331, 10.311A, 10.311B, 10.321A, 10.321B	Course 3681
14.501	Accounting and Financial Management 1A***ttt	I	1	S1	4½				0600, 1000, 5811, 1400, 6810 Course 3681
14.511	Accounting and Financial Management 1B	I	1	S2	4½	14.501			0600, 1000, 5811, 1400, 6810
14.522	Accounting and Financial Management 2A	II	1	S1	4½	14.511			0600, 1000, 5811, 1400, 6810
14.542	Accounting and Financial Management 2B	II	1	S2	4½	14.511			0600, 1000, 1400, 5811, 6810

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded	Specific Programs
14.563	Accounting and Financial Management 3A	III	1	S1	4½	14.542			1400, 6810
14.573	Accounting and Financial Management 3A (Honours)	III	1	S1	6	14.542			6810
14.583	Accounting and Financial Management 3B	III	1	S2	4½	14.522			1400, 6810
14.593	Accounting and Financial Management 3B (Honours)	III	1	S2	6	14.522			6810
15.101E	Microeconomics 1	I	1	S1 or S2	3½	See Subject Descriptions later in this Handbook		15.001	0600, 1000, 1400, 6810
15.101H	Australia in the International Economy in the Twentieth Century	I	1	S1 or S2	3½	See Subject Descriptions later in this handbook		15.901	6810
15.102E	Macroeconomics 1	I	1	S1 or S2	3½	15.101E or 15.001		15.011	0600, 1000 1400, 6810
15.201E	Microeconomics 2	II	1	S1	4	15.011 or 15.102E, 15.401 or 15.411 or 15.101M or 15.102M or 10.001 or 10.011		15.002 or 15.072 or 15.203E	0600, 1000, 6810, 5811
15.202E	Macroeconomics 2	II	1	S2	4	15.002 or 15.201E, 15.401 or 15.411 or 15.101M or 15.102M or 10.001 or 10.011	15.421 or 15.103M	15.042 or 15.062 or 15.204E	0600, 1000 6810, 5811
15.203E	Applied Microeconomics 2	II	1	S1 or S2	4	15.011 or 15.102E		15.002 or 15.072 or 15.201E	6810
15.204E	Applied Macroeconomics 2	II	1	S1 or S2	4	15.011 or 15.102E		15.042 or 15.062 or 15.202E	6810
15.246H	Management Strategy and Business Development	I	1	S2	3½	See Subject Descriptions later in this handbook		15.902	6810
15.301E	Microeconomics 3	III	1	S1	4	15.002 or 15.201E	15.412 or 15.203M	15.143	0600, 1000
15.302E	Macroeconomics 3	III	1	S2	4	15.042 or 15.052 or 15.202E or 15.222E	15.412 or 15.203M	15.003	0600
19.602	Computer Information Systems 1	II	1	S1	3	See Subject Descriptions later in this handbook		14.602	0600, 1000, 1400, 5811, 6810
19.603	Computer Information Systems 2	II	1	S2	3	14.602 or 19.602		14.603	0600, 1000, 1400, 5811, 6810
19.605	Information Systems Implementation	III	1	S2	3	14.603 or 19.603		14.605	0600, 1400
19.607	Distributed Computer Systems	III	1	S2	3	14.603 or 19.603		6.633, 14.607	0600, 1400, 6810
19.608	Database Systems	III	1	S1	3	14.603 or 19.603		6.633, 14.608	0600, 1400, 6810
19.609	Computer Information Systems Technology	II	1	S1	3	6.611 or 6.711 or 14.602 or 19.602			1400
19.611	Information Systems Development	III	1	S1	3	14.603 or 19.603 and approval from Head of School		6.647, 14.611	0600,6810

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded	Specific Programs
19.616	Commercial Programming Principles	II	1	S2	3	14.605 or 19.605			1400
19.691	Industrial Training 1	II/III	0	S1	1	14.602 or 19.602			1405
19.692	Industrial Training 2	III	0	S2	1	14.605 or 19.605			1405
19.693	Industrial Training 3	III	0	S1	1		14.611 or 19.611		1405
25.5212	Sedimentology	II	½	S1	2	25.120		25.212	2503
25.5313	Stratigraphy	III	½	S1	2	25.5212		25.312	2503
25.631	Marine Geology 2	III	1	F	3	25.621			6833, 6870
25.632	Estuarine Geology	III	1	S1	3			25.211	6832, 6833, 6870
25.6341	Marine Mineral Deposits	III	½	S1	3	25.621	25.631		6833, 6870
25.9314	Geological Applications	III	½	S1.	4	25.120			2503
25.9321	Geophysical and Geological Applications	III	½	S2	3	25.120		25.6342	2503
27.040	Data Processing Systems	I	0	F	2				6851, 6852, 6853
48.403	Polymer Science	III	1	F	3	2.102A, 2.102B, 10.031, 10.301	10.331		Course 3681
70.011A	Histology 1	II	1	F	3	17.041, 17.031	70.011C		§§ 7000 or in the Anatomy Quota. Courses 4770 (Anatomy) 3820
70.011B	Mammalian Embryology	III	1	F	3	17.041, 17.031	70.011A, 70.011C		
70.011C	Introductory Anatomy	II	1	S1	6	17.041, 17.031			
70.012B	Visceral Anatomy	III	1	S2	6	70.011C			
70.012C	Neuroanatomy 1	III	1	S1	6	70.011A 70.011C			
70.304	Histology 2‡	III	1	S2	6	70.011A		70.3041§	
70.305	Neuroanatomy 2	III	1	S2	3	70.012C			
70.306	Functional Anatomy 1	III	1	S1	6	70.011C			
70.307	Functional Anatomy 2	III	1	S2	6	70.306			
70.3041	Histological and Histochemical Techniques‡	III	½	S2	3	17.031, 17.041 and any 1 of 41.101, 45.301 or 70.011A		70.304§	
73.012F	Clinical Physiology	III	1	F	3	73.111, 41.101, 2.102B, 70.011A, 70.011C, 80.014			Course 3820
80.014	Human Behaviour	II	1	F	3				Course 3820
90.112	Legal System-Tort			F	4				Course 4770
90.141	Contracts			F	4				Course 4770
90.161	Criminal Law			F	4				Course 4770
90.216	Administrative Law			S1 or S2	4				Course 4770
90.301	Property and Equity			F	4				Course 4770
90.621	Law, Lawyers and Society			S1 or S2	4				Course 4770
90.741	Legal Research and Writing 1			F	2				Course 4770
98.613	Business Finance 2A	II	1	S1	3			14.613	1400, 6810
98.614	Business Finance 2B	III	1	S2	3	14.613 or 98.613			1400, 6810
98.615	Business Finance 3	III	1	S1	3	14.614 or 98.614		14.615	6810
98.864	Australian Capital Markets	II/III	1	S2	3			14.864	1400
99.774	Legal Environment of Commerce	I	1	S2	3	See Subject Descriptions later in this handbook		14.774	1400, 6810
99.775	Legal Transactions in Commerce	II	1	S1 or S2	3	See Subject Descriptions later in this handbook		14.775	1400

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded	Specific Programs
99.776	Legal Regulations of Commerce	II	1	S1 *or* S2	3	14.774 *or* 99.774		14.776	1400
99.783	Taxation Law	II	1	S1	4	14.775 *or* 14.776 *or* 99.775 *or* 99.776		14.783	1400

*Students who have passed 2.121 may not subsequently enrol in 2.111. Students meeting the 2.121 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Once students enrol in 2.111 they must pass 2.111 before they can proceed to 2.121 or 2.131. Students may not count more than two Level I Chemistry units towards BSc degree requirements.
**In exceptional circumstances the Head of School may give permission for students outside the specified programs to undertake one of these subjects.
***Not available in Year 1 of programs 0600, 1000, 5811, 1400.
†††May be counted in Courses 3611, 3661, 3681 and 3701 in special circumstances only.
‡‡May not be offered in 1989 if insufficient enrolments.
§70.304 and 70.3041 are mutually exclusive (see **Subject Descriptions** later in this handbook).
§§Anatomy units may be counted as Table 1 units in any program on obtaining special permission of the Head of the School of Anatomy.

**Course 3970
Level IV units offered by
the Board of Studies in
Science and Mathematics**

Table 3

A student planning to complete a program involving any subject from this table must seek the approval of the Head of the School in which the subject is taught.

No.	Name	Level	Unit Value	When Offered	Prerequisites in Years 1, 2, 3 or 4	Number of Level III Units Required
1.104	Physics 4 (Honours)	IV	10	F	Program 0100	7
					Program 0161	6
					Program 5801	6
1.304	Applied Physics 4 (Honours)	IV	10	F	Program 0100	7
					Program 0161	6
					Program 5801	6
1.504	Theoretical Physics 4 (Honours)	IV	10	F	Program 0100§	7
					Program 0161	6
					Program 5801	6
1.604	Biophysics 4 (Honours)	IV	10	F	Program 0100	6
2.004	Chemistry 4	IV	10	F	4 Level III Chemistry units	8
					Program 5820	7
6.606	Computer Science 4	IV	10	F	6.613, 6.632, 6.642, 6.643	8
10.123	Pure Mathematics Honours	IV	10	F	Program 1000	6*
					Program 5811 *or* 5812	6*
10.223	Applied Mathematics Honours	IV	10	F	Program 1000	6
					Program 5811 *or* 5812	6*
					Program 6810	6*
10.323	Theory of Statistics Honours	IV	10	F	Program 1006	6*
					Program 5811 *or* 5812	7*
10.623	Mathematics and Computer Science Honours	IV	10	F	Program 0600	7
					Program 1000	7
					Program 1061	7
12.403	Psychology 4 (Thesis)	IV	10	F	Program 1200	8
12.404	Psychology 4	IV	10	F	Program 1200	8

Table 3: Level IV units offered by the Board of Studies in Science and Mathematics

No.	Name	Level	Unit Value	When Offered	Prerequisites in Years 1, 2, 3 or 4	Number of Level III Units Required
14.794	Honours Thesis	IV				
14.853	Advanced Systems Management	IV				
14.857	Operations Research for Management 1	IV				
14.886	Research Topics in Information Systems 1	IV	10	F	Program 1400	6
14.887	Research Topics in Information Systems 2	IV				
14.891	Decision Support Systems	IV				
25.435	Geology 4 Honours	IV	10	F	Programs 2500, 2503 Program 5825	8 7
27.844	Geography 4	IV	10	F	Program 2700 27.050 or 27.884	8
41.103	Biochemistry 4	IV	10	F	4 Level III Biochemistry units Program 5841	8 7
42.103	Biotechnology 4	IV	10	F	4 Level III units in a discipline, or disciplines, related to Biotechnology	8
43.103	Botany	IV	10	F	4 Level III Plant Science units or a closely related discipline Program 5843	7 7
44.103	Microbiology Honours	IV	10	F	44.102, 44.112 Program 5844	8 7
45.103	Zoology 4	IV	10	F	4 Level III Animal Science units Program 5845	8 7
62.400H	Science and Technology Studies Honours	IV	10	F	Program 6200	7
68.304	Marine Science 4	IV	10	F	Program 6831, 6832, 6833 or 6834	6
68.404	Genetics 4	IV	10	F	Program 6840	7
68.430	Combined Geology Physics Honours	IV	10	F	Program 0100	8

No.	Name	Level	Unit Value	When Offered	Prerequisites in Years 1, 2, 3 or 4	Number of Level III Units Required
70.013	Anatomy 4	IV	10	F	4 Level III Anatomy units	6
72.304	Pathology Honours	IV	10	F	72.301	6
73.013	Physiology 4	IV	10	F	4 Level III Physiology units Program 5873	7 7
73.023	Pharmacology	IV	10	F	Program 7300(2)	7
79.014	Human Genetics	IV	10	F	At least 3 of the following: 41.102, 42.102C, 44.122, 45.121, 79.201, 79.202, 79.302, 68.602	8

*Some Higher Mathematics subjects should normally be included at Levels II and III in order to enter Level IV Mathematics. Students should discuss their Year 3 program in Department concerned.
§Students entering 1.504 from the 0100 program should have demonstrated adequate mathematical ability.

Undergraduate Study: Faculty of Biological and Behavioural Sciences

Faculty of Biological and Behavioural Sciences

Introduction

The Schools of the Faculty of Biological and Behavioural Sciences contribute programs to the Science and Mathematics Course **3970** and the Faculty supervises the undergraduate course in Psychology **3431**). The Schools of the Faculty also offer facilities for students to proceed to the award of a Graduate Diploma in Biochemical Engineering (**5320**); Graduate Diploma in Biotechnology (**5340**); to masters degrees in Biological Technology (**8260**) and in Psychology (**8251** and **8255**); and to the award of masters degrees by research and the award of the degree of Doctor of Philosophy.

Students requiring advice about the undergraduate course should contact
School of Psychology . . . . Professor B.J. Gillam
Mr T.J. Clulow

Student requiring advice about graduate studies should check details later in this handbook and also enquire from the Head of the appropriate School.

Faculty of Biological and Behavioural Sciences

Course Outline 3431

3431
Psychology Degree Course
— Full-time Course

Bachelor of Science (Psychology)
BSc(Psychol)

The four year course in Psychology, which leads to the award of the degree of Bachelor of Science (Psychology), is designed to meet the requirements of students who intend to become professional psychologists, as either practitioners or research workers.

The course requirements have been so designed that they allow for:

1. a solid core of psychology to equip the psychologist-in-training with psychological theory, skill in experimentation and psychological techniques;

2. supporting studies in mathematics and/or biology (a minimum of one such course is compulsory);

3. supporting studies in the social sciences (a minimum of one such course is compulsory); and

4. the special needs, interests and academic or vocational background of individual students.

For these reasons, no course patterns are prescribed. The patterns to be completed by students who are admitted with advanced standing will take into account the subjects credited.

Students commencing university studies for the first time will arrange their pattern of supporting subjects in consultation with the Head of the School or her representative before completing enrolment.

The course is available on a full-time basis only. Entry into the course is subject to a quota which is determined from time to time.

In the fourth year, students undertake a program of study which includes courses in the major areas of general psychology and in a number of applied fields. In addition, each student must complete either a research thesis or a group research project.

Details of the qualifications required for admission to the Psychology Course leading to the award of BSc(Psychol), the course requirements for Pass and Honours at graduation and rules governing admission with advanced standing are given below.

Rules governing the Psychology Course

1. Applicants for admission to the Course must be matriculated to this University; and also have satisfied either the entrance requirements for 10.001 Mathematics 1 *or* 10.021B General Mathematics 1B and 10.021C General Mathematics 1C *or for* 17.031 Biology A and 17.041 Biology B.

2. (1) In order to qualify for admission to the award of degree of BSc(Psychol) under these regulations a candidate must attend classes and satisfy the examiners in the following program:

Year 1
12.100
10.001 *or both* 10.021B *and* 10.021C *or*
17.031 *and* 17.041
15.101E *and* 15.102E *or* 52.103 *and* 52.104 *or*
12 Arts credit points of Level I Sociology *or*
Political Science *or* other approved discipline
Choose 1 elective Year 1 subject from Arts *or* Science

Note: Students wishing to take 73.111 as their Year 2 non-psychology follow-on subject should enrol in 2.121, 2.131, 10.001 or 10.021B and 10.021C, 17.031, 17.041 and are not required to take an Arts subject.

Year 2
12.203, 12.206, 12.207, 12.208, 12.209
Choose one Year 2 subject following on from one of the Year 1 non-psychology subjects — this constitutes a recognized sequence (one Year 2 subject is equivalent to 2 Science level II units or 12 Arts upper level credit points)

1 Category A General Education elective (56 hours)
1 Category B General Education elective (56 hours)

Note: If one of the Year 1 non-psychology subjects is divided into 2 single session subjects students may be able to replace the Session 2 subject by the Category A General Education elective and in Year 2 take the other non-psychology subject and the Category B General Education elective.

Year 3

12.300, 12.305
Choose 6 further Level III Psychology units

Note: Students intending to take 12.400 in Year 4 must take 12.301.

Year 4

12.400 *or* 12.401.

Examples of recognized sequences are:
Mathematics or Statistics
Year 1
10.001
Year 2
Choose *either* 2 Level II units of Pure *or* Applied Maths *or* 10.311A and 10.311B

Biochemistry
Year 1
2.121, 2.131, 17.031, 17.041
Year 2
41.101

Physiology
Year 1
2.121, 2.131, 17.031, 17.041
10.001 *or both* 10.021B *and* 10.021C
Year 2
73.111

Animal Science
Year 1
17.031, 17.041
Year 2
Choose 2 units from 17.012, 17.050, 45.201, 45.301

Genetics
Year 1
17.031, 17.041
2.121, 2.131 (for 17.601 only)
Year 2
Choose 2 units from 17.601, 45.121, 68.601, 68.602

Arts
Year 1
12 level I credit points of Economics, Philosophy, Political Science *or* Sociology
Year 2
12 upper level credit points following on from the Year 1 choice

NOTES 1. For details of Psychology and Science subjects, including pre- and co-requisites, refer to Table 1 of Course 3970 Science and Mathematics set out earlier in this handbook.
2. For details of Arts subjects, including pre- and co-requisites, refer to the Faculty of Arts handbook.

(2) The proposed course must be approved by the Head of the School of Psychology or his representative prior to or during enrolment. The courses must be chosen in such a way as to fit in with the timetable.

(3) Progression in the Course shall be by subjects, and the subjects in the Course may be completed in any order consistent with the requirements concerning prerequisites and co-requisites for the subjects chosen.

3. *Prerequisites and Co-requisites*
Before enrolling in any course (or equivalent units of a subject) the student shall have attended the classes and shall have satisfied the examiners in all relevant prerequisite subjects.

The student should refer to the appropriate Faculty Handbook for a statement of subject prerequisites and/or co-requisites.

4. The degree of BSc(Psychol) will be awarded at either Pass level or with Honours, after a minimum of four years of full-time study.

Rules governing admission to the Psychology Course with advanced standing

1. Graduates of the University of New South Wales may be admitted to the Psychology Course leading to the award of the degree of BSc(Psychol) with exemption from no more than five subjects or their unit equivalents that they have completed. No more than two Psychology subjects may be included in these exemptions.

2. Undergraduates of the University of New South Wales who transfer from another course to the Psychology Course may be admitted to the Psychology Course with exemption in no more than seven Psychology Course subjects or their unit equivalents.

3. Graduates or undergraduates of other universities may be admitted to the Psychology Course with advanced standing.

4. Students admitted under Rule 3 who have satisfied the examiners in subjects of the same title or subject matter as those permissible in the Psychology Course may, subject to the approval of the appropriate Heads of School, be granted exemption in no more than five subjects, of which no more than two may be Psychology subjects.

Undergraduate Study:
Faculty of Science

Faculty of Science

Introduction

The Schools of the Faculty of Science contribute programs to the Science and Mathematics Course (3970) and the Faculty supervises the undergraduate courses in Optometry (3950) and the graduate diploma course Food and Drug Analysis (5510). The Schools of the Faculty also offer facilities for students to proceed to masters degrees in Chemistry (8770), Mathematics (8740), Optometry (8760), Physics (8730), Statistics (8750) and Master of Science and Society (8780), to the award of masters degrees by research and to the award of the degree of Doctor of Philosophy.

Students requiring information about the undergraduate course should contact the representative of the appropriate School:
School of Chemistry . . . . Dr D. S. Alderdice
School of Optometry . . . . Mr G. L. Dick

Students requiring information about the graduate studies which are avaliable should seek advice from:
Graduate Diploma in Food and Drug Analysis . . . . Associate Professor G. Crank
or
in the case of masters and doctors degrees from:
School of Chemistry . . . . Professor P.S. Clezy
School of Mathematics . . . . Associate Professor J.F. Price
School of Optometry . . . . Professor H.B. Collin
School of Physics . . . . Professor H.G.L. Coster

Faculty of Science

Course Outlines

Optometry

3950
Optometry Course

The School provides a four year full-time course in Optometry lead-ing to the award of the degree of Bachelor of Optometry, at either the Pass or Honours level. The first year of the course involves a study in the fundamental sciences of physics, chemistry, mathematics and biology. Students who have completed the first year of a science course including physics, chemistry, mathematics and general and human biology or zoology at any Australian university are eligible for selection for admission to the second year of the course. Second, third and fourth years are devoted to professional training in optometry including clinical optometry in the final year.

3950
Optometry — Full-time Course

Bachelor of Optometry
BOptom

Year 1		Hours per week
1.021	Introductory Physics 1 *or*	
1.001	Physics 1	6
2.121	Chemistry 1A *and*	
2.131	Chemistry 1B *or*	6
2.141	Chemistry 1M	
10.001	Mathematics 1 *or*	
10.011	Higher Mathematics 1 *or*	
10.021B	General Mathematics 1B *and*	6
10.021C	General Mathematics 1C	
17.031	Biology A *and*	
17.041	Biology B	6
		24

In special cases, students who do not meet the prerequisites for admission to 2.121 Chemistry 1A may be enrolled in 2.111 Introductory Chemistry in Session 1, 2.121 Chemistry 1A in Ses-sion 2 and be permitted to carry 2.131 Chemistry 1B into Ses-sion 1 of Year 2.

Year 2			
Full Year		S1	S2
31.851	Optics	8	4
31.852	Visual Optics	2	3
31.853	Measurement of Light and Colour	—	2
31.821	Anatomy and Physiology of the Eye and Visual System	6	7
73.011	Principles of Physiology	6	6
	General Education subject	2	2
		24	24

Year 3		
12.100	Psychology	5
31.861	Optometry A	6
31.862	Diagnosis and Management of Ocular Disease	5½
31.863	Theory of Spectacle Lenses and Optical Intruments	1½
31.864	Clinical Methods	5
	Two General Education subjects	4
		27

Year 4		
12.741	Psychology (Optometry)	2
31.871	Optometry B	6
31.841	Clinical Optometry	16
71.001	Principles of Medicine for Optometry Students	1
		25

3951
Combined Science/Optometry Course

Conditions for the combined course leading to the award of the degrees of BSc BOptom in the Faculty of Science

1. Undergraduates* of the University of New South Wales who have satisfied the examiners in at least the first two years of the Optometry degree course may be admitted to the Science degree course with advanced standing for the purpose of qualifying for the award of the two degrees of BSc BOptom. Such undergraduates' performance shall have been of a high standard and their admission shall be subject to the approval of the Dean of the Faculty of Science.

2. In order to qualify for the award of the degree of BSc, students so admitted shall be required to complete the appropriate general studies subjects and no less than four units of either Level II or Level III and four other Level III units, in accordance with the Science and Mathematics Course regulations.

The units submitted for the award of the Bachelor's degree under these regulations must include at least four Level III units chosen from related disciplines in accordance with the Science Course regulations.

3. In order to qualify for the award of the degree of BOptom, students so admitted shall complete the requirements of the Optometry degree course.

*In Rule 1, the word 'undergraduates' includes graduands, ie a person may be admitted under these rules if he or she has met all requirements for a first degree which has not yet been conferred and admission under these rules shall be no bar to the subsequent award of the first degree.

Subject Descriptions

Identification of Subjects by Number

A subject is defined by the Professorial Board as 'a unit of instruction approved by the University as being a discrete part of the requirements for a course offered by the University'.

Each approved subject of the University is identifiable both by number and by name as this is a check against nomination of subject other than the one intended.

Subject numbers are allocated by the Academic Registrar and the system of allocation is based on the following guidelines:

1. The authority offering the subject, normally a School of the University, is indicated by the number before the decimal point.

2. Each subject number is unique and is not used for more than one subject title.

3. Subject numbers which have not been used for some time are not used for new subject titles.

4. Graduate subjects are indicated by a suffix 'G' to a number with three digits after the decimal point. In other subjects three or four digits are used after the decimal point.

Subjects taught are listed in full in the handbook of the faculty or board of studies responsible for the particular course within which the subjects are taken. Subject descriptions are contained in the appropriate section in the handbooks.

The **identifying numerical prefixes** for each subject authority are set out on the following page.

Servicing Subjects are those taught by a school or department outside its own faculty. Their subject descriptions are published in the handbook of the faculty which originates the subject and are also published in the handbook of the Faculty in which the subject is taught.

HSC Exam Prerequisites

Subjects which require prerequisites for enrolment in terms of the HSC Examination percentile range, refer to the **1978 and subsequent Examinations.**

Candidates for enrolment who obtained the HSC in previous years or hold other high school matriculation should check with the appropriate school on what matriculation status is required for admission to a subject.

Information Key

The following is the key to the information which may be supplied about each subject:

S1 Session 1, **S2** Session 2

F Session 1 *plus* Session 2, ie full year

S1 or **S2** Session 1 *or* Session 2, ie choice of either session

SS single session, but which session taught is not known at time of publication

CCH class contact hours

L Lecture, followed by hours per week

T Laboratory/Tutorial, followed by hours per week

hpw hours per week

C Credit point value

CR Credit

DN Distinction

HD High Distinction

Physics

Physics Level I Subjects

1.001 Physics 1   F L3T3

Prerequisites:

	HSC Exam Score Range Required
2 unit Mathematics* or	67-100
3 unit Mathematics or	1-50
4 unit Mathematics	1-100 or
and	(for 1.001 only) 10.021B
2 unit Science (Physics) or	57-100
2 unit Science (Chemistry) or	60-100
3 unit Science or	90-150
4 unit Science or	1-50
1.021	

Co-requisite: 10.021C or 10.001.

This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

Aims and nature of physics and the study of motion of particles under the influence of mechanical, electrical, magnetic and gravitational forces. Concepts of force, inertial mass, energy, momentum, charge, potential, fields. Application of the conservation principles to solution of problems involving charge, energy and momentum. Electrical circuit theory, application of Kirchoff's laws to AC and DC circuits. Uniform circular motion, Kepler's laws and rotational mechanics. Properties of matter: solids, liquids, gases. The wave theories of physics, transfer of energy by waves, properties of waves. Application of wave theories to optical and acoustical phenomena such as interference, diffraction and polarization.

1.021 Introductory Physics 1 (For Health and Life Scientists)   F L3T3

Prerequisites: Nil. Co-requisite: 10.021B and 10.021C, or 10.001.

Principally for students majoring in the life and health sciences disciplines. Topics at an introductory level.

The methods of physics, describing motion, the dynamics of a particle, conservation of energy, kinetic theory of gases, properties of liquids, vibrations and waves, electricity and conduction in solids, ions and ionic conduction, magnetism and electromagnetic induction, alternating current, atomic nature of matter, X-rays, the nucleus and radio-activity, geometrical optics, optical instruments, wave optics, microscopes and their uses.

1.041 Laboratory Computers in Physical Sciences   S2 L2T4

Prerequisite: As for 1.001. Co-requisites: 10.001, and 1.021 or 1.001. Excluded: Program 6806.

The role of the laboratory computer in scientific research. Introduction to microcomputer BASIC. Modelling the physical world in BASIC, iteration and simulation techniques. Measurement and control of physical variables by analog/digital conversions. Laboratory experiments collecting data via an interface and analysing it in the microcomputer.

1.061 Computer Applications in Experimental Science 1   S2 L2T4

Prerequisite: 6.611 or 6.711. Co-requisites: 1.001 or 1.021, 10.001 or 10.011. Excluded: 1.041.

Overview of the use of computers in Science for computation and instrumentation; the important role of the microcomputer in instrumentation and its special role in contemporary experimental science.
Integrated lectures and laboratory exercises on binary logic, digital electronic logic. Arithmetic as logic operations on binary variables. Communications on a party-line bus, master and slave elements, the bus structure of a computer. Instruction and instructions sets, machine level operation. Interfaces to the outside world, input/output structures. Interaction schemes between the computer and the outside world. Control and measurement of outside world variables by the computer, analog/digital conversions.

Physics Level II Subjects

1.002 Mechanics, Waves and Optics   S1 L3T1

Prerequisites: 1.001, 10.001. Co-requisite: 10.2111. Excluded: 1.992, 10.4111, 10.4211.

Harmonic motion, systems of particles, central force problems, Lagrange's equations, coupled oscillations, travelling waves, pulses, energy and momentum transfer, polarization, birefringence, interference, thin films, gratings, lasers, holography, fibre optics, Faraday effect, photoelasticity.

1.012 Electromagnetism and Thermal Physics   S2 L3T1

Prerequisites: 1.001, 10.001. Co-requisite: 10.2111. Excluded: 1.972, 1.992.

Electric field strength and potential, Gauss' law, Poisson's and Laplace's equations, capacitance, dielectrics and polarization, magnetism, electro-magnetic induction, Maxwell's equations, electromagnetic waves. Laws of thermodynamics, kinetic theory, microscopic processes, entropy, solid state defects, Helmholtz and Gibbs functions, Maxwell's relations, phase diagrams, chemical and electrochemical potential.

1.022 Modern Physics   FL1½T½

Prerequisites: 1.001, 10.001. Co-requisite: 10.2112. Excluded: 1.9322, 1.982.

Special theory of relativity: time dilation, length contraction, simultaneity, Lorentz transformations, energy and mass. Photon properties, de Broglie relations, Uncertainty principle, operators in quantum mechanics, postulates of quantum mechanics, potential wells, steps and barriers, harmonic oscillator, H atom, angular momentum, magnetic moment, electron spin, nuclear spin. Atomic and molecular spectra, lasers, quantum statistics,

free electron model of a metal, band theory; nuclear size, density, mass; nuclear models, fissionand fusion, nuclear forces.

1.032 Laboratory   F T3

Prerequisites: 1.001, 10.001. Excluded: 1.9222.

Alternating current circuits, complex impedance, resonance, mutual inductance, introductory electronics, diode and characteristics and circuits, power supplies, transistor characteristics, single stage and coupled amplifiers, experiments using AC circuits. Experimental investigations in a choice of areas including radioactivity, spectroscopy, properties of materials, Hall effect, nuclear magnetic resonance, photography, vacuum systems.

1.0522 Methods in Mathematical Physics   S1 L1½T½

Prerequisites: 1.001, and 10.001. Co-requisites: 10.2111 or 10.2211 and 10.2112 or 10.2212.

Not offered in 1989.

Differential and integral equations in physics. Fourier series and transform. Distributions (statistics, quantum mechanics). Legendre and Laguerre polynomials (hydrogen atom). Orthonormal functions. Integral equations, infinite matrices. Potential equation, Green's Theorem and functions. Waves, group velocity.

1.062 Computer Applications in Experimental
Science 2   S1 L2T3

Prerequisite: 1.061.

Review of microcomputer architecture and operation. Digital logic devices for busses. Analog and digital data collection and signal processing, laboratory interface architecture. Data transfer with implicit and explicit handshakes and protocols, communications. Interaction schemes, programmed, interrupt and direct access. Priority structures. Multi-master systems, arbitration concepts. Peripheral devices and peripheral systems. Microcomputer system concepts and user access, hardware and software aspects. The speed and capacity limitations of computer systems, peripheral techniques and systems that enhance the capacity of the microcomputer/peripheral system as a control/measurement instrument well beyond the limitations of a computer. Laboratory exercises and project work.

1.9222 Electronics   S1 L1T2

Prerequisites: 1.001 or 1.002 or 1.021. Excluded: 1.032.

The application of electronics to other disciplines. Includes: principles of circuit theory and analogue computing; amplifiers, their specification and application, transducers; electronic instrumentation; industrial data acquisition. ·

1.9422 Introduction to Physics of
Measurement   S1 L1½T1½

Prerequisite: 1.001.

Resolution: accuracy and sensitivity of instruments, errors of observation; experimental design; transducers; thermometry; electrical noise; servo systems, mechanical design of apparatus; optical instruments optical fibres; photometry; calorimetry;

analogue to digital conversion and digital instruments; measurement of very large and very small quantities.

Physics Level III Subjects

1.0133 Quantum Mechanics   S1 L1½T½

Prerequisites: 1.022, 10.2112. Excluded: 2.023A, 10.222F.

Revision of basic concepts, harmonic oscillator systems, spherically symmetric systems, angular momentum, H atom, first-order perturbation theory, identical particles, Exclusion Principle, atomic structure, spin-orbit coupling, Helium atom, introductory quantum theory of molecules.

1.0143 Nuclear Physics   S2 L1½T½

Co-requisite: 1.0133.

Nuclear shell model; theory of beta decay; the deuteron, nucleon-nucleon scattering; theories of nuclear reactions, resonances; mesons and strange particles, elementary particle properties and interactions; symmetries and quark models; strong and weak interactions.

1.023 Statistical Mechanics and
Solid State Physics   S1 L3T1

Prerequisites: 1.012, 1.022, 10.2112.

Canonical distribution, paramagnetism, Einstein solid, ideal gas, equipartition, grand canonical ensemble, chemical potential, phase equilibria, Fermi and Bose statistics, Bose condensation, blackbody radiation. Crystal structure, bonding, lattice dynamics, phonons, free-electron models of metals, band theory, point defects, dislocations.

1.0333 Electromagnetism   S1 L1½T½

Prerequisites: 1.012, 10.2111, 10.2112. Excluded: 10.222C.

Electromagnetic fields; Maxwell's equations, Poynting theorem, electromagnetic potentials, electromagnetic waves. Reflection and transmission, Fresnel equations, waveguides, radiation fields, dipoles and antenna theory.

1.0343 Advanced Optics   S2 L1½T½

Co-requisite: 1.002.

Fresnel and Fraunhofer diffraction, Fourier transforms, filtering, coherence length and time, stellar interferometers, laser theory, non-linear optics.

1.043 Experimental Physics A   F T4

Prerequisite: 1.032.

Basic experimental techniques and analysis of results in the following areas: electricity, magnetism, diffraction optics (including X-ray and electron diffraction, solid state physics, nuclear physics, atomic physics and spectroscopy, vacuum systems).

1.0533 Experimental Physics B1   S1 T4

Prerequisite: 1.032.

Selected experiments and projects. Advanced experimental techniques and open ended projects in the areas covered in

1.043 Experimental Physics A together with projects involving electron and nuclear magnetic resonances, low temperature physics and super-conductivity. Fourier optics, holography.

1.0543 Experimental Physics B2   S2 T4

Prerequisite: 1.032.

As for 1.0533 Experimental Physics B1.

1.1133 Advanced Quantum Mechanics   S2 L1½T ½

Co-requisite: 1.1033. Excluded: 2.023A, 10.222F.

Formal structure, matrix formalism, relativistic quantum mechanics, spin, scattering theory, Born approximation, phase shifts, many particle systems, occupation number formalism.

1.133 Electronics   S1 L2T4

Prerequisite: 1.9222 or 1.032.

Review of AC theory. Transistors. Operational amplifiers. Voltage regulators, constant current sources, switching power supplies. Field effect transistors, noise and drift. Digital electronics. Frequency dependent networks, active and passive filters, digital filters, oscillators. Communication and storage of information. Analogue-digital conversion. Transducers.

1.1433 Biophysics   S1 L2T1

Prerequisites: 1.012, 1.022.

Thermodynamics in biology, electrochemical potentials, Donnan equilibrium, irreversible processes, diffusion and applications to biological systems. Membrane potentials. Nernst potential, Goldman and Nernst-Planck equation, generalized approach. Active transport. Membrane structure. The nerve impulse, activation and inactivation, Hogkin and Huxley equations. Muscle, contractive process, thermodynamics. Ecological ensemble theory, global thermodynamics interaction of species, ecological associations.

1.1633 Astrophysics   S2 L1½T½

Prerequisite: 1.022.

Stellar radiation, spectra classification. Hertzsprung-Russell diagrams, determination of stellar masses and radii. Equations of stellar structure, energy sources in stars, nuclear reaction cycles energy transport, equations of state, degeneracy, opacity. Properties of main sequence stars, stellar evolution, structure of red giants and white dwarfs. The solar atmosphere.

1.3033 Mechanical Properties of Materials   S1 L1½T½

Co-requisite: 1.023.

Properties of materials in relation to their structure: atomic and molecular structure of solids; elasticity, inelasticity, long-range

(rubber) elasticity, viscoelasticity; plasticity; brittle fracture; viscosity and surface tension of liquids; adhesion; friction and lubrication.

1.3133 Physics of Solid State Devices   S2 L1½T½

Prerequisite: 1.023.

Review of electronic structure in semiconductors; p-n junctions; bipolar and field effect transistors including formation, characteristics and electrical breakdown. Optical devices including light emitting diodes and junction lasers. Integrated circuit structures.

1.3143 Topics in Condensed Matter Physics   S2 L1½T½

Prerequisite: 1.023.

Superconductivity, Meissner-Ochsenfeld effect, entropy, thermodynamics and relevant theories, Josephson junctions. Amorphous materials, preparation, magnetic properties, bandgaps, dangling bonds and ESR, mobility edge, solar cells. Polymers, structure, bonding, relaxation phenomena, electrical breakdown, liquid crystals.

1.3533 Marine Acoustics   S2 L1½T½

Wave theory: general wave equation for fluids, viscoelastic media and solids. Travelling and standing wave solutions. Wave guides: fluid and solid wave guides, ray and mode theories. Sound transmission in the ocean and application of reflection and refraction theory, scattering and diffraction effects.

1.5133 Classical Mechanics and Field Theory   S1 L1½T½

Prerequisites: 1.002, 10.1113, 10.2111, 10.2112.

Lagrange's equations and applications, variational principles, Hamiltonian formulation, canonical transformations, Poisson brackets, Hamilton-Jacobi equation, continuous systems and fields.

1.5233 Electrodynamics   S2 L1½T½

Prerequisites: 1.022, 10.1113, 10.2111, 10.2112. Co-requisite: 1.0333. Excluded: 10.222C.

Special relativity, covariant formulation of electrodynamics, stress tensor, radiation from moving charges, Lienard-Wiechert potentials, synchrotron radiation, bremsstrahlung, electro-magnetic mass, radiative damping, multipole expansion for fields, scattering.

1.5333 Radiation and Matter   S2 L1½T½

Prerequisites: 1.012, 1.022, 10.2111, 10.2112. Co-requisites: 1.0133 or 10.222F or 2.023A, 1.0333 or 10.222C.

The interaction of electromagnetic radiation with matter. Blackbody radiation; Einstein coefficients. Dipole radiation; shape and

broadening of spectral lines. Quantum mechanical transition probabilities. Propagation and dispersion of radiation. Scattering theory. Radiative transfer.

1.5433 Plasmas and Laser Fusion   S1 L1½T½

Prerequisites: 1.012, 1.022.

Not offered in 1989.

Microscopic and macroscopic descriptions of plasma, electromagnetic waves in plasma, stress tensor, ponderomotive force, laser-plasma interactions, momentum transfer and instabilities, non-linear force, self-focussing mechanisms, laser induced nuclear fusion, theoretical and experimental progress and prospects.

1.5533 General Relativity   S2 L1½T½

Prerequisites: 1.012, 1.022, 10.1113, 10.2111, 10.2112.

Relativistic kinematics and dynamics, tensors and tensor operations, Christoffel symbols, formulation of general relativity, curvature of space, geodesics, gravitational field equations, Schwarzschild solution, tests of the theory, astrophysical and cosmological implications.

1.7113 Lasers and Applications   S1 L1½T½

Co-requisite: 1.002. See also Table 1.

Offered only in odd-numbered years.
Interaction between light and matter, fundamental properties of laser amplifiers and oscillators, giant pulse generation, mode locking and Q switching, specific laser systems including gas lasers and semiconductor lasers, applications of lasers.

1.7123 Optoelectronics   S1 L1½T½

Co-requisite: 1.002. See also Table 1.

Offered only in even-numbered years.
Introduction to non-linear optics, second harmonic generation, parametric amplification, phase matching, optical bistability, modulation of light, detection of light, types of optical detectors including thermal detectors, photomultipliers and semiconductor detectors.

1.7613 Laser and Optoelectronics Laboratory   S2 T4

Prerequisite: 1.032. See also Table 1.

Aims to make students conversant with the techniques employed in advanced laser technology and to become familiar with the various components used in such applications. Includes: a study of advanced optical techniques including the construction, operation and characterisation of various types of laser; preparation and investigation of optical, electrooptical and other related devices in terms of their basic behaviour and with respect to applications in complex optical systems; safety aspects.

Physics Level IV Subjects

All Physics honours subjects consist of lecture topics and project work. Some of the lecture topics of which quantum mechanics, statistical mechanics and solid state physics are examples, are taken by all students. Other topics which are considered particularly relevant to the type of honours chosen are also prescribed. The actual list of topics in this second category varies from time to time and is partly influenced by student numbers and interest. Examples of such topics are given below under each honours subject heading. The project work forms a very significant part of each subject. Usually two projects are undertaken during the year of study.

Students whose academic records are satisfactory are invited to enrol in the honours year. Full details of lecture topics and projects are then supplied. The approval of the Head of School is required for each program of study.

1.104 Physics 4 (Honours)

Examples of specific lecture topics which may be offered include: astronomy, additional topics in solid state physics, lasers, biophysics.

1.304 Applied Physics (Honours)

Examples of specific lecture topics which may be offered include: physical principles of instrumentation, applied solid state physics, physics of materials.

1.504 Theoretical Physics 4 (Honours)

Examples of specific lecture topics which may be offered include: quantum theory of solids, plasma theory, quantum electrodynamics.

1.604 Biophysics 4 (Honours)

Biophysics, statistical mechanics and solid state physics are examples of prescribed topics. Additional lecture topics may be selected from those on offer in other Physics honours subjects and from Biochemistry and Physiology.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subject see the Faculty of Arts Handbook.

1.901 Astronomy   S1 or S2 L2T2

Involves an overview of Astronomy, from the solar system to the galaxies. Includes an exploration of the solar system, to indicate the advances that have been made, particularly and most recently with space probes, in our understanding of planetary systems. The characteristics of stars discussed along with their use in establishing an understanding of stellar evolution. The treatment of galaxies includes consideration of the nature of our

galaxy and its relation to other external systems, concluding with a brief discussion of aspects of observational cosmology. Discussion of such recent topics as black holes, pulsars, quasars.

For further information regarding the following subject see the Faculty of Architecture Handbook.

1.931 Physics 1 (Building)   S2 L4T2

4 credit points; compulsory. Prerequisites: nil.

Mechanics of solids; kinematics. Newton's Law of motion, work and energy. Atomistic description of mechanical properties of matter. Atomic structure of matter. Elasticity. Plasticity: dislocations, fracture, viscosity. Electrostatics, electromagnetism and DC circuits: Coulomb's Law. Electric field. Electric potential. Capacitance. Electrical energy sources. Conductors. Resistivity. Atomic view of conduction. EMF. Kirchoff's Laws. Magnetic induction. Torque on a coil in magnetic field. Moving coil meter. Wheatstone's bridge. Potentiometer. Faraday's Law. Transient circuits.

Wave motion, heat light and sound: simple harmonic motion. Wave motion. Interference. Doppler effect. Energy transfer. Heat, heat capacity. Joule's equivalent. Thermometry. Convection. Conduction. Radiation. Black body. Emittance. Absorptance. Light. Electro-magnetic spectrum. Huygens' Principle. Curved mirrors. Lenses. Dispersion. Interference. Polarization. Photometry. Colorimetry Sound. Longitudinal waves. Overtones. Intensity levels. Decibels. Quality of sound.

For further information regarding the following subjects see the Faculty of Engineering Handbook.

1.911 Physics 1 (Mechanical Engineering)   F L2T2

Prerequisites: As for 1.001 Physics 1. Excluded: 1.951.

For students in the School of Mechanical and Industrial Engineering.

Rotational mechanics. Mechanics of intermolecular systems. Atomic structure of solids; forces and defects. Plasticity of solids. Fracture of solids. Thermal properties of solids, liquids and gases. Wave motion, including acoustics. Optics: geometrical optics, optical instruments, interference and diffraction, polarisation, laser light. Electromagnetism: magnetic forces and fields, electromagnetic induction. Electric fields and currents: electrostatics, direct-current circuits. Elementary circuit theory. Introduction to electronics and electronic devices. Boolean algebra and basic number systems. Introduction to instrumentation.

1.921 Physics 1 (Surveying)   F L2T2

Prerequisites: As for 1.001 Physics 1. Excluded: 1.971.

Aims and nature of physics and the study of motion of particles under influence of mechanical, electrical, magnetic and gravitational forces. Concepts of force, mass, energy, momentum, charge, potential fields. Application of the conservation principles to the solution of problems involving charge, energy and momentum. Electrical circuit theory, applications of Kirchoff's laws to d.c. and a.c. circuits. Uniform circular motion, Kepler's laws and rotational mechanics. Geometrical optics, optical instruments. Wave theories of physics, transfer of energy by waves, properties of waves. Application of wave theory to interference, diffraction and polarisation.

1.961 Physics 1 (Electrical Engineering)   F L3T3

Prerequisites: As for 1.001 Physics 1.

For students in the School of Electrical Engineering.

Electrostatics in vacuum, electrostatics in dielectrics, steady state currents, magnetostatics in vacuum, ferromagnetism, electromagnetic induction, transient currents. Vectors motion in one dimension, motion in a plane, particle dynamics, work and energy, the conservation of energy, conservation of linear momentum, collisions, rotational kinematics, rotational dynamics, simple harmonic motion, gravitation. Temperature, heat and the first law of thermodynamics, kinetic theory of gases. Waves in elastic media, sound waves, geometrical optics, interference, diffraction, gratings and spectra, polarization.

1.962 Physics of Measurement (Surveying)   S1 L1T2

Prerequisite: 1.971.

For students in the School of Surveying.

Resolution, accuracy and sensitivity of instruments. Errors of observation and their treatment. Experimental design. Displacement transducers. Transducers for other mechanical quantities. Thermometry. Electrical noise. Dynamic response of measuring systems. Servo-systems. Mechanical design of apparatus. Microscopes, telescopes and other optical instruments. Lenses, optical fibres and other optical components. Photometry. Colorimetry. Measurements under adverse ambient conditions. Analogue-to-digital conversion. Digital instruments. Measurements of very large and very small quantities.

1.972 Electromagnetism (Electrical Engineering)   S1 or S2 L2T2

Prerequisites: 1.961 or 1.001, 10.001. Co-requisites: 10.2111, 10.2112. Excluded: 1.012.

Not offered in 1989.

Electrostatics in vacuum, electrostatics in dielectrics, electric currents, magnetostatics in vacuum, magnetic scalar potential, magnetostatics in magnetic media, time varying fields, Maxwell's equations.

1.981 Physics 1 (Civil Engineering)   S1 L2T2 and S2 L2T1

Prerequisites: As for 1.001 Physics 1.

For students in the School of Civil Engineering.

Aims of physics and its relation to civil engineering. Mechanical concepts, properties of matter, atomic structure, elasticity, plasticity, fracture of solids; surface tension and viscosity of fluids, electrical and magnetic forces, electromagnetism, DC and AC circuits, digital electronics. Simple harmonic motion and its relation to wave motion. Acoustic and mechanical waves, attenuation, velocity of propagation. Elastic moduli. Non-destructive testing, instrumentation, techniques and theory. Emphasis on the physics involved in non-destructive testing and the aspects of vibration important to civil engineering.

1.982 Solid State Physics (Electrical Engineering)   S1 L2½T2

Prerequisites: 1.961 or 1.001, 10.001. Co-requisites: 10.211. Excluded: 1.022, 1.9322.

The concepts of waves and particles, introductory quantum mechanics, atomic structure, optical spectra and atomic structure, structural properties of solids, band theory and its applications, uniform electronic semiconductors in equilibrium, excess carriers in semiconductors.

1.992 Mechanics and Thermal Physics (Electrical Engineering)   F L1½T½

Prerequisites: 1.961, 10.001. Co-requisite: 10.2111. Excluded: 1.002, 1.012.

Particle mechanics, harmonic motion, central force problems, systems of particles, Lagrange's equations with applications, coupled oscillations, wave equation. Thermodynamic laws, entropy, kinetic theory, M-B distribution, microscopic processes, Maxwell's relations, chemical potential, phase diagrams, multicomponent systems, electrochemical potential, statistics of defects in solids.

Chemistry

Chemistry Level I Subjects

2.111 Introductory Chemistry   S1 L2T4

Prerequisite: Nil.

Note: Students who have passed 2.121 or 2.131 may not enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.

Classification of matter and the language of chemistry. The gas laws and the ideal gas equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The periodic classification of elements, oxides, hydrides, halides and selected elements. Acids, bases, salts, neutralization. Stoichiometry, the mole concept. Electron transfer reactions. Qualitative treatment of reversibility and chemical equilibrium, the pH scale. Introduction to the diversity of carbon compounds.

2.121 Chemistry 1A   S1 or S2 L2T4

Prerequisites:

	HSC Exam Score Range Required
2 unit Mathematics* or	67-100
3 unit Mathematics or	1-50
4 unit Mathematics	1-100
and	

2 unit Science (Physics) or	53-100
2 unit Science (Chemistry) or	53-100
4 unit Science or	1-50
3 unit Science or	90-150
2.111	

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

Stoichiometry and solution stoichiometry. Properties of gases; kinetic molecular theory. Thermochemistry. Atomic structure, electron configurations and the periodic table. Types of chemical bonds, electronegativity, molecular geometry. Periodicity of physical and chemical properties of common representative elements and compounds. Liquids and solids, changes of state, phase diagrams. Types of solids. Solutions and their properties. Colloids. Facts and theories about reaction kinetics.

Note: Students who have passed 2.121 or 2.131 may not enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.

2.131 Chemistry 1B   S1 or S2 L2T4

Prerequisite: 2.121.

Chemical equilibrium, equilibrium constants, quantitative calculations applied to acid-base and solubility equilibria; buffers, titrations, chemical analysis. Oxidation and reduction reactions, electrode potentials. Chemical thermodynamics, entropy, free energy. Chemistry of carbon compounds, stereoisomerism; alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines.

Note: Students who have passed 2.111 may be permitted to enrol in 2.131 on application to the Head of the School of Chemistry.

2.141 Chemistry 1M   F L2T4

Prerequisites:

	HSC Exam Score Range Required
2 unit Mathematics*	67-100
3 unit Mathematics	1-50
4 unit Mathematics	1-100
and	
2 unit Science (Chemistry) or	60-100
4 unit Science or	1-50
3 unit Science	90-150
or	
2.111	

Note: As for Note 2.121 Chemistry 1A.

The syllabus is an integrated one of 2.121 and 2.131 (see above). Students majoring in Chemistry may take 2.141 in lieu of 2.121 and 2.131.

Chemistry Level II Subjects

2.102A Physical Chemistry   S1 or S2 L3T3

Prerequisites: 2.121 and 2.131, or 2.141, and 10.011 or 10.001 or 10.021B and 10.021C. Excluded 2.002A.

Thermodynamics: first, second and third laws of thermodynamics; statistical mechanical treatment of thermodynamic properties; applications of thermodynamics: chemical equilibria, phase equilibria, solutions of nonelectrolytes and electrolytes, electrochemical cells. Kinetics: order and molecularity; effect of temperature on reaction rates: elementary reaction rate theory. Surface chemistry and colloids: adsorption, properties of dispersions; macromolecules and association colloids.

2.102B Organic Chemistry   F or S2 L3T3

Prerequisite: 2.131 or 2.141. Excluded: 2.002B

Discussion of the major types of organic reaction mechanisms (eg addition, substitution, elimination, free-radical, molecular rearrangement) within context of important functional groups (eg aliphatic hydrocarbons, monocyclic aromatic hydrocarbons, halides, organometallic compounds, alcohols, phenols, aldehydes, ketones, ethers, carboxylic acids and their derivatives, nitro compounds, amines and sulfonic acids). Introduction to application of spectroscopic methods to structure determination.

2.102C Inorganic Chemistry and Structure   S1 or S2 L3T3

Prerequisites: 2.121 and 2.131, or 2.141. Excluded: 2.042C.

Fundamentals of spectroscopy as experimental basis for theories of electronic structures of atoms and molecules. Concepts and consequences of quantum theory. Molecular orbitals. Ligand field theory, magnetochemistry. Geometrical structure and chemical bonding, molecular and non-molecular structures, molecular symmetry, ionic covalent and metallic bonds. Occurrence, preparation, properties and reactions of compounds of the p-block elements, of transition metals and of post-transition metals. Principles of co-ordination chemistry. Thermodynamics applied to inorganic systems in solid and solution phases.

2.102D Chemical and Spectroscopic Analysis   S1 or S2 L3T3

Prerequisites: 2.121 and 2.131, or 2.141; and 10.011 or 10.001 or 10.021B and 10.021C. Excluded: 2.002D and 2.003H.

General procedures in analytical science, accuracy, propagation of errors, precision. Analytical reaction chemistry, titrimetric, and gravimetric, analysis. Solvent extraction. Electroanalytical methods. Chromatography. Instrumental aspects of all major spectroscopic methods. Optical spectroscopy, nuclear magnetic and electron spin resonances, mass spectrometry. Sample handling.

Chemistry Level III Core Subjects

2.103A Physical Chemistry   S1 L3T3

Prerequisites: 1.001, 2.102A and 2.102C. Excluded: 2.013A.

States of matter: gases, liquids, solutions and solids. Equations of state. Intermolecular forces and condensed phases. Gas kinetic theory and distribution of molecular energy. Statistical thermodynamics and prediction of properties of simple gases, liquids and solids. Structure and properties of liquids, solutions and solids. *Molecular energies and spectra.* Quantum properties of

radiation and molecules. Molecular vibration (harmonic and anharmonic). Infrared and Raman spectra of gases. Molecular rotation. Rotational structure in molecular spectra. Intensity distributions in molecular spectra. Applications of molecular spectroscopy.

2.103B Organic Chemistry   S1 L3T3

Prerequisite: 2.102B. Excluded 2.003B.

Heterocyclic Chemistry: synthesis and reactions of the following heteroaromatic systems; pyridine, quinoline, isoquinoline, pyrimidine, pyrrole, furan, thiophen, indole, imidazole; examples of naturally occuring alkaloids where relevant. *Alicyclic Chemistry:* stereochemistry of acyclic systems; classical and non-classical strain in cyclic systems; stereochemistry and conformation of monocylic and polycyclic compounds; synthesis, reactions and rearrangement of monocyclic compounds including stereochemical selectivity; transannular reactions in mediam rings; synthesis and reactions of fused and bridged polycyclic systems; examples of steroids and terpenes where relevant. *Structure Determination:* application of spectroscopic methods (eg nuclear magnetic resonance, mass spectroscopy) to determination of organic structures.

2.103C Inorganic Chemistry   S1 L2T4

Prerequisite: 2.102C. Excluded: 2.003C.

Transition metal chemistry: bonding theory; energies and population of d-orbitals and their correlations with stereochemistry, thermodynamic properties, spin states; theory and applications of magnetism; theory and applications of electronic spectra; stabilities of metal complexes; stabilisation of oxidation states; metal carbonyls; descriptive chemistry of transition metals; special characteristics of second and third transition series metals; *Lanthanide elements:* lanthanide contraction and its consequences: electronic configurations and oxidation states; spectral and magnetic properties; stabilities of complexes; separation. *p-block elements:* the inert pair effect; bonding, structure, and reactivity of representative compounds; halogen chemistry.

2.103D Analytical Chemistry   S1 L2T4

Prerequisite: 2.102D. Excluded: 2.003D.

Instrument design, theory and operating principles for the following instrumental areas: electrochemical, atomic and molecular spectroscopy, chromatography, mass spectrometry, automated analysis, thermal analysis.

Chemistry Level III Elective Subjects

2.113A Kinetics and Mechanism of Chemical Change   S2 L3T3

Prerequisite: 2.103A. Excluded: 2.053A.

Molecular collision dynamics, reactions in molecular beams, energy disposal and equilibration in chemical reactions gas phase energy transfer. Mechanisms and kinetic applications of lasers. Theories of bimolecular and unimolecular gas reactions, potential energy surfaces. Free radical reactions, chain reactions, explosions, mechanisms in pyrolysis and oxidation of hydrocarbons, polymerisation reactions, catalytic mechanisms.

Experimental methods for studying fast ractions. Reactions in solution: structure—reactivity relationships.

2.113B Synthetic Organic Chemistry   S2 L2T4

Prerequisite: 2.103B. Excluded: 2.013B.

Synthetic methods. Modern functional group transformations with particular reference to positional and sterochemical control; organometallic and carbonionic reagents. *Pericyclic reactions and photochemistry.* Electrocyclic sigmatropic reactions, Diels-Alder and related cycloadditions. Woodward-Hoffman rules, ring formation and cleavage. *Synthetic strategy.* Principles of planning or organic synthesis; disconnection approach to representative syntheses of compounds of theoretical and biological interest; use of protecting groups.

2.113C Advanced Inorganic Chemistry   S2 L2T4

Prerequisite: 2.102C. Co-requisite: 2.103C. Excluded: 2.013C.

Spectroscopy and magnetism of transition metal compounds; applications of infrared, electronic and Moessbauer spectra; magentic properties of polynuclear complexes. *Inorganic reactivity;* rates and mechanisms of ligand substitution and electron transfer; molecular rearrangements; reactions of co-ordinated ligands and activation of co-ordinated molecules; excited state reactivity. *Bio-inorganic chemistry:* the occurrence and co-ordination of metals in biology; heme proteins and dioxygen co-ordination redox and proteolytic metalloenzymes; metal storage and transport proteins; *Innovations and technological developments;* accounts of current advances, including topics such as inorganic polymers, inclusion compounds, zeolites, electronically delocalised compounds, and metal clusters.

2.113D Advanced Instrument Analysis   S2 L2T4

Prerequisite: 2.102D. Co-requisite: 2.103D. Excluded: 2.013D.

Advanced approaches to problem solving in analytical science using modern instrumental techniques and microcomputers for the analysis of complex organic, biological, inorganic and environmental materials. Sample selection procedures; extraction and recovery of major, minor, trace and untra-trace constituents; origins, identification and elimination of interference effects. Selection and optimisation of instrumental parameters; theory of separation strategies for identification and quantitative determinations. Networking of computer-controlled workstations for laboratory automation and management.

2.113E Nuclear and Radiation Chemistry   S2 L2T4

Prerequisite: 2.102A or 2.102B or 2.102C or 2.102D. Excluded: 2.003E.

Radioactivity, isotopes, fundamental atomic particles, nuclear structure and properties. Properties of nuclear radiations, their interaction with matter and their detection and measurement. Nuclear instrumentation. Factors to be considered when making radioactive measurements. Radioactive decay equation, half-life and radioactive equilibrium situations. Nuclear reactions initiated by neutrons. Effect of nuclear radiation on matter, ionisation, free radical formation, effect on living cells, contamination and radiation hazards, factors affecting radiotoxicity, shielding and inverse square law calculations. Applications of isotopes as tracers and radiation sources factors associated with selection and application. Radioactive dating methods. The chemistry of the reactor fuel cycle.

2.123A Biophysical and Interfacial Chemistry   S2 L3T3

Prerequisite: 2.102A. Excluded: 2.033A.

Interplay of interfacial, colloidal and macromolecular science. Physical properties of macromolecules. Determination of molecular size from gel permeation chromatography, diffusion, sedimentation, viscometry, osmometry and light scattering. *Spectroscopic properties:* circular dichroism, optical rotary dispersion and X-ray diffraction; conformation of macromolecules; Helix/random coil transitions. The use of modern spectroscopic techniques in surface chemistry including low energy electron diffraction, Auger electron, UV and X-ray photo-electron spectroscopy; electron energy loss, ion scattering and secondary ion emission at the gas/solid interface. Surface free energy and related thermodynamic concepts applied to the study of solutes at interfaces; wetting behaviour, capillarity, detergency, mineral flotation, micelles and bio-physical membranes. Adsorption and its significance in resulting biological and synthetic catalytic processes.

2.123B Biological Organic Chemistry   S2 L2T4

Prerequisite: 2.103B. Excluded: 2.023B.

Interdisciplinary aspects of selected classes of organic compounds of biological significance. *Natural polymers:* Synthesis and properties of proteins, poly-saccharides, nucleic acids. *Pharmacological chemistry:* Discussion of structural and synthetic aspects of several selected drugs; structure-activity relationships, metabolism, methods of analysis. *Herbicides, fungicides, pesticides.* Synthesis, degradation and mode of action of selected compounds.

2.123E Environmental Chemistry   S2 L3T3

Prerequisites: 2.102A and 2.102D. Excluded: 2.043A.

Physico-chemical aspects of the environment. Factors affecting the chemistry of rivers, estuaries, oceans, surface and sub-surface water. Photolysis reactions in the atmosphere, primary and secondary pollutants. Distribution of elements, nutrient elements, carbon and oxygen in ecological systems (chemical models of these cycles). Analysis of naturally occurring species and pollutants. Requirements, validation and performance monitoring of standard analytical procedures.

2.133B Applied Organic Chemistry   S2 L2T4

Prerequisite: 2.102B. Co-requisite: 2.103B. Excluded: 2.003L.

Discussion at advanced level of the chemistry of selected commercially important groups of organic materials with emphasis on reaction mechanisms and model systems. *Polymerization processes and synthetic polymers:* Thermal and oxidative polymerization, treatment of initiators, chain transfer agents, retarders; sulfur-olefin reactions. *Pigments and dyestuffs:* Basis of colour in organic compounds, azo, carbonyl, cationic dyes, colour photography; synthetic and natural pigments, eg phthalocyanines, carotenes, flavones, anthocyanins; fluorescent whiteners. *Oxidation and reduction processes:* Oxidation of allylic compounds, phenols, sulfur compounds etc; catalytic dehydrogenation and hydrogenation; hydride and dissolving metal reductions.

2.1813 Quantum Chemistry and Symmetry S2 L1½T1½

Prerequisites: 2.102C, and 10.111A or 10.031. Excluded: 2.023A.

Principles of quantum mechanics. Eigenvalue-eigenfunction problem and its representation by matrix algebra; approximate methods for quantum mechanical calculations. Molecular orbital theories (eg Huckel, *ab initio*; SCF) and properties derivable therefrom; choice of basis functions. Group theory. Symmetry operations. Reducible and irreducible representations; applications of character tables eg direct products, selection rules. Correlation diagrams for chemical reactions, and for bonding. Applications to vibrational spectroscopy.

2.1823 Computers in Chemistry S2 L1T2

Prerequisites: 2.102A and 2.102D.

Computing techniques introduced through specific chemical applications; simple and complex equilibria, rate equations, analysis of multicomponent mixtures, instrumental calibration curves. Treatment of transient signals. Specific case studies selected from spectroscopy, chromatography, and electrochemistry. Chemical databases and the literature, spectroscopic databases.

2.1833 Molecular Structure Determination S2 L1½T1½

Prerequisites: 2.102C and 2.102D.

The theory and practice of **1.** crystal structure determination by x-ray diffraction. **2.** multinuclear NMR spectroscopy, and **3.** mass spectrometry, in the determination of molecular structure. Experimental requirements and procedures; instrumentation. Interpretation of results; applications to contemporary chemical systems; examples from current research problems. Databases and computing. Evaluation of complementary information from these techniques about molecular structure, chemical bonding, and chemical reactivity.

2.1843 Organometallic Chemistry S2 L1T2

Prerequisites: 2.102B and 2.102C. Excluded: 2.003M.

Preparation, structure and reactions of transition metal and main group organometallic compounds; metal vapour syntheses. Structure and bonding of ligands; ligand stabilisation and activation; novel effects of ligand bulk and geometry. Catalytic applications of organometallic compounds.

Chemistry Level IV Subject

2.004 Chemistry Honours

An honours program consisting of selected series of lectures on advanced topics in Chemistry and a research project.

Students intending to seek admission to this program should consult the School re selection of units in the earlier years and apply to the Head of the School for consideration for admission at the end of Year 3 (or completion of requirements for the pass degree).

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subjects see the Faculty of Applied Science and Engineering Handbooks.

2.003J Fundamentals of Biological and Agricultural Chemistry S1 L2T4

Prerequisites: 2.121 and 2.131, or 2.141. Excluded: 2.013L, 41.101.

Aspects of the chemical and physical properties of materials important in biological systems. Methods of separation, of purification and estimation, and correlations of structure with reactivity. Methods of separation and identification, such as gel permeation, discussed as appropriate to each topic. Significance of isomerism in biological systems, optical and geometrical, absolute configuration. Amino acids, peptides and introduction to protein structure. Relevant properties, acid/base properties, pK values, zwitterion, isoelectric points. Simple peptide synthesis. Treatment of carbohydrates, establishment of structures, reactivity. Chemistry of monosaccharides, disaccharides and polysaccharides. Methods of analysis, chemical and physiochemical. Fats, correlation of properties with saturated and unsaturated fatty acid composition. Structural chemistry of fatty acids. Reaction of unsaturated fatty acids, urea complexes. Detergents. Trace elements in biological systems. Chemistry of common heterocyclic systems with emphasis on molecules of biological importance.

2.012E Organic and Inorganic Chemistry for Chemical Engineers F L2

Prerequisites: 2.121 and 2.131, or 2.141.

Discussion of selected types of organic reactions (eg addition, substitution, elimination, free radical, rearrangement) to provide a broad cover of the chemistry of aliphatic hydrocarbons, halides, alcohols, ethers and amines. Addition reactions of aldehydes and keytones. Substitution reactions of acid derivatives. Chemistry of benzene and its derivatives with a brief extension to include napthalene chemistry. Survey of geometrical structures, energetics, bonding, reactions and reactivity, spectroscopic and magnetic properties of representative inorganic compounds, including selected main group compounds, compounds of selected transition metals and rare earth elements, and coordination complexes. Applications of inorganic chemistry.

2.030 Organic Chemistry S1 L2T4

Prerequisite: 2.102B.

The spectroscopic identification of organic compounds, free radical chemistry and electro-organic processes, various aspects of the organic industrial processes such as industrial synthesis based on petrochemicals, and organometallic reactions of industrial interest. Selected topics from the dyestuff, pharmaceutical and agricultural industries discussing syntheses and reactions including degradation.

2.043L Chemistry and Enzymology of Foods F L2T4

Prerequisite: 2.102B. Excluded: 2.003J, 2.043L.

Not offered in 1989.

The chemistry of food constituents at an advanced level and the relationship between the chemistry and enzymology associated with the origin and handling of foodstuffs. Treatment of the stability of constituents, changes in colour and texture occurring during processing and storage. Methods of assessment, chemical and physical. General classification of constituents, role of free and combined water. Fixed oils and fats, rancidity of enzymic and autoxidative origin, antioxidants — natural and synthetic — theories on mechanisms of action, carbohydrates, reactivity, role in brewing processes, carbohydrate polymers,

starch structure, enzymic susceptibility and mode of action, estimations, enzymic degradation and enzymic browning, reactions and stability of natural pigments, vitamins, preservatives.

2.9111 Chemistry 1EE S1 L2T1
Prerequisite: As for 2.121.
Atomic and molecular structure and bonding. Chemical equilibrium. Rates of reactions. Thermochemistry. Ionic equilibria. Metals, electro-chemistry and corrosion. Colloids and clays. Colligative properties of solutions. Organic chemistry, polymers. Applications of chemical principles to engineering.

2.951 Chemistry 1ME S1 L3T3
Prerequisite: As for 2.121.
A treatment of chemistry which illustrates the application of the principles of chemistry to problems of concern to mechanical engineers. Topics: chemistry of materials, thermochemistry, chemical kinetics and equilibrium, radioactivity and nuclear power, electrochemistry and corrosion of metals. Introduction to organic chemistry, structure and properties of polymers, fuels and lubricants. Surface chemistry.

2.991 Chemistry 1CE S2 L3T3
Prerequisites: As for 2.121.
Atomic and molecular structure and bonding. Chemical equilibrium. Rates of reactions. Thermochemistry. Ionic equilibria. Metals, electro-chemistry and corrosion. Colloids and clays. Colligative properties of solutions. Organic chemistry, polymers. Applications of chemical principles to engineering.
For further information regarding the following subject see the Faculty of Medicine Handbook.

Materials Science and Engineering

4.412A Physical Metallurgy 1A S1 L3
Unit 1: Phase Equilibra I
Co-requisite: 2.102A, 4.732.
Elements of crystallography. The crystal structure of metallic phases. Defect structures, dislocations, grain boundaries, plasticity, deformatoin and recrystallization. Phase equilibrium in alloy systems. Genesis of microstructure. Mechanisms of phase transformations, departure from equilibrium, metastable transition phases. Use of free energy principles to determine nature of phase equilibrium, common tangent construction. Application of Hume-Rothery principles to determine liquidus and solidus boundaries, electro compounds. Introduction to nucleation theory.

Unit 2: Phase Equilibria Laboratory S1 T3
Elementary founding principles. Solidiffication processes in moulds. Metallography of non-ferrous alloys.

4.413 Physical Metallurgy 2A S1 L1 T1½
Prerequisite: 4.412A.
Metallography of non-ferrous alloys. Structure/property relationships in non-ferrous alloys. Hardening mechanisms. Metallography and properties of copper, aluminium, nickel, magnesium, lead, tin and titanium base alloys.

4.422B Physical Metallurgy 1B S2 L1T1
Metallographic techniques. Principles of optical microscopy. Quantitative microscopy and stereology.

4.432 Physical Metallurgy 1C S2 L1T3
Prerequisite: 4.412A
Ferrous alloys. Iron-carbon phase equilibrium. Microstructure and properties of plain carbon steels. Austenite decomposition under equilibrium and non-equilibrium conditions. Dilatometry. Heat treatment of steels. Surface hardening treatments. Microstructure and properties of ordinary cast irons, including grey, white, mottled, malleable and ductile irons.

4.433C Physical Metallurgy 2C S1 L2½T1½
Prerequisite: 4.412A.
Theory of plasticity of metals. Introduction to dislocation theory and its application to mechanical properties of alloys. Strengthening mechanisms, creep, fracture, grain size dependence of strength. Introduction to generation of deformation and recrystallization textures. Measurements of age-hardening, activation energy of strain ageing.

4.443 Physical Metallurgy 2D S2 L2T2
Prerequisite: 4.432.
Diffusion in the solid state, Kirkendall effect, mechanisms. Fick's laws, solutions. Grain boundary, surface and dislocation pipe diffusion. Precipitation, nucleation and growth of isolated precipitates. Co-operative precipitation, pearlite, discontinuous precipitation. Proposed laws governing growth rates, maximum velocity, maximum rate of entropy production. Hardenability. Effect of alloying elements on pearlite growth rates. Grossman and Jominy tests, calculation of depth of hardening. Development of stresses during quenching, retained stress, distortion, quench cracking.

4.453 Physical Metallurgy 2E S2 L1T1½
Prerequisite: 4.432.
Alloy steels. Ternary equilibria involving iron and carbon. Metallography and properties of alloys steels. Effect of alloying elements on austenite formation and decomposition under equilibrium and non-equilibrium conditions. Heat treatment of alloy steels. Metallography and properties of alloy cast irons.

4.642 Metallurgical Engineering 1D S2 L1T1
Prerequisite: 4.732.
Metal forming. Introduction to metal forming operations. Factors affecting deformation and workability. Processes of forging, rolling, extrusion, and wire drawing. Die materials and geometry. Deformation parameters and processing defects.

4.643 Metallurgical Engineering 2D S2 L2T1
Prerequisites: 4.412A, 4.732.
Fracture mechanisms. Classification of macroscopic and microscopic fracture mechanisms in metals. Initiation and propagation of ductile, brittle, fatigue, creep, stress-corrosion and corrosion-fatigue fracture. Effect of metallurgical defects and design deficiencies on origin and cause of fracture. Analysis of various models of fracture using metallographic and scanning transmission electron fractographic techniques. Studies of case histories of engineering service failures.

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4.713 X-Ray Diffraction and Electron Microscopy — S1 L2T2

Prerequisite: 4.412A or 4.212

X-ray diffraction, electron optics, and analysis. Production, absorption and diffraction of X-rays. Powder and single crystal X-ray methods. Stereographic projections and crystal geometry. Applications of diffraction methods to solid solutions and solubility limit, thermal analysis, stress measurement, chemical analysis. X-ray fluourescence spectroscopy and analysis, on-stream analysis. Electron optics and analysis, transmission and scanning electron microscopy. Energy-loss spectrometers, microanalysis.

4.732 Mechanical Properties of Materials — S1 L2T2

Prerequisite: 5.0011. Co-requisite: 4.412A.

Mechanical properties of solids. Nature and significance of mechanical properties. Mechanical testing; the tension test, hardness testing and impact testing. Stress-strain-time relationships. Analysis of stress and strain, stress and strain transformation relationships, Mohr's circle, elastic stress-strain relationships, application to various types of loading and metal working processes. Failure and yeilding criteria. Influence of stress state, temperature, strain rate and environment on mechanical behaviour.

4.742 Physics of Materials — S2 L2T1

Pre-requisite: 1.001 or 1.011.

Interatomic bonding in solid materials. Types of interatomic bonds, metallic, covalent, ionic. Introductory quantum mechanics in one dimension, free electron theory, effects of periodic potential, density of states curves. Effect of electron to atom ratio on conductivity and crystal structure; semiconductors; instrinsic, extrinstic. Exchange energy; ferromagnetism, antiferromagnetism. Elementary perturbation theory, covalent bond; crystal structures, properties. Ionic bond, crystal structures, force models, properties.

Mechanical and Industrial Engineering

5.0011 Engineering Mechanics 1 — S1 or S2 L2T2

Prerequisite:

	HSC Score
Either	
2 unit Science (Physics) or	*53-100*
3 unit Science or	*90-150*
4 unit Science (multistrand)	*1-50*
or	
2 unit Industrial Arts	
(Engineering Science) or	*53-100*
3 unit Industrial Arts	
(Engineering Science)	*1-50*

Excluded: 5.010, 5.0101, 5.0201.

Note: Students who wish to enrol in this subject in courses other than the full-time courses in Aeronautical Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture can make up for the lack of the prerequisite by work taken in Physics in the first half of the first year.

Equilibrium. Friction. Systems of multiforce members, co-planar and three-dimensional. Mass centre; centroid. Fluid statics. Plane particle kinematics: rectilinear, curvilinear and relative motion. Plane particle kinetics: equations of motion; work, power, energy; impulse, momentum, impact.

5.0012 Introductory Engineering Design and Materials Science — S1 or S2 L2 T0

Excluded: 5.0016, 5.010.

Introduction to engineering design: Engineering method, problem identification, creative thinking, mathematical modelling; computer-aided design; materials and processes; communication of ideas; the place of engineering in society.

Introduction to materials science: Structure and properties of main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

5.0016 Introductory Engineering Design and Drawing Practice — S1 L/T2

Excluded: 5.0012, 5.030, 5.0302, 5.010.

This subject is intended specifically for Electrical Engineering students, and is to be taken in conjunction with 5.0011.

Introduction to engineering design: Engineering method, problem identification, creative thinking, mathematical modelling; computer-aided design; materials and processes; communication of ideas; the place of engineering in society.

Introduction to drawing practice: Graphic communication. First and third angle orthographic projection. Descriptive geometry fundamentals. Mechanical drawing practice and interpretation. Pictorial views. Theory of computer-aided drafting. Electrical drawing practice.

5.0300 Graphical Analysis and Communication — S2 L1T2

Excluded: 5.0016, 5.030, 5.0302.

Descriptive geometry as the basis of analysis and synthesis of spatial relationships: points, lines, plans, solids, intersections. Orthographic and other projection systems. Engineering drawing as a means of definition and communication, selection of views, construction of drawings, conventions, dimensions and tolerancing. Introduction to computer-based drafting systems.

5.0305 Manufacturing Technology — S2 L/T3

Prerequisite: 5.0011. Co-requisites: 5.1010, 5.421. Excluded: 5.030.

Description of the processes classified as: forming from liquid or solid, material removal, material joining. Elementary mechanics of forming and cutting processes. Analysis of the primary functions of machine tool structures and their operation. Relationship between product design and manufacture processes. Elementary functional analysis of product designs, including linear loop equations, limits and fits, dimensional accuracy of processes and alternate design and manufacturing strategies.

5.421 Mechanics of Solids 1 — S1 or S2 L2T1

Co-requisite: 5.010 or 5.0011.

Stress and strain. Bars under axial loading. Stresses and deformation due to bending. Strain energy. Flexibility and stiffness. Stress and deformation due to torsion. Helical springs.

5.4220 Mechanics of Solids 2 ½S1S2L1½T2

Prerequisites: 5.421 or 8.171, 10.001 or 10.011. Excluded: 5.422, 5.4221.

Statics of frames and machines. Unsymmetrical bending. Analysis of stress; analysis of strain; generalized Hooke's Law. Thin-walled pressure vessels. Combined loads. Theories of failure. Stress concentrations and fatigue. Shear stress in beams; shear centre. Stability and buckling of columns.

5.4221 Mechanics of Solids 2 F L1½T2

Intended for Materials Science Majors in combined BE BSc degree course.
Prerequisites: 5.421 or 8.171, 10.001 or 10.011. Excluded: 5.422, 5.4220, 5.4222.

Mechanical properties of materials: tensile and compressive behaviour; hardness; testing machines. Statics of frames and machines. Unsymmetrical bending. Analysis of stress; analysis of strain; generalized Hooke's Law. Thin-walled pressure vessels. Combined loads. Theories of failure. Stress concentrations and fatigue. Fatigue of biaxial and triaxial systems. Shear stress in beams; shear centre. Stability and buckling of columns.

5.620 Fluid Mechanics 1 F L1T1

Prerequisites: 1.001 or 1.951, 5.010, 10.001 or 10.011. Co-requisite: 5.300. Excluded: 5.622.

Units. Fluid properties; fluid statics. Flow fields; unsteady and compressible flow. Bernoulli's equation. Momentum equations. Ideal flow. Flow measurement. Dimensional analysis: similitude; dimensionless numbers; methods of analysis. Steady one dimensional flow in ducts: laminar and turbulent; pressure loss; friction factor; losses in bends and fittings. Elementary boundary layer flow; skin friction and drag. Pups and turbines.

5.626 Thermodynamics 1 FL1T1

Prerequisites: 1.001 or 1.951, 5.0011, 10.001 or 10.011. Excluded: 5.622.

Work, energy, power. Units. Systems, states and processes. Control mass and volume. Fluid properties: extensive; intensive. Equation of state. Tables of properties. First law of thermodynamics. Non-flow processes: reversible; irreversible. Flow processes: energy equation; enthalpy. Ideal processes and cycles. Reversibility. The second law of thermodynamics. Entropy. Isentropic processes. Cycles for engines and heat pumps. Energy conversion efficiency. Reciprocating pumps; compressors; engines. Energy analysis; P-V diagrams.

Electrical Engineering and Computer Science

6.010 Electrical Engineering 1 S2 L3T3

Prerequisite: Electricity and magnetism section of 1.961.

Passive electrical components. Electric circuit concepts and relationship to field theory. Kirchoff's laws. Node and mesh analysis of resistive networks. Network theorems. Controlled sources. Transient conditions. Sources of periodic signals. Sinusoidal steady state operation. Concepts of impedance, resonance, bandwidth and filtering. Power in DC and AC circuits. Circuit models of diodes and transistors. Transistor switching. Combinational logic principles and circuits. Diode and transistor logic implementations. Sequential logic circuit elements: monostable, bistable and astable circuits.

6.021A Circuit Theory 1 S1 or S2 L2T2

Prerequisites: 1.961 or equivalent, 6.010, 10.001.

Lumped modelling concepts used in circuit theory and their relationship to observed physical properties and behaviour. Linear circuit elements. Kirchhoff's laws. Resistive network topology and systematic derivation of network equations using node and loop methods. Network theorems. Exponentials and first order transients. Sinusoidal steady state operation including phasors, impedance and admittance concepts and systematic circuit equations. Power relations and second order systems response. Resonance, Q factor and bandwidth. Three phase circuits. Controlled sources and two port analysis.

6.021C Electronics 1 S1 or S2 L2T2

Prerequisites: 1.982, 6.021A (one of these to be passed, the other to be attempted at an acceptable level and to be repeated concurrently).

Principles of operation and low-frequency characteristics of PN diodes, bipolar and field effect transistors, thyristors and various optoelectronic devices. Transistor low-frequency small-signal equivalent circuits. Design and analysis of low frequency Class A transistor amplifiers. Temperature effects. Device ratings and use of data sheets.

6.606 Computing Science Honours

6.613 Computer Organization and Design SS L3T2

Prerequisites: 6.631 or 6.021E, 6.021D or 6.621 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for these subjects). Excluded: 6.0318.

Bussing structures (asynchronous and synchronous); input/output organization; polling, interrupt and DMA control; parallel and serial device and processor communication and interfacing. Memory organization; CPU and control unit design. Microprocessor case studies.

6.621 Computing 2A S1 or S2 L3T2

Prerequisites: 6.611, 10.001 or 10.011. Excluded: 6.021D.

For those students who intend to take further subjects in computer science.

Expansion and development of material introduced in 6.611 Computing 1. Systematic program development: introduction to programming language semantics, reasoning about programs, program derivation, abstract programs, realization of abstract programs (conversion from abstract to concrete). Practice in programming in a high-level programming language. Data-structures arrays, lists, sets, trees; recursive programming. Introduction to computer organization: a simple machine architecture. Introduction to operating systems.

6.631 Computing 2B S1 or S2 L3T2

Prerequisite: 6.621 or 6.021D, Excluded: 6.021E.

Assembler programming: programming in a low level machine oriented language in order to illustrate the mapping of higher level language constructs onto a typical machine and the interaction between operating systems and devices. *Digital Logic Design:* Boolean algebra and logic gates, simplication of Boolean functions, combinational logic, medium scale integration building blocks, clocked sequential circuits, registers and memory, computer arithmetic.

6.632 Operating Systems   SS L2T3

Prerequisites: 6.631 or 6.021E, 6.641. Excluded: 6.672.

Introduction to operating systems via an intensive case study of a particular system, namely the UNIX Time-sharing systems which runs on the PDP11 computer. Includes system initialization, memory management, process management, handling of interrupts, basic input/output and file systems. A comparison of UNIX with other operating systems. General principles for operating systems design.

6.633 Data Bases and Networks   SS L3T2

Prerequisite: 6.641. Excluded: 14.608, 14.607.

Data base management systems: data models; relational and network structures; data description languages; data manipulation languages; multi-schema structures. Data distribution integrity and security; recovery; privacy. *Computer networks:* economic and technological considerations; digital data transmission; error detection and recovery; network configurations; circuit switching, packet switching; communication protocols, current international standards; data compression; encryption and decryption.

6.641 Computing 2C   S1 or S2 L3T2

Prerequisite: 6.021D or 6.621.

Design of data structures: abstraction, representation, manipulation and axiomatization. Key transformations (hashing), balanced and multiway tress, introduction to graphs. *Files:* sequential acces, random access, merging, sorting and updating. File organizations and introduction to data base systems. *Programming in logic:* descriptive programming languages, symbolic manipulation, pattern matching and associative programming. Software engineering: a survey of some current techniques in problem specification and program design.

6.642 Design and Analysis of Algorithms   SS L3T2

Prerequisite: 6.641.

Techniques for the design and performance analysis of algorithms for a number of classes of problems. Analysis of algorithms: order notation, recurrence equations, worst case and expected order statics. Design of efficient algorithms: recursion, divide and conquer, balancing; backtracking algorithms, branch and bound, dynamic programming: set manipulation problems; fast search algorithms, balance optimal and multiway trees; graph representations and algorithms; pattern matching algorithms. NP— complete problems. Design and specification of programs: modularization, interface design, introduction to formal specification techniques.

6.643 Compiling Techniques and
Programming Languages   SS L3T2

Prerequisite: 6.641. Excluded: 6.672.

1. Language description: phrase structure grammars, Chromsky classification, context-free grammars, finite state grammars, Backus Naur Form, syntax graphs LL(k), LR(k), LAL(k). 2. Lexical analysis: translation of an input (source) string into a (machine independent) quasi-terminal symbol string. Finite state recognizers. 3. Syntax analysis: top-down compilation for LL(1) grammars using syntax graph driven analysers or recursive descent. Bottom-up compilation for simple- and weak-precedence and LR(k) grammars. 4. Semantic analysis: program translation and code generation; attributed grammars. 5. Compliers generators: automatic generation of compliers for LALR(1) grammars. 6. Code optimization by systematic program transformation. 7. Run-time organization: activation record stacks, heap management.

6.646 Computer Applications   SS L3T2

Prerequisites: 6.621 or 6.712 or 6.021D; 10.331 or 10.351 or 10.361 or both of 10.331A and 10.311B.

The use of computers for solving problems with a substantial mathematical and operational research content: includes use of some standard software packages. Topic selected from: discrete event simulation; a simulation language; pseudo random number generation; simple queueing theory, applications of mathematical programming; dynamic programming; statistical calculations; critical path methods; computer graphics, artificial intelligence.

6.647 Business Information Systems   SS L3T2

Prerequisites: 6.641, 14.501.

Introduction to accounting systems: general ledger, debtors and creditors; models of business information systems; integrated business systems. System specification, system analysis, system design and implementation; testing and debugging. Managing a project team, project control. The COBOL programming language. File organization and design; sequential, indexed sequential, random, inverted, B-tree file organizations; data dictionaries, program generators, automatic system generators. A major project, written in COBOL, is undertaken as a team exercise.

6.711 Computing 1A   S1 or S2 L3T3

Prerequisite: as for 10.001. Co-requisite: 10.001 Excluded: 6.600, 6.611, 6.620, 6.021D

Introduction to the basic concepts of computing: Logic, Hierarchies, Abstraction, Specification, Refinement, Implementation, Algorithm, Programming language, Recursion, Non-determinism, Fundamental structures: sets, relations, functions, sequences, bags, trees, graphs. Exposure to a functional programming language for practical experience with the conceptual material in the subject. Machines for interpreting functional programs.

6.712 Computing 1B   S1 or S2 L3T3

Prerequisite: 6.711 Excluded: 6.620, 6.621, 6.021D

Expansion of the functional approach to computing in 6.711. Introduction to procedural and logic programming styles. Data structure implementation. Control structures: recursion and interation. The software development process. Program efficiency and complexity — time and space analysis. Practical experience in using a procedural language. The basic structure of a computer, the layered model of a computer, instruction execution, assembly language, computer building blocks, the function of the operation system.

Civil Engineering

8.2410 Mechanics of Solids 1   S1 L2T1

Prerequisite: 8.1410.

Stress resultants and stress. Deformation and strain. Bars under axial forces: homogeneous and non-homogeneous bars, linear and non-linear behaviour, concept of strain energy. Bars in bending: homogeneous and non-homogeneous bars, linear and non-linear behaviour, strain energy, moment area methods, concepts of stiffness and flexibility. Solid and thin-walled sections: shear stresses and deformations, shear centre.

Genotype — environment interaction. Heterosis and its utilization. Interaction of natural and artificial selection. Limits of selective program.

Wool and Animal Science

9.801 Genetics 1   S2 L3T3

Mendelian inheritance. Chromosomes, linkage and the physical basis of heredity. Gene action in physiology and development. Elements of molecular genetics. Principles of quantitative genetics, strength of inheritance and relationships. Selection and cross-breeding. Genetics applied to animal and plant improvement. Applications of genetics in sheep and wool production.

9.802 Genetics 2   F L2T2

Prerequisite: 9.801.

Genetic structure of populations. Forces causing genetic change. Partition of genetic and phenotyic variation. Resemblance between relatives and estimation of genetic parameters. Direct and correlated selection responses. Aids to selection and selection indexes. Inbreeding and genetic drift. Genetic homeostasis, Genotype — environment interaction. Heterosis and its utilization. Interaction of natural and artificial selection. Limits of selective program.

9.811 Biostatistics 1   S1 L2T2

Design and analysis of comparative experiments, for continuous and discrete random variables. Analysis of variance for fixed, mixed and random models. Linear regression and correlation. Multiple comparison methods.

Mathematics

Note: When a subject is listed as a prerequisite or co-requisite, the appropriate higher subject may be substituted.

Many subjects in the School of Mathematics are offered at two levels. The higher level caters for students with superior mathematical ability. Where both levels are offered grades higher than Credit are only awarded in the ordinary level in exceptional circumstances.

Students should note that all of the Mathematics honours programs require them to take most of their Mathematics subjects at higher level. However, students should not think that the higher level subjects are intended only for those in honours programs. Any student with the ability to undertake higher subjects benefits from so doing.

First Year Mathematics

10.001 Mathematics 1. This is the standard subject and is generally selected by the majority of students in the Faculties of Science, Biological and Behavioural Sciences, Engineering and Applied Science who intend to pursue further studies in mathematics, computer science, physics, chemistry or engineering.

General Mathematics

This is a combination of the single session subjects 10.021B and 10.021C and provides for students who do not intend studying mathematics beyond first year but whose other studies require some knowledge of basic mathematical ideas and techniques. It is particularly designed to meet the needs of such students in Biological and Behavioural Sciences. Optometry, Psychology and Wool Science. However, students who select this subject should weigh seriously the implications of their choice because *no further mathematical subjects are normally available.* A student with meritorious performance in 10.021C may be permitted to proceed to a certain limited number of second year subjects intended for biologists and chemical engineers. The single subject 10.021B is also available to students seeking a prerequisite for 10.001.

Mathematics as a Subsidiary Subject

The School also provides the sequence of two subjects 10.031 and 10.032 at the second and third levels respectively, for students in the Science and Mathematics Course and the Faculty of Science who are mainly interested in the chemical and biological sciences. These courses offer an introduction to mathematical techniques for scientists and engineers.

There is also the Level II subject in Statistics. 10.331, which provides an introduction to statistical procedures commonly used in Science, and which also leads to the Level III subjects 10.3321 Regression Analysis and Experimental Design, 10.3322 Applied Stochastic Processes and, with a Credit Pass, to 10.312B Experimental Design (Applications) and Sampling.

For both the above Level II subjects the entry qualification is a pass in 10.001 Mathematics 1, but in appropriate cases students who have passed in 10.021C General Mathematics 1C at a satisfactory level may be given permission to enrol.

10.001 Mathematics 1   F L4T2

Prerequisite:	
	HSC Exam Score Range Required
2 unit Mathematics* or	67-100
3 unit Mathematics or	1-50
4 unit Mathematics or	1-100
10.021B.	

Excluded: 10.011, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

10.011 Higher Mathematics 1   F L4T2

Not offered in 1989

Prerequisite:

	HSC Exam Score Range Required
3 unit Mathematics	120-150
or	
4 unit Mathematics	1-100

Excluded: 10.001, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

10.021B General Mathematics 1B   S1 L4T2

Prerequisite:

	HSC Exam Score Range Required
2 unit Mathematics or	60-100
3 unit Mathematics or	1-50
4 unit Mathematics	1-100

Excluded: 10.011, 10.001.

Functions (and their inverses), limits, asymptotes, continuity; differentiation and applications; integration, the definite integral and applications; inverse trigonometric functions; the logarithmic and exponential functions and applications; sequences and series; mathematical induction; the binomial theorem and applications; introduction to probability theory; introduction to 3-dimensional geometry; introduction to linear algebra.

10.021C General Mathematics 1C   S2 L4T2

Prerequisite: 10.021B. Excluded: 10.001, 10.011.

Techniques for integration, improper integrals; Taylor's theorem; first order differential equations and applications; introduction to multivariable calculus; conics; finite sets; probability; vectors, matrices and linear equations.

10.031 Mathematics   F L1T1

Prerequisite: 10.001 or 10.011 or 10.021C (CR).

Note A: A unit, together with 10.032, which is available to Faculty of Science students as one of a sequence of two units constituting a terminating service course in mathematics. As such it is mutually exclusive to any other Level II or Level III unit in Pure and/or Applied Mathematics except that 10.292A may be taken with 10.031 and 10.032.

Note B: Mathematics 10.031 is included for students desiring to attempt only one Level II Mathematics unit. If other Level II units in Pure Mathematics or Applied Mathematics are taken, 10.031 Mathematics will not be counted.

Differential equations, use of Laplace transforms, solutions by series; partial differential equations and their solution for selected physical problems, use of Fourier series; multiple integrals, matrices and their application to theory of linear equations, eigenvalues; introduction to numerical methods.

10.032 Mathematics   F L1T1

Prerequisite: 10.031.

Note A: As for Note A in 10.031 Mathematics.

Note B: Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics or Applied Mathematics are taken, 10.032 Mathematics will not be counted.

Vector calculus; special functions; convolution theorem and applications; complex variable theory; Fourier integrals; Laplace transforms with application to ordinary and partial differential equations.

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

10.0331 Transform Methods   S2 L1½T½

Prerequisites: 10.114, 10.2111. Excluded: 10.033, 10.4331, 10.2921.

The mathematics of signals and linear systems. Fourier series. Fourier and Laplace tansforms. Delta-distributions. Discrete Fourier transform, Z-transform. Applications to spectral analysis, autocorrelation, filters.

10.081 Discrete Mathematics   S1 or S2 L4T2

Co-requisite: 10.001 or 10.011.

Role of proof in mathematics, logical reasoning and implication, different types of proofs. Sets, algebras of sets, operations on sets. Mathematical logic, truth tables, syntax, induction. Graphs and directed graphs, basic graph algorithms. Counting, combinatorial identities, binomial and multinomial theorems. Binary operations and their properties, groups and semigroups, ordered structures. Recursion relations. Application to network theory, assignment problems and population growth.

10.623 Mathematics and Computer Science Honours

Pure Mathematics

Level II Subjects

10.111A Pure Mathematics 2 — Linear Algebra   F L1½T1

Prerequisite: 10.001 or 10.011. Excluded: 10.121A.

Vector spaces, linear transformations and matrices, change of basis. Eigenvalues and eigenvectors, generalized eigenvectors. Functions of matrices. Linear systems of differential equations including the use of Laplace transform. Inner products, orthogonalization, projections. Unitary and self-adjoint transformations. Quadratic and Hermitian forms.

10.1113 Pure Mathematics 2 — Multivariable Calculus   S1 or S2 L1½T1

Prerequisite: 10.001 or 10.011. Excluded: 10.1213.

Multiple integrals, partial differentiation. Analysis of real valued functions of one and several variables.

10.1114 Pure Mathematics 2 — Complex Analysis   S1 or S2 L1½T1

Prerequisite: 10.001 or 10.011. Excluded: 10.1214.

Analytic functions, Taylor and Laurent series, integrals. Cauchy's theorem, residues, evaluation of certain real integrals.

10.1115 Pure Mathematics 2 —
Finite Mathematics A   **S1 L1½T½**

Prerequisite: 10.001.

Positional number systems, floating-point arithmetic, rational arithmetic, congruences. Euclid's algorithm, continued fractions, Chinese remainder theorem, Fermat's theorem, applications to computer arithmetic. Polynomial arithmetic, division algorithm, factorization, interpolation, finite field. Codes, error-correcting codes, public-key cryptography.

10.1116 Pure Mathematics 2 —
Finite Mathematics B   **S2 L1½T½**

Prerequisite: 10.1115 (or any other Year 2 Mathematics half-unit).

Introduction to combinatorial computing, recurrence relations, examples of divide and conquer strategies, backtrack and branch and bound algorithms. Finite Fourier transforms, roots of unity, convolutions, application to fast multiplication and the analysis of pseudo-random numbers. Boolean algebra, switching circuits.

10.121A Higher Pure Mathematics 2 —
Algebra   **F L2T½**

Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.111A, 10.1111.

Linear algebra: vector spaces, commutative rings, polynomials, modules, linear transformations, eigenvectors, invariant subspaces, canonical forms, linear functions, bilinear and multi-linear algebra. Group theory; subgroups, quotient groups, isomorphisms. Lagrange's theorem, Sylow's theorem.

10.1213 Higher Pure Mathematics 2 —
Multivariable Calculus   **S1 L2T½**

Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.1113.

As for 10.1113 Pure Mathematics 2 — Multivariable Calculus but in greater depth.

10.1214 Higher Pure Mathematics 2 —
Complex Analysis   **S2 L2T½**

Prerequisite: 10.1213. Excluded: 10.1114.

As for 10.1114 Pure Mathematics 2 — Complex Analysis, but in greater depth.

Level III Subjects

10.1111 Pure Mathematics 3 —
Group Theory   **S1 L1½T½**

*Prerequisites: * * * Excluded: 10.121A.*

Mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups.

10.1112 Pure Mathematics 3 — Geometry   **S2 L1½T½**

*Prerequisites: * * *. Excluded: 10.1424.*

Elementary concepts of Euclidean, affine and projective geometries.

10.1121 Pure Mathematics 3 —
Number Theory   **SS L1½T½**

*Prerequisites: * * *. Excluded: 10.1421.*

Euclidean algorithm, congruences, sums of squares, diophantine equations.

10.1123 Pure Mathematics 3 —
Logic and Computability   **SS L1½T½**

*Prerequisites: * * **

The propositional calculus — its completeness and consistency: Turing machines; unsolvable problems; computability and Church's thesis; Godel's incompleteness theorems.

10.1124 Pure Mathematics 3 —
Combinatorial Topology   **SS L1½T½**

*Prerequisites: * * **

Elementary combinatorial topology of surfaces.

10.1125 Pure Mathematics 3 —
Ordinary Differential Equations   **S1 L1½T½**

Prerequisite: 10.111A. Excluded: 10.1425.

Systems of ordinary differential equations: variations of constants formula; stability; Poincare space; Lyapunov's direct method.

10.1126 Pure Mathematics 3 —
Partial Differential Equations   **S1 L1½T½**

*Prerequisites: 10.1113, 10.1114, * * *. Co-requisite: 10.1125. Excluded: 10.1426.*

System of partial differential equations characteristic surfaces; classifications. Cauchy problem. Dinches and Neumann problems; the maximum principle. Poisson's formula: conformal mapping.

10.1127 Pure Mathematics 3 —
History of Mathematics   **S2 L1T1**

*Prerequisites: * * **

Topics from the history of mathematics, with emphasis on the development of those ideas and techniques used in undergraduate courses. Students are expected to read widely and to present written material based on their readings.

10.1128 Pure Mathematics 3 —
Foundations of Calculus   **S1 L1½T½**

*Prerequisites: * * * Excluded: 10.122B.*

Properties of the real numbers. Convergence of sequences and series. Properties of continuous and differentiable functions of a real variable.

10.122B Higher Pure Mathematics 3 —
Real Analysis and Functional
Analysis   **F L1½T½**

Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN), †††
Excluded: 10.1128. 10.1523.

The limit processes of analysis; introduction to Lebesgue integration; introduction to metric spaces. Hilbert spaces; linear operators; Fourier series.

10.1321 Higher Pure Mathematics 3 — Rings and Fields S1‡ L1½T½

Prerequisite: 10.121A or 10.111A (DN)†††.

Rings; integral domains; factorization theory; Fields; algebraic and transcendental extensions. Introduction to algebraic number theory, quadratic reciprocity.

10.1322 Higher Pure Mathematics 3 — Galois Theory S2‡ L1½T½

Prerequisites: †††. Co-requisite: 10.1321.

Galois fields. Galois groups. Solution of equations by radicals. Further algebraic number theory.

10.1323 Higher Pure Mathematics 3 — Complex Analysis S1‡‡ L1½T½

Prerequisites: 10.1214 or 10.1114 (DN),†††. Co-requisite: 10.122B (strongly recommended).

Topics in advanced complex function theory chosen from the following: Conformal mapping. Analytic continuation. Entire and meromorphic functions. Elliptic functions. Asymptotic methods. Integral formulae. Harmonic functions.

10.1324 Higher Pure Mathematics 3 — Integration and Fourier Analysis S2‡ L1½T½

Prerequisites: †††. Co-requisite: 10.122B.

Lebesgue integration; measure theory. Fourier transforms.

10.1325 Higher Pure Mathematics 3 — Differential Geometry S1† L1½T½

Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN),†††. Excluded: 10.1522.

Curves and surfaces in space; classification of surfaces. Curvature; geodesics.

10.1326 Higher Pure Mathematics 3 — Calculus on Manifolds S2‡ L1½T½

Prerequisites: †††. Co-requisite: 10.1325.

Manifolds; vector fields; flows. Introduction to Morse theory. Differential forms; Strokes' theorem; the Gauss-Bonnet theorem.

10.1421 Higher Pure Mathematics 3 — Number Theory S1‡‡ L1½T½

Prerequisite:††† . Excluded: 10.1121.

Prime numbers; number theoretic functions; Dirichlet series; partitions. Continued fractions, diophantine approximation; p-adic numbers.

10.1422 Higher Pure Mathematics 3 — Groups and Representations S2‡‡ L1½T½

Prerequisites: 10.121A or 10.111A (DN) and 10.111 (DN),†††.

Abelian groups, composition series; nilpotent groups; soluble groups. Representations and characters of finite groups; induced representations.

10.1423 Higher Pure Mathematics 3 — Topology S1‡‡ L1½T½

Prerequisite: 10.1213 or 10.1113 (DN),†††.

Naive set theory, the axiom of choice Metric and topological spaces, compactness.

10.1424 Higher Pure Mathematics 3 — Geometry S2‡‡ L1½T½

Prerequisites: 10.121A or both 10.111A (DN) and 10.1111 (DN),†††. Excluded: 10.1112.

Axioms for a geometry; affine geometry, Desargues' theorem; projective geometry.

10.1425 Higher Pure Mathematics 3 — Ordinary Differential Equations S1‡‡ L1½T½

Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN),†††. Co-requisites: 10.122B (strongly recommended). Excluded: 10.1125.

Existence and uniqueness theorems. Linearization. Qualitative theory of autonomous systems.

10.1426 Higher Pure Mathematics 3 — Partial Differential Equations S2‡‡ L1½T½

Prerequisites:††† Co-requisite: 10.1425. Excluded: 10.1126.

Classification, characteristics. Cauchy problem; Dirichlet and Neumann problems. Distributions.

10.1521 Pure Mathematics 3 — Combinatorics and its Applications SS L1½T½

Prerequisites: ***

Generating functions, their properties and applications to partitions and recurrence relations. Branching processes, trees and the analysis of their paths, the analysis of algorithms and the Galton-Watson process. Coding theory and other design problems. Latin squares, block designs and error-correcting codes.

10.1522 Pure Mathematics 3 — Differential Geometry SS L1½T½

Prerequisites: 10.1113, ***. Excluded: 10.1325.

Curves and surfaces in space. Gaussian curvature, Gauss theorem. Gauss Bonnet theorem.

10.1523 Pure Mathematics 3 — Functional Analysis and Applications S1 or S2 L1½T½

Prerequisites: 10.111A, 10.2112, *** Co-requisite: 10.1128 (strongly recommended). Excluded: 10.122B.

Geometry of Hilbert spaces, approximation problems, linear operators, filters, spectral methods for differential equations.

Level IV Subject

10.123 Pure Mathematics 4

An honours program consisting of the preparation of an undergraduate thesis together with advanced lectures on topics chosen from fields of current interest in Pure Mathematics. With the permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

***Normal prerequisites for attempting Level III Pure Mathematics units are at least two level II Mathematics units, including any course prerequisites. For any listed prerequisite or co-requisite unit, an appropriate higher unit may be substituted.

‡These subjects are offered in odd-numbered years.

‡‡These subjects are offered in even-numbered years.

†††Students wishing to enrol in Level III Higher Pure Mathematics units should consult with the Department before enrolling. Normal prerequisites for attempting Level III Higher Pure Mathematics units are at least two Level II Mathematics units, including any course prerequisites, at an average of distinction level or their higher equivalents. Subject to the approval of the Head of the Department, these may be relaxed.

Applied Mathematics

Level II Subjects

10.0331 Transform Methods   S1 L1½T½

Prerequisites: 10.2111, 10.1114. Excluded: 10.2921.

The mathematics of signals and linear systems. Fourier series. Fourier and Laplace transforms. Discrete Fourier transform, z-transform. Applications to spectral analysis, autocorrelation, filters.

10.2111 Applied Mathematics 2 — Vector Calculus   S1 or S2 L1½T½

Prerequisite: 10.001. Excluded: 10.2211.

Properties of vectors and vector fields; divergence, gradient, curl of a vector; line, surface, and volume integrals. Gauss' and Stokes' theorems. Curvilinear co-ordinates.

10.2112 Applied Mathematics 2 — Mathematical Methods for Differential Equations   S1 or S2 L1½T½

Prerequisite: 10.001. Excluded: 10.2212.

Mathematical methods for ordinary and partial differential equations. Series solutions, numerical methods, separation of variables. Fourier series. Bessel functions.

10.2113 Applied Mathematics 2 — Linear Programming   S1 or S2 L1½T½

Prerequisite: 10.001. Co-requisite: 10.111A. Excluded: 10.2213.

Mathematical modelling and solution techniques for linear optimization problems. Feasible regions, graphical methods, the standard problem, basic solutions, fundamental theorem, simplex and revised simplex methods, duality and the dual simplex method, sensitivity analysis, the transportation problem.

10.2115 Applied Mathematics 2 — Discrete-Time Systems   S1 or S2 L1½T½

Prerequisite: 10.001. Co-requisite: 10.111A, Excluded: 10.2215.

The study of dynamical systems whose states change at discrete points in time. Difference equations: existence and uniqueness of solutions, general solution of linear equations. Linear systems: dynamics, stability, and oscillations, z-transforms, state-space methods. Nonlinear systems; equilibrium points, limit cycles.

Applications selected from problems of importance in engineering, biological, social, management, and economic systems.

10.2116 Applied Mathematics 2 — Continuous-Time Systems   S2 L1½ T½

Prerequisite: 10.001. Excluded: 10.2216.

The study of continuous dynamical systems. One-dimensional systems, kinematic waves, applications to traffic flow and waves in fluids. Momentum equation for one-dimensional fluid flow, sound waves. Dynamics of a system of particles, oscillations. An introduction to the modelling of biological and ecological systems.

10.2211 Higher Applied Mathematics 2 — Vector Analysis   S1 L2T½

Prerequisite: 10.011 or 10.001 (CR). Excluded: 10.2111.

As for 10.2111 but in greater depth.

10.2212 Higher Applied Mathematics 2 — Mathematical Methods for Differential Equations   S2 L2T½

Prerequisite: 10.011 or 10.001 (CR) Excluded: 10.2112.

As for 10.2112 but in greater depth.

10.2213 Higher Applied Mathematics 2 — Linear Programmimg   S1 or S2 L1½T½

Prerequisite: 10.011 or 10.001 (CR) Co-requisite: 10.111A. Excluded 10.2113.

As for 10.2113 but in greater depth.

10.2215 Higher Applied Mathematics 2 — Discrete-Time Systems   S2 L1½T½

Prerequisite: 10.011 or 10.001 (DN). Co-requisite: 10.111A Excluded: 10.2115.

As for 10.2115, but in greater depth.

10.2216 Higher Applied Mathematics 2 — Continuous-Time Systems   S2 L1½T½

Prerequisite: 10.011 or 10.001 (CR), Excluded: 10.2116.

As for 10.2116 but in greater depth.

10.261A Applied Mathematics 2 — Mathematical Computing   S1 L1½T½

Prerequisite: 10.001.

The development of efficient and reliable software for mathematical applications using FORTRAN. Data types, input/output,

structured programming, communication between sub-programs, file manipulation, portability, efficiency, accuracy, documentation, de-bugging. Examples will be chosen from the following areas: non-linear equations in one and two variables, extrapolation procedures, numerical quadrature, systems of linear equations, difference equations, ordinary differential equations.

Level III Subjects

10.212A Applied Mathematics 3 — Numerical Analysis   S2 L3T1

Prerequisites: 10.2112, 10.111A. Excluded: 10.222A.

Introduction to the techniques required for the analysis of numerical methods. Theory of interpolation and approximation, using polynomials, splines, rational functions and Fourier methods. Numberical quadrature including Gaussian and Clenshaw-Curtis rules, adaptive methods and methods for singular and oscillatory integrands. Sets of linear equations and their numerical solution, matrix eigenvalue problems. Numerical solution of ordinary and partial differential equations, boundary value problems, introduction to finite element methods.

10.212B Higher Applied Mathematics 3 — Fluid Dynamics   S2 L3T1

Prerequisites: 10.2111, 10.2112. Excluded: 10.222B, 10.422A.

The mathematical modelling and theory of problems arising in the flow of fluids. Cartesian tensors, kinematics, mass conservation, vorticity, Navier-Stokes equation. Topics from inviscid and viscous fluid flow, gas dynamics, sound waves, water waves.

10.212D Applied Mathematics 3 — Mathematical Methods   S1 L3T1

Prerequisites: 10.2112, 10.111A, 10.1113, 10.1114. Excluded: 10.0331, 10.033, 10.222D, 10.412D, 10.422D, 10.4331, 10.2921.

Fundamental methods for solution of problems in applied mathematics, physics and engineering. Functions of a complex variable, contour integration, asymptotic methods. Fourier and Laplace transforms, complex inversion theorems. Orthogonal polynomials and functions, Sturm-Liouville theory, eigenfunction expansions, generalized Fourier series. Applications to the solution of boundary value problems for ordinary and partial differential equations is given for all methods.

10.212L Applied Mathematics 3 — Optimization Methods   S1 L3T1

Prerequisites: 10.111A, and 10.1113 or 10.2111. Excluded: 10.222L.

Development, analysis and application of methods for optimization problems. Theory of multivariable optimization; including necessary and sufficient optimality conditons, stationary points, Lagrange multipliers, Kuhn-Tucker conditions, convexity and duality. Numerical methods for one dimensional minimization, uncostrained multivariable minimization (including steepest descent, Newton, quasi-Newton and conjugate gradient methods) and constrained multi-variable minimization (including linear programming and quadratic programming).

10.212M Applied Mathematics 3 — Optimal Control   S2 L3T1

Prerequisites: 10.1113 and 10.1114, 10.111A. Excluded: 10.222M

Introduction to control of time-varying systems. Open and closed loop control systems. Mathematical description of dynamical systems. Transform methods for linear systems. Stability, feedback and control. State space, observability and controllability. Optimal control. Dynamic programming and the Bellman equation. The Pontryagin maximum principle. Calculus of variations.

Examples and applications are selected from physical, engineering, economics, resource and financial management, social and biological systems.

10.212N Applied Mathematics 3 — Dynamical Systems   S1 L3 T1

Prerequisites: 10.111A, 10.2112, 10.1125. Excluded: 10.222N

Nonlinear differential equations and applications to time-dependent systems. Perturbation methods, averaging and asymptotic techniques, Floquet theory, bifurcation theory. Hamiltonian dynamics, Liouville's theorem, integral invariants, canonical transformations, action-angle variables. Applications to ecological, biological and mechanical systems.

10.222A Higher Applied Mathematics 3 — Numerical Analysis   S2 L3T1

Prerequisites: 10.2212 or 10.2112 (CR), 10.121A or 10.111A (CR). Excluded: 10.212A.

As for 10.212A but in greater depth.

10.222B Higher Applied Mathematics 3 — Fluid Dynamics   S2 L3T1

Prerequisites: 10.2211 or 10.2111 (CR), 10.2212 or 10.2112 (CR) Excluded: 10.212B, 10.422A

As for 10.212B but in greater depth.

10.222C Higher Applied Mathematics 3 — Maxwell's Equations and Special Relativity   S2 L3T1

Prerequisites: 10.2211 or 10.2111 (CR), 10.2212 or 10.2112 (CR), 10.1214 or 10.1114 (CR), 1.001. Excluded: 1.0333.

Theory and applications of electromagnetic fields and waves. Electrostatics; Poisson and Laplace equations, potential theory, boundary value problems, spherical harmonics, Green's functions, dielectrics. Magnetic fields and forces; applications, magnetohydrodynamics. Electromagnetic fields, electromagnetic potentials, waves and radiation, vector and scalar wave equations, spherical waves, applications. Lorentz tranformation, relativistic electrodynamics.

10.222D Higher Applied Mathematics 3 — Mathematical Methods   S1 L3T1

Prerequisites: 10.2212 or 10.2112 (CR), 10.121A or 10.111A (CR) 10.1213 or 10.1113 (CR), 10.1214 or 10.1114 (CR), Excluded: 10.0331, 10.033, 10.212D, 10.412D, 10.422D, 10.4331, 10.2921

As for 10.212D but in greater depth.

10.222L Higher Applied Mathematics 3 — Optimization Methods S1 L3T1

Prerequisites: 10.121A or 10.111A (CR), 10.2211 or 10.2111 (CR) or 10.1213 or 10.1113 (CR). Excluded: 10.212L.

As for 10.212L but in greater depth.

10.222M Higher Applied Mathematics 3 — Optimal Control S2 L3T1

Prerequisites: 10.1213 or 10.1113 (CR), 10.1214 or 10.1114 (CR), 10.121A or 10.111A (CR). Excluded: 10.212M.

As for 10.212M but in greater depth.

10.222N Higher Applied Mathematics 3 — Dynamical Systems S1 L3T1

Prerequisites: 10.121A or 10.111A (CR), 10.1425 or 10.1125 (CR), 10.2212 or 10.2112 (CR). Excluded: 10.212N.

As for 10.212N but in greater depth.

10.262A Applied Mathematics 3 — Mathematical Software S2 L3T1

Prerequisites: 10.111A, 10.2112, and either 6.621 or 10.211E or 10.261A or equivalent. Excluded: 10.612.

Underlying methods, development, and use of mathematical software packages; primarily of those written in FORTRAN. Numerically stable methods for matrix factorizations, solution of systems of linear equations and calculation of matrix eigenvalues and eigenvectors. Numerical quadrature, including special methods for singular, oscillatory and infinite integrals and for multiple integrals. Numerical solution of ordinary differential equations, including initial and boundary value problems. Extensive use is made of computers and software packages. A basic knowledge of Fortran is assumed.

10.292A Applied Mathematics 3 — Oceanography S1 L3T1

Prerequisites: 10.2111 or 10.031, 1.001. Excluded: 10.412A.

Review of basic physical features and mathematical description of oceans. Physical properties of sea water. Elementary hydrodynamics. An elementary discussion of turbulence. Geostrophy, dynamic heights and the inference of heights from hydrographic measurements. Ekman layers. Wind-driven ocean circulation, western boundary currents. Surface and internal waves, tides. Thermohaline process: mixing, entrainment, double-diffusive phenomena, mixed layers and gravity currents.

10.2922 Applied Mathematics 3 — Applied Time Series Analysis S2 L1½T½

Prerequisites: 10.022 or 1 level II Pure or Applied Mathematics unit. Co-requisite: Nil. Excluded: 10.4129.

Techniques for analyzing time-varying data. Classification of random processes, sampling for discrete analysis, Fourier analysis, spectra, filtering. Cross-spectra, estimation and hypothesis testing, confidence limits, application to experiment planning. Emphasis on computer analysis of actual data.

Level IV Subjects

10.223 Applied Mathematics 4

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: advanced mathematical methods for applied mathematics, advanced optimization, numerical analysis, theory of linear and non-linear dynamical systems, optimal control, operations research, functional analysis and applications, mathematics of economic models and of economic prediction, fluid mechanics, oceanography, microhydrodynamics, and analytical and numerical solution of partial differential equations. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

10.233 Applied Mathematics 4 (Short Course)

6 units consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: topics listed in 10.223. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

Statistics

Level II Subjects

10.301 Statistics SA F L1½T½

Prerequisite: 10.001 or 10.021C. Excluded: 10.331, 10.311A, 10.311B, 10.321A, 10.321B, 45.101.

Probability, random variables, independence, binomial, Poisson and normal distributions, transformations to normality, estimation of mean and variance, confidence intervals, tests of hypotheses, contingency tables, two sample tests of location, simple and multiple linear regression, analysis of variance for simple models.

10.311A Theory of Statistics 2 — Probability and Random Variables S1 L3T1

Prerequisite: 10.001 or 10.011 or 10.021C(CR). Excluded: 10.321A, 10.301, 10.331, 45.101.

Probability, random variables, standard discrete and continuous distributions, multivariate distributions, transformations, random sampling, sampling distributions, limit theorems.

10.311B Theory of Statistics 2 — Basic Inference S2 L3T1

Prerequisite: 10.311A. Excluded: 10.321B, 10.301, 10.331, 45.101.

Point estimation: general theory, estimation by moments, maximum likelihood, interval estimation with general theory and application, hypothesis testing using Neyman Pearson theory, linear regression and prediction, analysis of variance.

10.3111 Theory of Statistics 2 — Statistical Computing and Simulation
S1 L1½T½

Prerequisite: 10.001 or 10.011 or 10.021C(CR). Co-requisite: 10.311A.

Introduction to APL, random variables, univariate transformation, simulation of random variables, APL programming, integer value random variables, random walks — theory and simulation, introduction to Markov chains.

10.3112 Theory of Statistics 2 — Nonparametric Statistical Inference
S2 L1½T½

Prerequisite: 10.311A. Co-requisite: 10.311B.

Order statistics, exact and approximate distributions, multinomial distributions, goodness of fit, contingency tables, one-sample and two-sample estimation and inference problems.

10.321A Higher Theory of Statistics 2 — Probability and Random Variables
S1 L3T1

Prerequisite: 10.001 or 10.011. Excluded: 10.311A, 10.301, 10.331, 45.101.

As for 10.311A but in greater depth.

10.321B Higher Theory of Statistics 2 — Basic Inference
S2 L3T1

Prerequisite: 10.321A. Excluded: 10.311B, 10.301, 10.331, 45.101.

As for 10.311B but in greater depth.

10.3211 Higher Theory of Statistics 2 — Statistical Computing and Simulation
S1 L1½T½

Prerequisite: 10.001 or 10.011. Co-requisite: 10.321A.

As for 10.3111 but in greater depth.

10.3212 Higher Theory of Statistics 2 — Nonparametric Statistical Inference
S2 L1½T½

Prerequisite: 10.321A. Co-requisite: 10.321B.

As for 10.3112 but in greater depth.

10.331 Statistics SS
F L1½T½

Prerequisite: 10.001 or 10.021C (CR). Excluded: 10.311A, 10.311B, 10.321A, 10.321B, 10.301, 45.101.

An introduction to the theory of probability, with finite, discrete and continuous sample spaces. The standard elementary univariate distributions: binomial, Poisson and normal, an introduction to multivariate distributions. Standard sampling distributions, including those of chi^2, t and F. Estimation by moments and maximum likelihood (including sampling variance formulae, and regression); confidence interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction to experimental design; fixed, random and mixed models, involving multiple comparisons and estimation of variance components.

Level III Subjects

10.312A Theory of Statistics 3 — Stochastic Processes
S1 L3T1

Prerequisites: 10.311A, 10.111A, 10.1113. Excluded: 10.322A, 10.3322.

Probability spaces, generating functions, convolutions. Poisson process, renewal processes. Branching processes. Recurrent events, Markov chains. Birth-and-death processes, queueing models. Inference for stochastic processes.

10.312C Theory of Statistics 3 — Linear Models
S1 L3T1

Prerequisites: 10.311B, 10.111A, 10.1113. Excluded: 10.322C, 10.3321.

Matrix theory. Multivariate normal distribution. Quadratic forms (distributions and independence). The general linear hypothesis, Gauss-Markov theorem. Hypothesis testing. Selection of variables. Analysis of residuals. Analysis of variance.

10.312F Theory of Statistics 3 — Statistical Computation
S2 L2T2

Prerequisites: 10.311B or 10.321B, 10.3111 or 10.3211.

Array and sequential processing in APL. Standard statistical operations and their efficient coding. Simulation of random variables and stochastic processes. Efficient coding of survey data. Modular package construction, and the use of packages (eg STATAPL, IDAP, INSTAPAK, SPSS, GLIM, GENSTAT, MINITAB, SAS, BMD). A project, to construct a small package consistent with general specifications and with safeguards against common errors.

10.3121 Theory of Statistics 3 — Sample Survey Theory
S1 L1½T½

Prerequisite: 10.311B. Excluded: 10.3221.

Finite population sampling theory illustrated by mean estimation; simple random, stratified, cluster, systematic, mutistage and ratio sampling, sampling proportional to size.

10.3122 Theory of Statistics 3 — Design and Analysis of Experiments
S2 L1½T½

Prerequisites: 10.311B, 10.312C. Excluded: 10.3222, 10.3321.

Principles of good experimental design. Completely randomized experiment, randomized complete block design. Latin square design. Contrasts and multiple comparisons. Analysis of factorial experiments. Random effects models.

10.3123 Theory of Statistics 3 — Statistical Inference
SS L1½T½

Prerequisite: 10.311B. Excluded: 10.3223.

Uniformly minimum variance unbiased estimation. Cramer-Rao inequality, Lehman-Scheffe theorem. Monotone likelihood ratio distributions and uniformly most powerful unbiased tests. Generalized likelihood ratio test, exact test and large samples tests. Bayesian point estimation, interval estimation and hypothesis testing.

10.3124 Theory of Statistics 3 —
Nonparametric Methods　　　　**SS L1½T½**

Prerequisite: 10.311B, 10.3112. Excluded: 10.3224.

One sample and two sample problems. Tests for association. Contingency tables. Nonparametric analysis of variance and regression.

10.322A Higher Theory of Statistics 3 —
Stochastic Processes　　　　**S1 L3½T1**

Prerequisites: 10.321A, 10.111A, 10.1113. Excluded: 10.312A, 10.3322.

As for 10.312A but in greater depth.

10.322C Higher Theory of Statistics 3 —
Linear Models　　　　**S1 L3½T1**

Prerequisites: 10.321B, 10.111A, 10.1113. Excluded: 10.312C, 10.3321.

As for 10.312C but in greater depth.

10.322D Higher Theory of Statistics 3 —
Probability Theory　　　　**S2 L3T1**

Prerequisites: 10.321A, 10.111A, 10.1113.

Probability spaces, generating functions. Weak convergence, convergence in probability, weak law of large numbers, central limit theorem. Extreme value distributions. Borel-Cantelli lemma, almost sure convergence, strong law of large numbers. Stable and infinitely divisible distributions.

10.3221 Higher Theory of Statistics 3 —
Sample Survey Theory　　　　**S1 L1½T½**

Prerequisite: 10.321B. Excluded: 10.3121.

As for 10.3121 but in greater depth.

10.3222 Higher Theory of Statistics 3 —
Design and
Analysis of Experiments　　　　**S2 L1½T½**

Prerequisites: 10.321B, 10.322C. Excluded: 10.3122, 10.3321.

As for 10.3122 but in greater depth.

10.3223 Higher Theory of Statistics 3 —
Statistical Inference　　　　**SS L1½T½**

Prerequisite: 10.321B. Excluded: 10.3123.

As for 10.3123 but in greater depth.

10.3224 Higher Theory of Statistics 3 —
Nonparametric Methods　　　　**SS L1½T½**

Prerequisites: 10.321B, 10.3212. Excluded: 10.3124.

As for 10.3124 but in greater depth.

10.3225 Higher Theory of Statistics 3 —
Statistic Project　　　　**F**

Prerequisites: 10.321A, 10.321B. Co-requisites: At least four units from 10.322A, 10.322C, 10.3221, 10.3222, 10.3223, 10.3224, 10.322D, 10.312F.

10.3321 Regression Analysis and
Experimental Design　　　　**S1 L1½T½**

Prerequisite: 10.331 or 10.311B or approved equivalent. Excluded:10.3122, 10.3222, 10.312C, 10.3222C.

A revision of linear regression with extension to multiple and stepwise linear regression. Analysis of block designs, Latin squares, factorial designs, variance component and mixed model analyses. Bioassay, logit models. Contingency tables.

10.3322 Applied Stochastic Processes　　　　**S2 L1½T½**

Prerequisite: 10.331 or 10.311A or 10.321A, or approved equivalent. Excluded: 10.312A, 10.322A.

An introduction to processes in discrete and continuous time Markov chains and Markov processes, branching processes, time series with moving average models.

Level IV Subject

10.323 Theory of Statistics 4

Specialized study, from the topics set out, for students attempting honours in the Science and Mathematics or Arts courses with a major in Statistics. Mathematical basis. Experimental design; response surfaces. Stochastic processes. Theories of inference. Sequential analysis. Non-parametric methods. Multivariate analysis. Mathematical programming. Information theory. Discrete distributions. Project.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For Further information regarding the following subjects see the Faculty of Applied Science and Engineering Handbooks.

10.022 Engineering Mathematics 2　　　　**F L2T2**

Prerequisite: 10.001.

Differential equations, use of Laplace transforms, solutions by series; partial differential equations and thier solution for selected physical problems, use of Fourier series; introduction to numerical methods; matrices and their application to theory of linear equations, eigenvalues and thier numerical evaluation; vector algebra and solid geometry; multiple integrals; introduction to vector field theory.

10.0332 Electrical Engineering
Mathematics 3 —
Numerical Methods　　　　**S2 L1½T½**

Prerequisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112. Excluded: 10.212A, 10.222A.

Numerical approximation of solutions to linear and non-linear equations. Interpolation and extrapolation. Approximation of definite integrals. Approximate solution of differential equations. Optimization. Approximate solution of matrix eigenvalue and eigenvector problems.

10.341 Statistics SU　　　　**S1 L2½T½**

Prerequisite: 10.001 or 10.011.

For students in the School of Surveying.

Introduction to probability theory, random variables and distribution functions, sampling distributions, including those of t, (chi² and F. Estimation procedures, including confidence interval estimation with an emphasis on least squares and surveying problems, and computer based exercises.

10.351 Statistics SM   F L1½T½

Prerequisite: 10.001 or 10.011.

For students in Aeronautical, Industrial and Mechanical Engineering and Naval Architecture.

Introduction to probability theory, with finite, discrete and continuous sample spaces. Random variables: the standard elementary distributions including the binomial, Poisson and normal distributions. Sampling distributions: with emphasis on those derived from the normal distribution: t, (chi² and F. Estimation of parameters: the methods of moments and maximum likelihood and confidence interval estimation. The standard test of statistical hypotheses, and, where appropriate, the powers of such tests. An introduction to regression and the bivariate normal distribution.

10.361 Statistics SE   F L1½T½

Prerequisite: 10.001 or 10.011.

For students in the School of Electrical Engineering.

Introduction to probability theory, random variables and distribution functions; the binomial, Poisson and normal distributions in particular. Standard sampling distributions, including those of (chi² and t. Estimation by moments and maximum likelihood; confidence interval estimation. The Standard tests of significance based on the above distribution with a discussion of power where appropriate.

An introduction to linear regression, auto-regression. Probability limit, law of large numbers and central limit theorem. Multivariate normal distribution. Stochastic processes in discrete and continuous time: Poisson and Gaussian processes.

10.381 Statistics SC   S1 or S2 L1½T½

For students in the School of Civil Engineering.

Introduction to probability. Random variables. Elementary distribution. Statistical inference. Point estimation. Confidence intervals.

Psychology

Psychology Level I Subject

12.100 Psychology 1   F L3T2

An introduction to the content and methods of psychology as a basic science, with emphasis on the biological and social bases of behaviour, relationship to the environment, and individual differences. Training in the methods of psychological enquiry, and in the use of elementary statistical procedures.

Psychology Level II Subjects •

12.200 Research Methods 2

Prerequisite: 12.100.
Not offered in 1989.

General introduction to the design and analysis of experiments; hypothesis testing, estimation, power analysis; general treatment of simple univariate procedures; correlation and regression.

12.201 Biological Basis of Psychology 2

Prerequisite: 12.100.
Not offered in 1989.

Two strands: one emphasises basic biological structures and mechanisms, with particular emphasis on specific sensory systems (eg pain) and behaviour (eg aggression); the other strand emphasises structure and function of sensory systems, evaluates neurological concepts and models, and examines the sensory interaction of people with their environment.

12.202 Social and Cognitive Psychology 2

Prerequisite: 12.100.
Not offered in 1989.

Two strands; one provides a consideration of the content, methods and models of social psychology and evaluates effects of social factors on behaviour of individuals and groups; the other strand is concerned with cognitive behaviour of humans, particularly in relation to speech, pattern recognition, memory and thinking.

12.203 Psychology 2A   F L2T2

Prerequisite: 12.100. Co-requisites: 12.206, 12.207, 12.208, 12.209. Excluded: 12.331.

Available to Course 3431 students only.

Introduction to several areas of professional practice in psychology and the roles of psychologists in these areas (eg Developmental Disabilities, and Psychology and the law). Principles and techniques of interviewing and counselling in a variety of contexts.

12.204 Human Relations 2   S1 L2T2

Prerequisite: 12.100.

Development of the individual, human relations in the family group, interpersonal relationships and, in particular, the handling of anxiety, aggression and communication.

12.205 Individual Differences 2

Prerequisite: 12.100.
Not offered in 1989

Measurement and significance of individual differences in intellectual, motivational and personality functioning. Statistics, to cover the fundamentals of hypothesis testing.

12.206 Research Methods   S1 L2T2

Prerequisite: 12.100. Excluded: 12.200.

General introduction to the analysis of data by means of inferential statistics (z, t and chi square). Consideration of issues in the use of statistics (power, robustness, multiple tests). General features of research methodology. Laboratory and statistical traditions affecting design and control procedures. The implications of the use of inferential statistics for research methodology generally.

12.207 Psychological Assessment   S2 L2T1

Prerequisite: 12.206. Excluded 12.200.

Principles and techniqes of psychological measurement. Types of tests and issues relevant to their construction, administration and interpretation in decisions about selection and classification.

12.208 Attention, Memory and Thought   S1 L2T2

Prerequisite: 12.100. Excluded: 12.202.

Introduction to the fundamental principles of human cognition underlying pattern recognition, selective attention, memory storage and retrieval, and reasoning and problem-solving. Applications are considered.

12.209 Personality and Social Psychology   S2 L2T2

Prerequisite: 12.100. Excluded: 12.202.

This course consists of two components. One focuses on models of personality and their method of study, personality development and links with social behaviour. The other deals with social behaviour and the processes of verbal and nonverbal communication, person perception and interpersonal relationships in particular.

The Psychology level III program is currently being revised for 1990 and students should check with the School for details of the changes before deciding on their Psychology level II units for 1989.

Psychology Level III Subjects: Group A

12.300 Research Methods 3A   S1 L2T2

Prerequisite: 12.200.

Analysis of variance for single factor and multifactor designs. Test procedures for planned and post-hoc contrasts defined on parameters of fixed and mixed models. General principles of experimental design.

12.305 Learning and Behaviour 3   S1 or S2 L2T2

Prerequisites: 12.200 and 12.201.

The establishment and elimination of extended sequences of behaviour in complex environments. Implications of the theories and research for applied work.

Psychology Level III Subjects: Group B

12.301 Research Methods 3B   S2 L2T2

Prerequisites: 12.200 and 12.300.

Multivariate statistics and computing. Data analysis using the SPSS and PSY computer programs; their statistical basis.

12.304 Personality and Individual Differences 3   S1 L2T2

Prerequisites: 2 Psychology Level II subjects.

Personality dynamics and structure and differences in ability and intelligence.

12.310 Physiological Psychology 3   S1 L2T2

Prerequisites: 12.200 and 12.201.

Elementary neuropharmacology and neuroanatomy. Brain control of eating, drinking, aggression, copulation, pain perception, memory, language and functional disorders.

12.311 Perception 3   S2 L2T2

Prerequisites: 12.200 and 12.201.

Studies of infant perception, conflict between vision and other senses, certain illusions, and of the perception of size and distance generally.

12.312 Language and Cognition 3   S2 L2T2

Prerequisites: 12.200 and 12.202.

Stages involved in reception of stimulus information from environment, its analysis, storage, and transmission into responses. Stress on processing of language.

12.314 Motivation and Emotion 3   S2 L2T2

Prerequisites: 12.200 and 12.201.

An examination of contemporary research regarding 'drives', 'incentives' and 'emotions' as determinants of animal and human action. Theoretical perspectives cover biological and social influences.

12.315 Theories of Associate Learning 3

Prerequisite: 12.305.
Not offered in 1989.

Contemporary theoretical approaches to instrumental and classical conditioning. Topics may include: traditional behaviour theories, information processing theory, cybernetic theory, and neurophysiological approaches.

12.316 Psychophysiology 3

Prerequisites: 12.200 and 12.201.
Not offered in 1989.

The major theoretical, methodological, and applied issues in psychophysiology. Topics may include: arousal, attention, habituation, lie detection, clinical assessment, and biofeedback.

12.320 Social Psychology 3   S1 L2T2

Prerequisites: 12.200 and 12.202.

Contemporary research areas in social psychology. Topics may include the social basis of human interaction, interpersonal relationships, social perception and cognition, and interpersonal communication.

12.321 Development Psychology 3   S1 L2T2

Prerequisites: 12.200 and 12.202.

The development of perception and the development of operational thought, the development of language and its relationship to the development of thought; and the development of reading.

12.322 Abnormal Psychology 3   S1 L2T2

Prerequisites: 12.200 and 12.201.

Descriptive psychopathology; symptomatology and diagnostic features of schizophrenia, organic brain syndromes, affective disorders, neurotic disorders, psychopathy, sexual aberrations, and addictions.

12.324 Experimental Psychopathology 3   S2 L2T2

Prerequisite: 12.322.

An examination of the aetiology and mechanisms of behavioural disorders in the light of experimental research and theory construction. Major topics include: aetiology and mechanisms of schizophrenia, affective disorders; psychophysiological disorders, anxiety, depression, driven behaviours.

12.325 Social Behaviour 3   S2 L2T2

Prerequisites: 12.200 and 12.202.

Research and theory in applied social psychology. Topics may include the relation of the physical setting to behaviour, cross cultural studies, and race relations.

12.330 Psychological Assessment 3

Prerequisites: 12.200, and 1 other Psychology Level II subject.
Not offered in 1989.

Principles and techniques of psychological assessment. Types of tests and their application in selection and allocation procedures.

12.331 Counselling Psychology 3   S1 L2T2

Prerequisites: 2 Psychology Level II subjects.

Principles and techniques of counselling in a variety of contexts. Interviewing, group process and structure, and interpersonal relations.

12.332 Behavioural Change 3

Prerequisites: 12.200 and 12.201.
Not offered in 1989.

Use of the methods of behavioural change in individual, group and institutional settings. Non-psychological methods of behavioural influence. A comparison of attitude and behavioural change. Definitions of problem behaviour. Ethical issues.

12.333 Ergonomics 3

Prerequisite: 12.200.
Not offered in 1989.

Aspects of human performance relevant to work design. The principles involved in designing the environment in general, and work in particular, to suit humans' capabilities.

12.334 Behaviour in Organizations 3   S1 L2T2

Prerequisites: 2 Psychology Level II subjects.

Theories and research methods for understanding behaviour in organizations and in the environment.

12.335 Behavioural Evaluation and Assessment 3

Prerequisite: 12.200.

Assessment and evaluation of individual behaviour and behavioural change. Problems of measurement and scale construction; objective versus subjective measures; self report, behavioural and psychophysiological measures. Interviewing and behavioural analysis; psychometric testing and case history taking.

12.340 Special Topic 3

Prerequisites: 12.200 and 12.202.
Not offered in 1989.

An occasional elective dealing with a special field of psychology.

Psychology Level IV Subjects

12.400 Psychology 4 (Thesis — Course 3431)   F

Prerequisite: All requirements for Years 1-3 of the course.

Psychology 4 in the BSc(Psychol) degree course. A supervized research thesis and course work to be determined in consultation with the Head of School.

12.401 Psychology 4 (Course 3431)   F

Prerequisite: All requirements for Years 1-3 of the course.

Psychology 4 in the BSc(Psychol) degree course. Course work and a supervized group research project to be determined in consultation with the Head of School.

12.403 Psychology 4 (Thesis)   F
‡
Prerequisites: 12.100, 12.200, 12.201, 12.202 and 8 Psychology Level III units, including 12.300 and 12.305 from Group A and 12.301 from Group B, with a weighted average of at least 68% and at the discretion of the Head of School.

Psychology 4 in the Arts, and Science and Mathematics degree courses. A supervized research thesis and course work to be determined in consultation with the Head of School.

12.404 Psychology 4   F
‡
Prerequisites: 12.100, 12.200, 12.201, 12.202 and 8 Psychology Level III units, including 12.300 and 12.305 from Group A with a weighted average of at least 68% and at the discretion of the Head of School.

Psychology 4 in the Arts, and Science and Mathematics degree courses. Course work and a supervized group research project to be determined in consultation with the Head of School.

Psychology Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subject see the Faculty of Commerce Handbook.

12.651 Psychology (Industrial Relations)

Prerequisite: Nil.
Not offered in 1989.

Problems and limitations affecting social research in industry. Critical review of American research from Hawthorne to Herzberg and of British research from Tavistock and Trist to Emery in Australia. Conflict and organic theories of organization and related theories of motivation and morale. The use of library resources. Practice in the skills and discipline required to obtain and evaluate empirical evidence in this field. Recent developments under the headings of 'participation' and democracy in industry.

For further information regarding the following subject see the Faculty of Science section in this Handbook.

12.741 Psychology (Optometry)　　　　　F L2

Prerequisite: 12.100.

Visual perception: The nature and characteristics of visual perception. Topics to be discussed include: psychophysics, the organization of visual perception, the influence of context, and the effects of learning and motivation on perception. Throughout the course emphasis will be placed on an examination of relevant experimental data. *Abnormal psychology:* The concepts of normality and abnormality, and an examination of the principal psychodynamic processes. Causes and symptoms of various mental disorders are introduced with some emphasis on the importance of these symptoms in optometrical practice.

Accounting

14.501 Accounting and Financial Management 1A　　　　S1 or S2 L2T2½

Prerequisite: Nil.

The basic concepts of financial model building and information systems, including the double-entry recording system, the accounting cycle, income measurement and financial reporting, and an introduction to basic elements of auditing.

14.511 Accounting and Financial Management 1B　　　　S1 or S2 L2T2½

Prerequisite: 14.501.

Development of basic concepts introduced in 14.501 Accounting and Financial Management 1A, including corporate reporting, business finance, system design, elementary computer applications.

14.522 Accounting and Financial Management 2A　　　　S1 or S2 L2T2½

Prerequisites: 14.511 plus

	HSC minimum mark required
2 unit Mathematics *or*	60
3 unit Mathematics *or*	1
4 unit Mathematics	1

The design, production and use of accounting and other quantitative information in the planning and control of organizations, with particular reference to manufacturing activities.

14.542 Accounting and Financial Management 2B　　　　S2 L2T2½

Prerequisites: 14.511 plus HSC results as for 14.522.

Critical examination of concepts and problems in income measurement, asset valuation and financial reporting for various forms of business undertaking with particular reference to corporate organizations, including associated aspects of auditing and taxation and methods of accounting for changing prices.

14.563 Accounting and Financial Management 3A　　　　S1 or S2 L2T2½

Prerequisite: 14.542.

Financial Accounting: Advanced aspects of financial accounting and reporting for business enterprises with particular reference to developments in accounting theory and practice and in professional standards, including the financial and accounting aspects of mergers, takeovers and group companies.

14.573 Accounting and Financial Management 3A (Honours)　　　　S1 LT6

Prerequisite: 14.542.

Includes 14.563 Accounting and Financial Management 3A as well as additional and more advanced work in both accounting theory and in the financial management and accountability of corporate enterprises.

14.583 Accounting and Financial Management 3B　　　　S1 or S2 L2T2½

Prerequisite: 14.522.

Management Accounting: advanced treatment of management accounting theory and applications including statistical cost analysis, budgetary and strategic planning and decision models.

14.593 Accounting and Financial Management 3B (Honours)　　　　S2 LT6

Prerequisite: 14.522.

Includes 14.583 Accounting and Financial Management 3B, as well as more advanced work dealing with theoretical and research issues in management accounting.

Economics

15.101E Microeconomics 1   S1 or S2 L2T1½ or T2

Commerce/Arts/Applied Science/Sciences prerequisite:

	HSC minimum mark required
2 unit English (General) or	60
2 unit English or	53
3 unit English	1

Economics as a social science; scarcity, resource allocation and opportunity cost. An introductory analysis of consumer behaviour. The economics of firms and markets: production and costs; the classification and analysis of markets. Efficiency concepts and market failure. The gains from international trade and the impact of trade restrictions. Economic growth and structural change.

15.201E Microeconomics 2   S1 L2T2

Commerce prerequisite: 15.011.

Arts/Applied Science/Sciences prerequisites: 15.011 plus 15.401 or 15.411 or 10.001 or 10.011. Co-requisite: 15.412
Excluded: 15.012, 15.072.

The theory of consumer behaviour and the theory of the firm. Structure and behaviour: adjustment and stability. General equilibrium analysis in an open economy. Externalities, public goods. Aspects of public sector and international economics.

15.302E Macroeconomics 3   S1 L2T2

Commerce prerequisite: 15.042 or 15.052.
Arts/Applied Science/Sciences prerequisites: 15.042 or 15.052. plus 15.422 or 15.416
Excluded: 15.013.

Review and extension of macroeconomic models of open economics. Dynamics, including cyclinical. Introduction to the theory of economic policy. Rational expectation and macroeconomic policy. Theory and analysis of Australian fiscal, monetary, exchange rate, public and external debt, and income policy. International policy interdependence. Introduction to macroeconomic models.

15.102E Macroeconomics 1   S1 or S2 L2T1½

Commerce/Arts/Applied Science/Sciences prerequisite: 15.001.

Introduction to the analysis of aggregate output, employment and economic growth and their relationship to the policy issue of unemployment, inflation and the balance of payments. Social accounting and aggregate income and expenditure analysis. Introduction to macroeconomic models of income determination; consumption and investment functions. The role of money and financial institutions; interactions between goods and money markets in equilibrium and disequilibrium situations. Analysis of recent Australian macroeconomic experience.

15.202E Macroeconomics 2   S2 L2T2

Commerce prerequisite: 15.011.

Arts/Applied Science/Sciences prerequisites: 15.002 plus 15.412.
Co-requisite: 15.422 or 15.416.
Excluded: 15.052, 15.062.

Models of aggregate income determination in open economies. Theories of aggregate economic behaviour with respect to consumption and investment expenditures and financial transactions. Balance of payments and exchange rate analysis. Theories of inflation and unemployment. Introduction to dynamic analysis. Theories of growth and cycles.

15.204E Applied Macroeconomics   S1 or S2 L2T1½

Commerce/Arts/Applied Science/Sciences prerequisite: 15.011.
Excluded: 15.052 and 15.042.

Economic growth and fluctuations in Australia. Inflation, unemployment and balance of payments issues. Fiscal, monetary, exchange rate and incomes policies. Changes in the structure of the Australian financial system and its links with the international monetary system. Effects of restrictions on capital markets.

15.203E Applied Microeconomics   S1 or S2 L2T1½

Commerce/Arts/Applied Science/Sciences prerequisite: 15.011.
Excluded: 15.012 and 15.002.

Structural change in the Australian economy. The effect of different market structures on firms and consumer welfare. The consequences of markets failure and the effects of government regulation. Investment decisions in the public and private sectors, including the estimation of future benefits, revenues and costs, the measurement of consumer and producer surplus. The economics of non-renewable and other resources. Australia's international trade and investment and the effects of restrictions on international trade and investment.

15.301E Microeconomics 3   S2 L2T2

Commerce prerequisite: 15.002 or 15.012.
Arts/Applied Science/Sciences prerequisites: 15.002 or 15.012 plus 15.422 or 15.416.
Excluded: 15.153.

General equilibrium and input-output analysis, including the impacts of taxation and other forms of government intervention. Theory of second best. Public enterprise pricing and investment. "Privatisation" and deregulation of markets. Decision-making under uncertainty.

15.304M Econometrics B   S2 L2T1

Prerequisite: 15.303M. Excluded: 15.324M.

For students who first enrolled before 1989 —
Commerce prerequisite: 15.413.
Sciences prerequisite: 15.413, or with permission of the Head of the Department of Econometrics, 10.312C.
Excluded: 15.473.

Identification, specification and estimation of simultaneous equation models including forecasting, policy analysis and simulation. The extimation techniques include: two-stage least squares, three stage least squares, limited information maximum likelihood and reduced form estimation.

Students build their own models using standard computer packages.

15.101H Australia in the International Economy in the 20th Century   S1 or S2 L2T1½

Commerce/Applied Science/Arts/Sciences prerequisite:

	HSC minimum mark required
2 unit English (General) or	60
2 unit English or	53
3 unit English	1

The international economy at the end of the 19th century: trade, factor flows, and payment arrangement. Problems of the international economy between the wars. The impact of World War II and the international economy in the post-war era. Australian economic development and its relationship with the international economy; economic fluctuations; problems of the inter-war period; growth of manufacturing; government policy and action; the importance of the mining industry; economic development and the distribution of income and wealth.

15.246H Management Strategy and Business Development   S2 L2T1½

Commerce prerequisite: 15.901.
Applied Science/Arts/Sciences prerequisite:

	HSC minimum mark required
2 unit English (General) or	60
2 unit English or	53
3 unit English	1

The strategy and structure of large scale business enterprise over the past century. An analysis of the process of growth from small family firms and partnerships to corporate enterprises and multi-national corporations. The external business environment. Case studies of managerial hierarchies, investment strategy and diversification of firms in transport, mass retailing and mass production.

Information Systems

19.602 Computer Information Systems 1   S1 or S2 L2T1

Prerequisite: 15.102M or 15.101M or approved studies in computer science.

Information systems and the organization, architecture of typical commercial application systems, the systems lifecycle, the systems analysis/design task, tools and techniques of the systems analyst, documentation techniques, internal controls and interfacing with the edp auditor, file design concepts, logic and computer hardware, commercial computer programming.

19.603 Computer Information Systems 2   S2 L2T1

Prerequisite: 19.602. Excluded: 19.606.

Systems design: physical design of business systems, specifications and updating of VSAM files, man-machine dialogue procedures, top-down structured design and evolutionary design methodologies. Introduction to communications networks. Operating systems concepts; processor, storage, device and process management, segmentation and paging systems. COBOL programming.

19.605 Information Systems Implementation   S2 L2T1

Prerequisite: 19.603.

Supervised implementation of an information systems project in a commercial programming language. Advanced program design and structured techniques, interface with systems software at application implementation level, comparison of a range of programming languages, test data specification, implementation procedures.

19.607 Distributed Computer Systems   S2 L2T1

Prerequisite: 19.603.

Advanced data communication concepts, computer networks, reference to international standards and common industry communications software packages; transaction processing software and interface with data management systems; local networks; interaction between text processing and data processing; a case study based on a microcomputer network.

19.608 Database Systems   S1 L2T1

Prerequisite: 19.603 or 19.606.

Advanced data storage concepts, including detailed study of alternative approaches to database management systems. Management information needs and database specification in a commercial environment. Detailed evaluation, with project work, of a microcomputer based database management system. Information retrieval concepts, relational query-systems, security, control and audit considerations.

19.609 Computer Information Systems Technology   S1 L2 T1

Prequisite: 19.602 or 6.711

Operating system concepts; processor, storage device and process management, segmentation and paging systems. Introduction to computer networks and distributed systems. COBOL programming.

19.611 Information Systems Development   S1 L2T1

Prerequisite: 19.603 and approval by the Head of the Department of Information Systems.

A systems analysis and design case study. Information systems project management, data processing administration, on-line systems, design techniques, internal controls.

19.616 Commercial Programming Principles   S2 L2T1

Prerequisite: 19.605 Co-requisite: 19.692

Available only to BIT students.

An advanced treatment of the practice of implementing commercial systems. Topics include: the use of library code, program design for performance, the use of code generators, project control and reporting practice.

19.691 Industrial Training 1   S1 1CCH

Prerequisite: 19.602

Available only to BIT students.

A practical treatment of the characteristics of commercial information systems. The topics covered include: analysis of an existing information system; development of overview documentation of the system; evaluation of the interface design; consideration of the role of security and control mechanisms.

19.692 Industrial Training 2   S2 1CCH

Prerequisite: 19.605. Co-requisite: 19.616.

Available only to BIT students.

An in-depth practical exposure to Information Systems Development. The topics covered include: the structure and management of the implementation teams; the roles of users and information staff in implementation; scheduling and control during implementation,

19.693 Industrial Training 3   S1 1CCH

Co-requisite: 19.611

Available only to BIT students.

In-depth practical work in Information Systems Analysis and Design. The topics covered include: the structure and management of analysis and design teams; the roles of users and I/S staff in analysis and design; scheduling and control during analysis and design.

19.853 Advanced Systems Management   L3

Prerequisite: Admission to BCom degree course at Honours level.

As for 19.953G. See Graduate Study: Subject Descriptions.

19.857 Operations Research for Management 1   L3

Entry approval by Head of Department of Information Systems.

As for 19.957G. See Graduate Study: Subject Descriptions.

19.886 Research Topics in Information Systems 1   L3

Entry approval by Head of Department of Information Systems.

As for 19.987G. See Graduate Study: Subject Description.

19.887 Research Topics in Information Systems 2   L3

Entry approved by Head of Department of Information Systems.

As for 19.987G. See Graduate Study: Subject Descriptions.

19.891 Decision Support Systems   L3

Prerequisite: 19.603.

As for 19.991G. See Graduate Study: Subject Descriptions.

Banking and Finance

98.613 Business Finance 2A   S1 or S2 LT3

Prerequisites: 14.511, 15.102E and 15.103M.

The essential aspects of financial decision-making in business including: factors influencing capital expenditure decisions; alternative approaches to valuation; factors affecting the formulation of the capital structure; influence of the capital market environment.

98.614 Business Finance 2B   S1 or S2 LT3

Prerequisite: 98.613.

Financial decision making within the framework of capital market theory. Includes diversification, risk and return, determinants of risk, efficient market hypothesis with emphasis on Australian evidence, capitalization changes and performance measures, takeovers and mergers.

98.615 Business Finance 3   S1 L3

Prerequisite: 98.614.

Theory and analytical techniques relevant to investment analysis and management. Includes analysis and valuation of securities, properties of accounting numbers, portfolio theory and asset pricing models, capital asset returns and information, bond ratings and yields and financial distress predictions.

98.864 Australian Capital Markets   S2 LT3

Prerequisite: Nil.

As for 98.964G. See Graduate Study Subject Descriptions.

99.774 Legal Environment of Commerce   S1 or S2 L2T1

Prerequisite:

	HSC minimum mark required
2 unit English (General) or	60
2 unit English or	53
3 unit English	1

The Australian legal system and areas of substantive law relevant to commerce including contract, business organization, employment, commercial arbitration, advertising, trade regulation, civil compensation, discrimination.

99.775 Legal Transactions in Commerce   S1 or S2 L2T1

Prerequisite: 99.774.

General principles of law of contract and specialized commercial transactions including banking and negotiable instruments, insurance, agency, sale of goods, bailment, suretyship.

99.776 Legal Regulation of Commerce   S1 or S2 L2T1

Prerequisite: 99.774.

The regulation of restrictive trade practices and sales promotion. The legal framework of marketing strategy with special reference to anti-competitive practices (including collusive activity, exclusive dealing, price discrimination, resale price mainte-

nance, mergers and monopolization) and consumer protection law (including misleading and deceptive advertising and other unfair practices). Consumer credit; product liability; protection of intellectual property.

99.783 Taxation Law   S1 L3T1

Prerequisite: 99.775 or 99.776.

The law and practice of the taxation of income under the Income Tax Assessment Act 1936 (Commonwealth) including the concepts of income and allowable deductions; alienation of income; taxation of partnership, trusts and corporation; tax avoidance and evasion. Taxes. Introduction to stamp duties, payroll tax, land tax and sales tax. Tax policy.

Biological and Behavioural Sciences

17.031 Biology A   S1 L2T4

Prerequisite:

	HSC Exam Score Range Required
2 unit Science (Physics) or	53-100
2 unit Science (Chemistry) or	53-100
2 unit Science (Geology) or	53-100
2 unit Science (Biology) or	53-100
3 unit Science or	90-150
4 unit Science	1-50

Basic cell structure; membranes, organelles, prokaryotic and eukaryotic cells; cellular locomotion; basic biological molecules; enzymes; structure and metabolic roles, cellular compartmentalization and enzyme function; diffusion, osmosis and active transport; theory of inheritance, linkage, mutation, information transfer and protein synthesis.

Requirements for Practical Work
Equipment required for practical work is set out in the *Course Guide,* available during enrolment time at the First Year Registration Centre (Physics Building). Students must purchase this *prior* to the first week of session.

17.041 Biology B   S2 L2T4

Prerequisite: 17.031 (however, students without this prerequisite may seek the permission of the Director of First Year Biology to enrol). Excluded: 17.021.

The evolution, diversity and behaviour of living things and the ways in which they have adapted to varying environments. Emphasis on the structure and function of flowering plants and vertebrate animals, and their roles in Australian ecosystems. The theory covered in lectures and tutorials is illustrated by observation and experiment in laboratory classes.

17.012 General Ecology   S2 L2T4

Prerequisite: 17.031 and 17.041.
Not offered in 1989.

Evolution and environmental selection in the Australian continent; geological, palaeoclimatological, biogeographical and historical background. Functional organization of ecosystems; energy budgets, hydrological and biogeochemical cycles. Integrated structure and function of ecosystems, including cropping and management

of natural resources. Aspects of microbial ecology. Students are required to attend a field camp as an integral part of the course.

17.050 Functional Adaptation in Biology   S1 L2T4

Prerequisites: 17.031 and 17.041.

An introduction to functional relationships between living organisms and the environments in which they live. Illustration of structural, physiological, ecological and behavioural characteristics at both cellular and organismic level as examples of adaptations or neutral traits, and the evaluation of these attributes as the outcome of ecological and evolutionary selection. Selected areas of the course will also serve as an introduction to the process of scientific enquiry.

17.601 Introductory Genetics   S2 L2T4

Prerequisite: 2.131 or 2.141, 17.031, 17.041. Excluded: 9.801

Structure, function and organization of DNA in prokaryotes and eukaryotes. Genetic bases of life cycles in prokaryotes and eukaryotes. Genetic aspects of development. Gene control. Genetic engineering. Mutation, gene interaction and linkage analysis in prokaryotes and eukaryotes. Binomial Square Law and extensions. Effects of population size on levels of genetic variation. Selection in natural populations. Molecular evolution and levels of selection. Cytogenetics, gene mapping, levels of variation and selection in human populations. Recombination in prokaryotes and eukaryotes.

Applied Geology

25.110 Earth Materials and Processes   S1 L2T4

Constitution of the Earth. The Earth and the Solar System. The interior of the Earth: the crust and its chemical composition, gravity and isostasy. Minerals and rocks, economic mineral deposits. *Earth Processes.* The origin of igneous rocks; plutonism and volcanism. The geological cycle. Weathering processes, soil formation and landforms. The origin of sedimentary rocks; transportation, deposition, lithification. Arid, glacial and periglacial processes. Geological time. Metamorphism and metamorphic rocks. Structural geology, classification and origin of faults and folds. Quaternary stratigraphic sequences, neotectonics. *Field work* of up to two days is a compulsory part of the subject.

25.120 Earth Environments and
Dynamics   S2 L2T4

Prerequisites:

	HSC Exam Score Range Required
2 unit Mathematics* or	55-100
3 unit Mathematics or	1-50
4 unit Mathematics	1-100
and	
2 unit Science (Physics) or	53-100
2 unit Science (Chemistry) or	53-100
2 unit Science (Geology) or	53-100
2 unit Science (Biology) or	53-100
4 unit Science	1-50
3 unit Science	90-150
and	
25.110.	

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

Earth Environments: Introductory palaeontology, including the evolution of life, invertebrates and vertebrates. Principles of stratigraphy. The stratigraphy of New South Wales: Broken Hill, Lachlan Orogen, New England Fold Belt and Sydney Basin. Introductory stratigraphy of Australia from the Precambrian to the Recent. The mineralogical study of rocks; techniques and significance of mineralogy. Structural geology; stereographic and statistical treatment of structural data. *Earth Dynamics:* The evolution of ocean basins; sea-floor spreading and sea-level changes. Climates of the past. Geophysical methods of exploration; seismology and earthquake prediction. Plate tectonics and continental drift. *Field work* of up to four days is a compulsory part of the subject.

25.211 Earth Materials 1   S1 L2T4

Prerequisite: 25.120.

Mineralogy: Principles of optical crystallography and the use of the polarizing microscope. Chemical and physical properties of rock forming minerals. Mineral identification. *Igneous Petrology:* Occurrence, classification and origin of igneous rocks. Fractional crystallization and differentiation. Partial melting. Simple binary melting diagrams. Igneous petrology relating to plate tectonics. *Practical:* Macroscopic and microscopic examination of rock forming and ore minerals and igneous rocks in the field and the laboratory. *Field work* of five days is a compulsory part of the subject.

25.212 Earth Environments 1   S1 L3T3

Prerequisite: 25.120.

Sedimentology: Flow regimes and bedding forms, sedimentary structures. Modern and ancient sedimentary environments of deposition: alluvial, nearshore, shelf and deep sea, in both terrigenous clastic and carbonate/evaporite domains. The facies concept: lateral and vertical relationships between depositiona environments and associated lithofacies within developing sediment wedges. *Palaeontology:* Morphology and stratigraphic distribution of invertebrates, including Foraminifera, Brachiopoda, Mollusca, Arthropoda, Protochordata and Echinodermata. Introductory palaeobotany. Palaeoecology. Biogeography. Trace fossils. Reef building organisms and the evolution of reefs. *Field work* of up to five days is a compulsory part of the subject.

25.221 Earth Materials 2   S2 L3T3

Prerequisite: 25.211.

Sedimentary Petrology: The influence of transportation, deposition and diagenesis on the composition, texture and structure of detrital sedimentary rocks. The non-clastic sedimentary rocks including phosphates, evaporites, ferruginous and silceous deposits. *Metamorphic Petrology:* Origin and classification of metamorphic rocks as an aid in understanding common mineral assemblages. Petrographic studies of common metamorphic rocks. Field studies. *Structural Geology:* Origin, classification and description of structures in rocks. Techniques of stereographic projection of structural elements and analysis of simple fracture systems. Tectonics and tectonic analysis. *Field work* of up to four days is a compulsory part of the subject.

25.223 Earth Physics   S2 L2T4

Prerequisite: 25.110.

Global Geophysics: Principles of gravity, geomagnetism, palaeomagnetism, geothermy and seismology and their relation to shape, internal constitution, dynamic processes and major tectonic features of the earth. *Photogeology:* The use of air photos for geological mapping and geomorphological evaluation of land. Techniques and principles of photo-interpretation and multi-band photography. Photo-interpretation of folds, faults, joints, bedding, limestone, intrusive igneous volcanic rocks, alluvial fans, terraces, slopes, landslides, coastal and tropical landforms. Relationships between geology, drainage, soil and vegetation, orebody expression gossans, colouration halos. An introduction to remote sensing. *Geological Surveying:* Levels, tachometers and theodolites. Field techniques. Precision of angular measurements. Stadia surveying. Levelling. Field computations. Closed and open traverses. Coordinates and their computation. *Field work* of two days is a compulsory part of the subject.

25.2261 Mathematical Geology 1   S2 L2T1

Prerequisite: 25.120.

Geological Statistics: Measurement scales in geology. Probability distributions and their properties; sampling and test of significance. Application of these techniques using geological data. *Geological Computing:* FORTRAN programming; text editing; control language for VAX and CYBER.

25.311 Earth Materials 3   S1 L2T4

Prerequisite: 25.221.

Mineralogy: Principles of X-ray powder diffractometry and the use of X-ray powder cameras and diffractometers. Elementary stereology. Laboratory methods of mineral separation. Mineral characterization. *Geochemistry:* Accuracy, precision and quality of geochemical data. Graphical display of analyses. Norms. The distribution of elements in terrestrial rocks. Nature and origin of meteorites and tektites. *Aqueous Geochemistry:* Redox potentials in nature. Oxidation/reduction and sediment formation. Solubilities, metal transport and ore deposition. The growth of minerals from solution and the development of mineral textures. Particular aqueous geochemical systems.

25.312 Earth Environments 2   S1 L3T3

Prerequisite: 25.212 (note: it is desirable that students taking this unit have also taken 25.223).

Stratigraphy: Stratigraphic classification. Biological and physical methods of correlation. Introduction to radiogenic methods of age determination: 14C, K/Ar, Rb/Sr, Nd/Sm, U/Th/Pb and fission track methods. Definition of international stratigraphic boundaries, stratotypes and reference points. Types of sedimentary basins and continental margins. The development of the Precambrian craton of Australia. The geological evolution of eastern Australia, particularly the late Palaeozoic and Mesozoic history of the Tasman Mobile Belt. Intracratonic basins of western and southern Australia and the effects of the dispersal of Gondwanaland. Geological evolution of the northern margin of the Australian plate, particularly the Mesozoic to Recent of Papua-New Guinea. *Palaeontology:* Theories of biological classification. Processes and theories of evolution. The origin and

early history of life. Functional morphology. Practical application of palaeontology. *Field Mapping:* Geological mapping in a complicated geological terrain. Geological report writing and cartography. *Field work* of up to seven days is a compulsory part of the subject.

25.314 Mineral and Energy Resources 1   S1 L3T3

Co-requisite: 25.221 or 25.311.

Metallic Resources: Classification and origin of the ore deposits, geochemical processes, research methods. Orthomagmatic, hydrothermal, porphyry, volcanic-sedimentary, Mississippi Valley type, chromium, iron, manganese ores, residual and mechanical ores. Introduction to mineral exploration. Laboratory study of hand specimens, thin sections and polished sections of various ore types; study of selected mining areas representing various genetic types of ore. *Economic Mineralogy:* Nature of reflected light. Ore textures and their interpretation. Phase relations and paragenesis of ore minerals. Practical work in optical properties of ore minerals, hardness and reflectivity measurements: study of selected ores and ore minerals under the microscope including textural studies. *Field work* of up to three days is a compulsory part of the subject.

25.3162 Mathematical Geology 2   S1 L2T1

Prerequisite: 25.2261.

Application of the mathematical techniques listed below to geological data processing and analysis. Analysis of variance. Introduction to matrix algebra. Regression analysis; trend surface analysis; time series analysis; Markov chain analysis. Introduction to nonparametric statistics. Introduction to multivariate statistics. *Practical work* based on the use of SPSS, BMDP and other library programs.
Metamorphic petrology of Australia. Practical macroscopic and microscopic study of metamorphic rocks. *Field work* of up to six days is a compulsory part of the subject.

25.321 Earth Materials 4   S2 L3T3

Prerequisite: 25.221.

Clay Mineralogy: The structure and properties of the clay mineral groups including the kaolinites, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for the identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals. Industrial uses of clays and bauxite. *Advanced Igneous Petrology:* Origin of silicate liquids. High pressure and low pressure fractionation. Liquids and fluids. Nature of the Upper Mantle. The use of trace elements and isotopes as petrogenetic indicators. Practical petrography and literature studies of igneous suites. Field study. *Advanced Metamorphic Petrology:* Facies series. Metamorphic reactions. Isograds. Mineral assemblages as geobarometers and geothermometers. Fluids in metamorphism. Fabric. Relationships of deformations and recrystallization.

25.324 Mineral and Energy Resources 2   S2 L3T3

Prerequisite: 25.212 or 25.5212.

Coal Geology: Nature and properties of coal. Methods of test-

ing and analysis. Introduction to coal petrology. Origin of coal seams and coal-bearing sequences. Coalfield exploration and coal mining geology. Geological factors in coal preparation and use. Geology of oil shale. *Petroleum Geology:* Geological factors critical to the occurrence of oil and natural gas. Geochemistry of hydrocarbons and formation fluids; techniques of petroleum exploration. Assessment and development of reserves. Typical petroleum occurrences in Australia and overseas. *Non-metallic Minerals:* Occurrence and economic use of non-metallic and industrial minerals including limestone, silica, asbestos and construction materials. *Sedimentary Basin Analysis:* Techniques of analysis and data presentation using information from outcrops, boreholes (including geophysical logs) and seismic sections. Construction and interpretation of structural, isopachous and lithofacies maps. Seismic stratigraphy. Styles of sedimentation within and structural development of basins in different tectonic regimes. Evolution of sedimentary basins. *Field work* of four days is a compulsory part of the subject.

25.325 Engineering and Environmental Geology   S2 L4T2

Environmental Geology: Hydrodynamics of pollutants and water quality principles. Domestic, industrial and radioactive waste disposal, deep well injections. Geological hazards and urban planning. Environmental impacts of dams, mineral exploration, mining and impact statement techniques. Water resources law and pollution. Land use conflicts. *Hydrogeology:* The hydrological cycle; confined and unconfined groundwater. Hydrological characteristics of rocks and their measurement. Pump tests. Aquifer boundaries. Exploration for groundwater development and monitoring of groundwater resources. Groundwater flow tests. Case studies from the Great Artesian Basin and the Murrumbidgee area. *Geomechanics:* Rock and soil masses and their engineering behaviour influence of composition and fabric. Discontinuities in rocks and soils and their analysis for engineering purposes. Mechanical properties and their measurement. Stress-strain theory. *Coastal Geology:* Properties of sedimentary populations. Sampling practices. Measurements of grain size, grain shape and packing; analyses of measured data. Geological significance of sediment parameters. The shoreline processes Littoral and longshore drifts and net sand movement. Coastal engineering works. The estuarine environment. *Field work* of up to three days is a compulsory part of the subject.

25.3261 Geochemical Analytical Techniques   S2 L1T1

Prerequisite: 25.311.

Sampling and sample preparation. Modern destructive methods of rock and mineral analysis. Non-destructive methods; X-ray fluorescence spectroscopy and electron probe microanalysers.

25.3271 Structural Geology   S2 L1T1

Prerequisite: 25.221.

Advanced Structural Geology: Analysis of structural elements at the microscopic, mesoscopic and macroscopic scales. Detailed studies of the analysis of metamorphic terrains, eg Cooma Complex, Broken Hill. *Field work* of up to four days is a compulsory part of the subject.

25.333 Exploration Geophysics   S1 L3 and S2 L1T1

Prerequisite: 25.120.

Physical properties of rocks and soils. Introduction to seismic, gravity, magnetic, electrical, electromagnetic and radiometric methods of geophysical exploration. Application of these methods in the search for mineral deposits, petroleum, coal and groundwater and in civil and mining engineering projects. Interpretation of geophysical data. *Field work* of up to three days is a compulsory part of the subject.

25.435 Geology 4 Honours

Students with a double major in geology will follow the program set for Year 4 students in the Faculty of Applied Science Course 3000 Applied Geology, which involves in Session 1 a core of advanced geological topics and one strand chosen from mineral resources, sedimentary basin resources, engineering and environmental geology, or geophysics. Session 2 is devoted to a specialized research project.

Students with a single major will follow a course of advanced study that includes geological topics subject to approval of the Head of School.

25.5212 Sedimentology   S1 L1T1

Prerequisite: 25.120. Excluded: 25.212.

As for *Sedimentology* in 25.212 Earth Environments 1.

25.5313 Stratigraphy   S1 L2

Prerequisite: 25.5212. Excluded: 25.312.

As for *Stratigraphy,* in 25.312 Earth Environments 2.

25.621 Marine Geology 1   F L1T2

Prerequisites: 25.110 and 25.120.

Sedimentology: Flow regimes and bedding forms, sedimentary structures. Modern and ancient sedimentary environments of deposition: alluvial, nearshore, shelf and deep sea, in both terrigenous clastic and carbonate/evaporite domains. The facies concept: lateral and vertical relationships between depositional environments and associated lithofacies within developing sediment wedges. *Global Geophysics:* Principles of gravity, geomagnetism, palaeomagnetism, geothermy and seismology and their relation to shape, internal constitution, dynamic processes and major tectonic features of the earth. *Mineralogy and Petrology:* Igneous and sedimentary rock types of the ocean floor and their significance.
Field work of five days is a compulsory part of the subject.

25.622 Hydrological and Coastal Surveying   F L1T2

Prerequisite: Nil.

General principles of surveying, with particular reference to coastlines and off-shore techniques. Optical and electronic methods of distance measuring and position fixing. Methodology for short-term and long-term measurement of tides and flow currents. Bathymetric surveys in shallow and deep water conditions. Coastline morphologies and their relationship to behaviour of water masses. Analysis of sedimentary systems in deltaic, estuarine and near-shore environments. Data collecting, processing and storage. Shallow-water investigations for bedrock morphologies. *Field work* of five days is a compulsory part of the subject.

25.631 Marine Geology 2   F L1T2

Prerequisite: 25.621.

Clay Mineralogy: Structure and properties of the clay mineral groups including the kaolinites, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals. *Sedimentary Basin Analysis:* Technique of analysis and data presentation using information from outcrops, boreholes (including wireline logs) and seismic sections. Construction and interpretation of structural, isopachous and lithofacies maps. Seismic stratigraphy. Styles of sedimentation within and structuring of basins in tensional, compressive and strike-slip tectonic regimes. Basin evolution. *Stratigraphy:* Ocean basin stratigraphy and the environmental and chronological utility of the principal groups of index fossils. Stratigraphical history and correlation of sedimenty rocks in the deep ocean basins and on continental shelves. Changes of sea level. The Quaternary history of the oceans. Reefs and carbonate sedimentation. Deep sea consolidated sediments. *Field work* not exceeding two days is a compulsory part of the subject.

25.632 Estuarine Geology   F L1T2

Prerequisite: Nil.

The physical nature of the estuarine environment: its characteristic topography, chemistry and layering of water masses; tidal behaviour. Characteristic sediments, stratigraphy of sediment bodies and distribution patterns of sediments and microfossils in estuaries. Inorganic and microbial diagenesis of estuarine sediments. Procedures for mapping, sampling and sample analysis. Mineral morphology. Statistical treatment of results. *Field work* of four days is a compulsory part of the subject.

25.6341 Marine Mineral Deposits and Oceanic Minerals   S1 L1T1

Oceanic minerals and mineral deposits: detrital, authigenic and epigenetic. Methods of exploration, assessment and exploitation, international law relating to the sea floor. Resources important to human civilization of a biological, fluid and mineral nature. Mining of ocean resources. Geological aspects of waste disposal and engineering works in the ocean. Tidal energy.

25.6342 Exploration and Seismic Methods   S2 L2T1

Geophysics of ocean basins and off-shore areas and the techniques of their study. Seismic refraction, reflection and computational methods, instrumentation of seismic and acoustic sources, recording systems and signal processing. Geological and physical interpretation of results. Practical work on instrumentation, recording and interpretation of field data.

25.9311 Gravity and Magnetic Methods   S1 L2T1

Prerequisites: 1.001 and 10.001. It is desirable that students taking this subject have a background in geology.

Fundamental principles. Field procedures and instruments.

Reduction of field data. Regionals and residuals. Effects of sources of simple geometrical shapes and generalized two and three-dimensional distributions. Applications. *Field work* of one day is a compulsory part of the subject.

25.9312 Seismic Methods   S1 L2T1

Prerequisites: 1.001 and 10.001. It is desirable that students taking this subject have a background in geology.

Seismic waves. Physical/engineering properties of geological materials. Ray theory in seismic refraction and reflection methods. Instrumentation. Data acquisition and processing. Depth and velocity analysis. Geophysical and geological interpretation. Case history studies. *Field work* of one day is a compulsory part of the subject.

25.9313 Electrical Methods   S1 L2T1

Prerequisites: 1.001 and 10.001. It is desirable that students taking this subject have a background in geology.

Introductory theory and field practice of resistivity, self-potential, induced polarization and airborne and ground electromagnetic methods. Geological interpretation of field data. Geophysical logging. *Field work* of one day is a compulsory part of the subject.

25.9314 Geological Applications   S1 L1T1

Prerequisite: 25.120.

A subject of ten weeks' duration. *Structural Geology:* Elements of structural geology, stereographic projection and fracture analysis. *Geology of Fuels:* Origin of coal, oil and natural gas; stratigraphic and structural consideration of oil and coalfields. *Hydrogeology:* Principles of hydrogeology; transmission of groundwater in rocks and soils. *Field work* of one day is a compulsory part of the subject.

25.9321 Geophysical and Geological Applications   S2 L1T2

Prerequisite: 25.120. Excluded: 25.6342.

Geological Interpretation of Geophysical data: Seismic stratigraphy. Coal-seam geometry from high resolution seismic and in-seam data. *Geology of Ore Deposits:* Mineralogy of industrially important metallic and non-metallic minerals. Theories of ore formation including secondary enrichment processes. Available only in program 2503.

Geography

27.010 Land Studies   S1 L2T2

Concepts, significance and problems of land. Land as territory and land as resource in Australia. Constraints imposed by the physical environment on human occupancy and settlement patterns, the variety of conflicts that result and management strategies. Practical work involves study of the ways in which the attributes and characteristics of land are displayed on maps, air photos and satellite imagery, and introduces these as basic information sources and research tools in applied geography.

27.030 Environmental Processes   S2 L2T2

Essential and continuing links between components of the physical environment. Movement of energy and matter in the physical environment, including consideration of Earth's energy balance, the hydrological cycle, nutrient cycles in vegetation and soil, imbalances leading to land degradation and instability, alternatives to and movement of materials.

27.040 Data Processing Systems   F T2

Measurement, processing and display of spatial data. Basic knowledge and skills for using the University's computing system effectively; the use of computer software packages in geographic enquiry; exploratory data analysis and graphic information processing; and the presentation of data in tables, graphs and diagrams.

27.050 Geographical Data Analysis   F L2T2

Prerequisites: 27.111 or 27.010 and 27.030. Excluded: 27.162, 27.632, 27.813, 27.884.

Inferential statistics and hypothesis testing in the analysis of spatial data. Methods of analysing categorical data, identifying spatial correlation and associations, and multivariate methods applicable to topics in physical and economic geography.

27.100 Field Project 1   S2 T3

A five days field project normally undertaken during the mid-year recess, designed to support teaching in Year 1 (Level 1) subjects and to develop basic field methods and skills. Students will incur some personal expenses in connection with this subject, which is a compulsory part of the course.

27.133 Pedology   S2 L2T3

Prerequisites: 27.010 and 27.030 or 27.111 or any two units from 2.111, 2.121, 2.131, 2.141, and 27.811, 27.828 or 25.012 or 25.022.

Methodology of pedogenic studies and the application of these studies to the understanding of soil-landform relationships. Soil physical and chemical properties and their interrelationships, emphasizing clay-mineral structure and behaviour, soil solution chemistry, soil water movement and the application of these properties to elements of soil mechanics. Soil properties in natural, rural and urban landscapes, including assessment of soil fertility, swelling characteristics, dispersibility, erodibility and aggregate stability. Laboratory analysis of soil physical and chemical characteristics with emphasis on properties associated with land capability assessment. Statistical analysis of soil data and its application to mapping. The use of soil micromorphological and mineralogical studies in pedology.

27.143 Biogeography   S1 L2T3

Prerequisites: 27.010 and 27.030 or 27.811 or 27.828 or 17.031 and 17.041 or 27.111 or 27.172.

Distribution of taxa. Floras of the Southern Hemisphere with particular reference to Australia. Endemic, discontinuous and relict taxa. Dispersal and migration of species. Origin, evolution and geological history of Angiosperms. The development of the Australian biogeographic element. Study of the recent past to understand present distributions of taxa. The role of man and climatic change on Australian vegetation. Detection of pattern and association and their causes. Classification, ordination and

mapping of vegetation. Ecology of selected Australian vegetation types. Composition, structure, productivity and environmental control of heathland, woodland, grassland and rainforest communities. Management of vegetation in different climate regimes. *Field work* of up to five days is a compulsory part of the subject.

27.153 Climatology — S1 L2 T3

Prerequisites: 1.001 or 27.811 or 27.828 or 25.110 and 25.120 or 17.031 and 17.041 or 27.111.

Physical bases for understanding microclimate. Proceses of energy exchange exchange at the earth's surface, and the atmospheric and terrestial surface controls of the heat and mass budgets. Atmospheric diffusion. Wind profiles and atmospheric turbulence as affected by stability and surface properties. Determinants of the local and site-specific climatic environment, particularly topographic, surface cover and substrate conditions. Urban climate and climate in relation to human comfort and health. Building constructional design aspects of climate and applications of climatology in urban and regional planning. Climatic aspects of the development and regional planning. Climatic aspects of the development and utilization of solar and wind energy sources.

27.175 Introduction to Remote Sensing — S1 L2 T2

Prerequisite: Successful completion of a Year 1 program in Applied Science, Science or Arts (or equivalent) as approved by the Head of School.

Principles and technical aspects of remote sensing. Forms of available imagery, their utility and facilities for interpretation. Basic air-photo interpretation techniques relevant to environmental assessment. Introduction to principles of the electro-magnetic spectrum, photometry and radiometry. Sensor types, image formation and end products associated with selected satellite programs, including Landsat. Land-cover and land-use interpretation procedures in visual image analysis. Basic procedures in machine-assisted image enhancement.

27.176 Remote Sensing Applications — S2 L2T2

Prerequisites: 27.175 or 27.1711, 29.514 or 29.511 and 29.631. Excluded: 27.1712

Spectral characteristics of natural phenomena and image formation. Ground truthing, collection and calibration. Introduction to computer classification procedures. Multitemporal sampling procedures, image to image registration and map to image registration. Major applications of remote sensing in the investigation of renewable and non-renewable resources to include: soils, geology, hydrology, vegetation, agriculture, rangelands, urban analysis, regional planning, transportation and route location and hazard monitoring.

27.183 Geomorphology — S2 L2T3

Prequisites: 25.110 and 25.120 or 27.010 and 27.030 or 27.811 or 27.828 or 27.111 or 27.172. Excluded: 27.860.

Beaches and their response to waves, currents and sediment movement. Barrier systems, lagoons and estuaries. Rock platforms. Quaternary sea level changes. Hydraulic geometry of stream channels, including effects of sediment transport and human activities. Hillslope form, process and associated slope materials. Methods of slope measurement, analysis and survey. Hillslope models.

Systems approach, equilibrium concepts and modelling in landform studies. Field projects in coastal and fluvial geomorphology, and laboratory time is devoted to statistical exercises using data collected from maps, airphotographs and in the field.

27.193 Environment Impact Assessment — S1 L2T2

Rationale and basic objectives; standardized types of environmental impact assessment (EIA), including matrix approach, adopted methods of EIA in Australia. Frequently used assessment and predictive techniques for meteorological, hydrological, biological, socio-economic impacts. Techniques of impact evaluation in terms of socio-economic criteria. Environmental decision making and planning under conditions of uncertainty. Case studies exemplifying procedures, techniques and issues. Trends, changes and possible future developments in EIA. Practical exercises representing components of typical EIAs.

27.213 Soils and Landforms — S1 L2T2

Prerequisite: 27.133 or 27.183 or 27.828

Organization of soil material: stratigraphic layers versus profiles. Models of soil formation zonal, leaching and landscape approaches. Australian and international soil classification systems. Soil development on hillslopes: texture contrast soils. Floodplain landforms: river terraces and chrono-sequences. Lito- and chrono-stratigraphic use of soils in residual aeolian, fluviatile and coastal deposits.

27.223 Environmental Change — S1 L2T2

Prerequisite: Successful completion of a Year 2 Programme in Applied Science, Science, or Arts or equivalent as approved by the Head of School.

The nature of environmental change on the land, oceans biosphere and atmosphere. Evolution of the continents, oceans, life and atmosphere. Techniques for environmental reconstruction and chronology building. Quaternary climatic change and modelling. Human impact on the atmosphere and climatic consequences.

27.300 Field Project 3 — S1/S2 T3

A five days field project normally undertaken during a recess, designed to support teaching in Year 3 (Level III) subjects in physical and economic geography and to demonstrate the application of field methods in problem solving and research projects. Students will incur some personal expenses in connection with this subject, which is a compulsory part of the course.

27.432 Computer Mapping and Data Display — S1 L1T3

Prerequisite: Successful completion of a Year 1 program in Applied Science, Science or Arts (or equivalent) as approved by Head of School.

Introduction to theoretical and practical problems in displaying data graphically and constructing thematic maps by computer using the GIMMS mapping package. The emphasis is on developing skills in automated cartography through hands-on experience culminating in the preparation of a folio of maps of selected census data. No previous computing expertise is required.

27.652 Geographic Information Systems — S2 L2T2

Prerequisite: 10.021B and 10.021C, or 10.001 or 10.011 or 27.432.

An introduction to information systems of particular relevance for geographers with special reference to computer-based

systems for resource evaluation. Problems of data structures, geocoding, and spatial identifiers. Model-based information systems. Project work: case study evaluation and the development of information systems for monitoring spatial change.

27.753 Social Welfare and Urban Development — S1 L2T3

Prerequisite: 27.829 or 27.812. Note: This prerequisite does not necessarily apply to students enrolled in the Faculty of Applied Science.

Offered subject to availability of staff.

A consideration of welfare aspects of urban development, including social policies and urban structure; social costs and benefits of urban renewal especially in the inner city; growth centres and new towns; distributional aspects of social services; and spatial disparities in social well-being.

27.813 Geographic Methods — S2 L2T2

Prerequisites: 27.010 and 27.030, or 27.111 or 27.801 and 27.802, or 27.818 and 27.819. Excluded: 27.050, 27.813.

Statistical procedures and field methods used in both human and physical geography. Includes: measures of dispersion; measures of spatial distribution; samples and estimates; correlation and regression; tests for distribution in space; data collection and analysis; field observations.

27.818 Australian Environment and Human Response — S1 L2T2

Prerequisite: Nil. Excluded: 27.801, 27.295, 27.111.

Themes selected from the mechanisms of the physical environment with particular reference to Australia and the Sydney region. *Landscape as an expression of dynamic response:* land capability and land use problems, humans as agents of landscape change. *Energy and Atmospheric Circulation over Australia:* local weather patterns and weather extremes, human responses to fire, flood, and drought hazards. *Development and Stability of Hillslopes:* soil, vegetation and drainage relationships, problems of soil erosion. *Coastal Ecosystems:* problems of demand, risk and management in the coastal zone. Lectures are supplemented with tutorials, workshops, and field tutorials. Students are required to provide some materials for workshop exercises and to contribute to the cost of field tutorials.

27.819 Technology and Regional Change — S2 L2T2

Prerequisite: Nil. Excluded: 27.802.

The impact of technological change on the spatial organization of human activities and regional development and disparities. The implications of technological change on population distribution, resource utilization, and settlement patterns are examined at different scales emphasizing the social consequences at the community and regional level. Examples are taken from Third World and modernized countries, with particular reference to Australian case studies.

27.824 Spatial Population Analysis — S2 L2T2

Prerequisite: 27.812, or 27.829.

Population growth and structure in an urban and regional context. The components and processes of population change; fer-

tility, mortality and migration set within the framework of demographic transition theory. Theories of migration and mobility and of optimal populations. Demographic and social indicators for urban and regional analysis and their implications for disparities in living conditions, residential differentiation and regional growth. The adjustment of immigrant and migrant populations to the urban environment.

27.825 Urban Activity Systems — S1 L2T2

Prerequisites: 27.812, 27.829.

Focus is on trip making, movement, and activity patterns in urban areas. Topics include: the activity concept, travel behaviour and urban spatial structure; constraints to individual travel behaviour and activity pattern linkages; the urban transport disadvantaged; public transport problems and issues in Australian capital cities; travel and activity consequences of transport infrastructure developments.

27.826 Urban and Regional Development — S2 L2T2

Prerequisite: 27.812, or 27.829. Excluded: 27.836.

Theories of urban and regional change leading to assessment of the role of planning. Emphasis on resource allocation, conflict resolution and evaluation techniques including cost-benefit analysis and environmental impact assessment. Lectures accompanied by seminars and workshop sessions which concentrate on methodology.

27.828 Australian Natural Environments — S2 L2T2

Prerequisite: 27.801 or 27.818. Excluded: 27.111, 27.811.

Emphasizing interdependencies of climate, hydrology, landforms, soils and vegetation. Consideration of the development of landform, soil and vegetation patterns. Classification of climates. Case studies of selected zones in Australia and comparison with neighbouring areas. Climatic analysis and mapping, and analysis of natural landscapes.

27.829 Australian Social Environments — S1 L2T2

Prerequisite: 27.802 or 27.819. Excluded: 27.812.

Focus is on the interaction between human communities and the built environment in Australia: the effects of the natural environment on the evolution of settlement patterns; detailed analysis of rural and metropolitan social environments. Emphasis on inner city, suburbia, behavioural and social area approaches, and to managerialist and structural theories of social change on areas and their communities.

27.844 Honours Geography — F

Prerequisites: Arts students must satisfy Faculty requirements for entry to the Honours Level program and must have obtained at least 54 credit points in Geography subjects, including 12 Level 1 credit points. A minimum cumulative average at Credit level is required for all Upper Level subjects taken which must include 27.884.

Details of Honours Geography for science students are available from the School of Geography office.

Students are required: **1.** To undertake an original piece of work extending throughout the year and to submit a thesis based upon it. **2.** To participate in seminars and fieldwork as notified by the School of Geography.

**27.862 Australian Environment and
Natural Resources** **S1 L2T2**

Prerequisites: 27.010 and 27.030 or 27.811 or 27.812 or 27.828 or 27.829.

Continental and regional patterns of land, water and energy resources in Australia and its territorial waters, and natural factors affecting their development, including climate, soils and terrain; problems of limited surface and underground water resources and of conflicting demands, exemplified through particular basin studies; comparable reviews of energy, minerals and forest resources, human resources and development.

27.883 Special Topic **S1 or S2 L4**

Prerequisite: Nil.

Admission by permission to suitable students with good Passes in at least four subjects at Upper Level. A course of individually supervised reading and assignments as an approved topic in Geography not otherwise offered.

27.884 Advanced Geographic Methods **S1 L2T2**

Prerequisites: 27.813 or both 27.2813 and 27.2814. Excluded: 27.050, 27.880.

Additional quantitative research techniques normally taken by Honours students in their third year. Research organization; computer analysis; collection and organization of data; statistical description; hypothesis testing and sampling; simple and multiple association analysis; nonparametric methods.

Optometry

**31.821 Anatomy and Physiology of
Eye and Visual System** **S1 L4T2 S2 L5T2**

Prerequisites: 17.031, 17.041. Co-requisite: 73.011.

Histology, anatomy and embryology of the eye and associated structures: Fibrous, vascular and neural tunics of the eye. The eyelids and laerimal apparatus. Blood supply and innervation of these tissues. Visual pathways and gross anatomy of the brain. Functional architecture of the visual pathways. Pathways involved in ocular motility. Elementary embryology of the eye and associated structures. Developmental abnormalities of the eye. Internal and external examination of the eye using clinical techniques. *Vegetative physiology of the eye:* Corneal function: Transparency and thickness related to hydration. Ionic bases of corneal hydration; corneal metabolism and biochemistry. Epithelial electrophysiology. Control of intraocular pressure. Mechanisms of production and drainage of aqueous humour. Physiology of the crystalline lens. Electropotentials. Lens biochemistry and the basis of cataract formation. Autonomic reflexes: Pupil size and retinal illumination. Accommodation and the synkinetic near response. Blinking. Physiology of the lacrimal apparatus. Introduction to clinical techniques for evaluation of ocular function *Physiology of vision:* Photochemistry, Pigment bleaching and regeneration in rods and cones. Psychophysics and physiology of adaptation. Physiology, psychophysics and perception of colour. Visual eletrophysiology. Theories of parallel and hierarchical processing of visual information. Perception

of spatial and temporal modulation of retinal illuminance. Ocular motility. Binocular vision, fusion and stereopsis. Introduction of issues of interest in current visual science. *Visual perception:* Perception of form. Space perception. Visual illusions.

31.841 Clinical Optometry **F L1T15½**

Prerequisites: 31.861, 31.862, 31.863, 31.864.

Students are required to examine patients in the Optometry Clinic, to diagnose their problems and to prescribe optical aids, orthoptic treatment or other management or referral as required. They also work in special clinics, including orthoptics, colour vision, low vision, children's vision and contact lenses, and participate in patient review clinics.

31.851 Optics **S1 L4T4 S2 L1T3**

Prerequisites: 1.001 or 1.021, 10.001 or 10.021B and 10.021C or 10.011.

Physical optics: extension of Physics I content on the nature of light, interference, diffraction, polarisation. *Geometrical optics:* reflection, refraction, thin lenses, lens systems, thick lenses, optical instruments. *Mechanical optics and optical dispensing:* manufacture and properties of spectacle lens materials. Optical properties of spherical, cylindrical, sphero-cylindrical, and prismatic spectacle lenses. Bifocal and multifocal lenses. Protective lenses. Frame measurements. Optical dispensing. Magnifying spectacles, and magnifying glasses. Lens aberrations and spectacle lens design. Lens measuring and lens testing instruments.

31.852 Visual Optics **S1 L1T1 S2 L2T1**

Prerequisites: 1.001 or 1.021, 10.001 or 10.021B and 10.021C or 10.011.

Optical systems of the eye: schematic eye, reduced eye, emmetropia, spherical ametropia, astigmatic ametropia, correction of ametropia, elementary magnification effects, aphakia. Accommodation, presbyopia, correction of presbyopia. Accommodation and convergence. Aberrations of the eye Phorias, measurement of phorias. Modulation transfer function Gradient index optics.

31.853 Measurement of Light and Colour **S2 L1T1**

Prerequisite: Nil.

Sources of radiant energy, detection and measurement of radiant energy. Distribution temperature. Colour temperature. The eye as a photoreceptor. Luminous energy. Relative luminous efficacy. Photometric measures and units. Reflection and transmission of light. Spectrophotometry. Colour mixture. Colorimetric equations. Grassman's Laws. Geometrical representation of colour. Transformation of primaries. CIE System. CIE Standard Observers. Uniform colour space. Colour differences. Colour rendering. Correlated colour temperature. Colour order systems.

31.861 Optometry A **F L5½T½**

Prerequisites: 31.821, 31.851, 31.852, 31.853.

Refraction: theory and practice of keratometry, measurement of vision and visual acuity, aetiology and treament of ametropia, objective and subjective refraction, prescribing special visual aids. *Orthoptics and binocular vision:* convergence/accommodation anomalies, strabismus, amblyopia. *Contact lenses:* corneal anatomy and physiology, contact lens design and manufacture, fit

ting techniques. *Low vision:* examination of the low vision patient, selection of aids.

31.862 Diagnosis and Management of Ocular Disease   F L5T½

Prerequisite: 31.821.

Microbiology: cell structure, genetics, metabolism and classification of microbes. Special environments. Host-parasite relations. Introductory chemotherapy and immunology. Pathogenic micro-organisms and parasites. Viruses. *Pathology:* acute inflammation, chronic inflammation, repair, regeneration, haemorrhage, thrombosis, embolism, ischaemia, infraction, hyperplasia, hypertophy, atrophy, metaplasia, neoplasia, carcinogenesis. *Diseases of the eye:* aetiology, pathology, diagnosis, prognosis and management of diseases of the eyelids, cornea, conjunctiva, iris, ciliary body, choroid, retina, optic nerve, lacrimal apparatus, sclera, orbit, lens and vitreous. Glaucoma. Lesions of the visual pathways. Ocular manifestations of systemic disease. *Diagnostic examination:* history taking and symptomatology, internal and external examination, ophthalmoscopy, slit-lamp biomicroscopy, tonometry, gonioscopy, visual field examination, colour vision tests.

31.863 Theory of Spectacle Lenses and Optical Instruments   F L1½

Prerequisite: 31.851, 31.852.

Advanced geometrical optics and spectacle lens design. Aberrations and their control. The elements of microscopic and macroscopic systems.

31.864 Clinical Methods   F T5

Prerequisites: 31.821, 31.851, 31.852, 31.853.
Co-requisites: 31.861, 31.862.

Practical assignments in ophthalmoloscopy, biomicroscopy, tonometry, gonioscopy, visual fields, colour vision tests, refraction, assessment of binocular vision, strabismus.

31.871 Optometry B   F L6

Prerequisites: 31.861, 31.862, 31.863, 31.864.

Public health optometry: visual task analysis, visual standards vision screening. Industrial hazards; identification assessment and prescription of protective measures. Ergonomics and visual ergonomics. Illuminating engineering. Fatigue and visual fatigue. Epidemiology. *Contact lenses:* materials. Fitting. Residual astigmatism. Care, maintainance and solutions. Continuing patient care. Extended wear and special applications. *Pharmacology and drugs used in refraction:* classification. Pharmaceutical aspects: administration, absorption, elimination, accumulation, sterilisation. Preservatives. Chemotherapy. Toxicity. Ocular drugs and complications. Mydriatics, Miotics, Cycloplegics, Anaesthetics. Staining agents and contact lens solutions. *Paediatric optometry:* visual and perceptual maturation. Juvenile ocular pathology. Clinical procedures. Vision screening. *Colour vision:* normal and abnormal. Features and mechanisms. Genetics. *Advanced Physiological optics and optometry:* current issues and research. *History of optometry:* development of optics, optometry and ophthalmology. *Legal aspects of optometry. Projects.*

Social Science

34.3001 Social Science Research Laboratory   S2 3CCH C6

Prerequisites: 60.2000, 60.2001. Excluded: 60.3001.

A continuation and development of the Year 2 Research Laboratory. Students are encouraged to utilise research and technical skills acquired during their earlier course work to colve problems and write reports.

Biochemistry

41.101 Principles of Biochemistry and Molecular Biology   F L2½T3½

Prerequisites: 17.031 and 17.041, 2.121 and 2.131, or 2.141.
Excluded 2.003J.

The chemical properties of amino acids, peptides and proteins, carbohydrates, nucleic acids and lipids and the biological roles of these compounds. The nature and function of enzymes. The intermediary metabolism of carbohydrates, lipids and nitrogenous compounds. The relationship between structure and function of enzymes, other proteins, hormones and biological membranes, metabolic networks and control mechanisms. The molecular mechanism of gene expression and protein synthesis. Regulation of gene expression. Recombinant DNA technology and protein engineering. Introduction to biotechnology. Photosynthesis. Practical work to complement the lectures.

41.102 Biochemistry of Macromolecules   S1 L3T9

Prerequisites: 41.101, and 2.102B or 2.102D. Excluded: 41.102A

Complex carbohydrates. Chemistry and biology of polynucleotides. Methods of amino acid and nucleic acid sequence analysis. Protein structure and synthesis. Active centres of some proteins. Sub-unit organization of proteins. Enzyme kinetics and enzyme mechanisms. Spectroscopy of biopolymers. Practical work to illustrate the lectures and to provide experience in modern biochemical techniques.

41.103 Biochemistry Honours

Advanced training in selected areas of biochemistry including a supervised research program that places emphasis on the use of specialized techniques relevant to the research area. A written thesis on the research is required.

41.112 Human Biochemistry   S2 L2T4

Prerequisite: 41.101.

Aspects of metabolism that are of particular relevance to the human: nutrition, exercise, neurochemistry, xenobiotics and genetic diseases.

The role of triglyceride, cholesterol and lipoprotein metabolism in human health, and other selected areas of human nutrition. Exercise, the metabolic fuels utilized and the use of *in vivo* NMR

to monitor changes in energy metabolism. Specialized aspects of endocrinology and neurochemistry including prostaglandins, leukotrienes, enkephalins and endorphins. The interrelation of purines, pyrimidines, folate and cobalamin metabolism in humans. Xenobiotics: the metabolism of foreign compounds by humans. Biochemical aspects of genetic disease including the use of recombinant DNA techniques for prenatal diagnosis and carrier detection. Practical work to amplify the lectures.

41.122 Cellular Biochemistry and Control   S2 L2T4

Prerequisite: 41.101. Excluded: 41.102B

Cell biology from a molecular physicochemical viewpoint. Biochemical aspects of cellular organization and how they are integrated and controlled. The arrangement of the component molecules of organelles, their function in integrated cellular metabolism to molecular interactions between the cells of multicellular organisms. The biochemistry of the cytoskeleton, carriers and intracellular transport systems. The regulation of cellular processes at the molecular endocrine level. Growth and differentiation. Aspects of cancer metabolism, the biochemistry of cell to cell communication and the structure and function of the extracellular matrix. This subject is complementary to 43.192 Ultrastructure, and students with a special interest in cell biology are encouraged to take both subjects. Practical work to amplify the lectures.

41.132 Molecular Biology of   Higher Organisms   S2 L2T4

Prerequisite: 41.102. Excluded: 41.102E

The organization of the genomes of higher organisms derived mainly from the application of recombinant DNA technology and related techniques. Methods used for the isolation, identification and characterization of eukaryotic genomes in terms of the organization of single-copy and repeated sequences and of coding and non-coding sequences and of several gene clusters, eg the alpha and beta globin gene cluster. Mechanisms known to operate in the control of eukaryotic gene expression, both at the DNA level and at the level of RNA processing. Review of several specialized genetic systems in plants and animals such as mitochondria, chloroplasts and RNA and DNA tumour viruses. Practical work provides training in the use of sterile techniques and in working with polynucleotides under nuclease-free conditions, using basic techniques such as hybridization and DNA sequencing.

41.142 Biochemistry and Genetic   Engineering of Plants   S2 L2T4

Prerequisite: 41.101.

The techniques of recombinant DNA technology and plant tissue culture with their application to the modification and improvement of plant productivity.

Plant organ, tissue and cell culture, organogenesis, embryogenesis and clonal plant propagation. The long term preservation of germplasm and plant genetic resources. Products from cultured plant cells and the technology of plant cell culture. Structure and expression of plant genes. Plant molecular biology including cloning plant genes and vectors for gene cloning. Genetic manipulation of plants to improve their natural resistance to pests, disease and environmental stress. Practical work provides training in the basic techniques of plant tissue culture with application of selected techniques to plant genetic engineering.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subjects see the Faculty of Medicine Handbook.

41.001 Biochemistry for Medical Students

41.002 Medical Biochemistry and Genetics

Biotechnology

42.102A Biotechnology A   S1 L3T3

Prerequisites: 41.101 and 42.101 or 44.101.

The basic principles involved in the operation of microbial processes on an industrial scale. Includes: the selection, maintenance and improvement of microorganisms; the influence of physical and chemical factors on the microbial environment; the control of environmental factors; the effects of operational patterns on batch and continuous flow cultivation; aeration and agitation; scale-up of microbial processes; air and media sterilization; the harvesting, purification and standardization of products; the principles involved in microbial processes for chemical, pharmaceutical and food production, microbial waste treatment and environmental control. The laboratory component includes manipulation of micro-organisms, laboratory-scale fermenter operation, microbial enzyme isolation, visits to industrial fermentation plants and industrial seminars.

42.102B Biotechnology B   S2 L2T4

Prerequisite: 42.102A.

Application of principles of biotechnology to the analysis and design of microbial processes of industrial relevance (antibiotics, microbial enzymes, single cell protein from carbohydrates and hydrocarbons, fermented foods and beverages, amino acids and vitamins, microbial polysaccharides, activated sludge and photosynthetic processes for waste treatment, microbial teaching of low-grade minerals). Emphasis on quantitative approach; mass and heat balance calculations, kinetic and thermodynamic analysis, detailed equipment design and specification, process design and layout, process simulation, plant location, application of optimization techniques. The economics of microbial processes are considered and comparison made with alternative modes of production or treatment. The economics of agro-industry in Australia using microbial processes. Marketing of fermentation products, clinical trials required, legal constraints, patent rights. Technical and economic feasibility studies, and a design project.

42.102C Microbial Genetics   S1 L2T4

Prerequisite: 41.101 or 44.101. Excluded: 43.102.

A detailed study of the mutational basis of microbial variation. Mutagens: mechanisms of mutagenesis; induction, enrichment, isolation and characterization of mutants; mechanisms of repair of mutational damage. Systems of gene transfer and recombination in fungi, bacteria and bacterial viruses; the use of these

systems in constructing genetic maps, and as tools for probing aspects of microbial physiology and biochemistry. Genetic control of gene expression; the operon concept and its application to specific regulatory systems. Genetic code, collinearity between a gene and its product, genes within genes, suppression of mutations. Restriction and modification of DNA; genetic engineering — its implications and prospects. Genetics of nitrogen fixation.

42.103 Biotechnology (Honours)

Advanced formal training in selected areas of biotechnology and participation in one of the school's research projects.

42.114 Fermentation Processes

Factors governing the use of micro-organisms in industrial processes, including the selection, maintenance and improvement of micro-organisms, the control of environmental factors, batch and continuous flow operational patterns, product recovery, process optimization and waste disposal. Demonstrations of the operation and control of fermenter systems and of microbial process simulation.

Biological Science

Plant Science

43.103 Botany Honours

43.112 Taxonomy and Systematics   S1 L2T4

Prerequisite: 45.111 or 43.111.

The assessment, analysis and presentation of data for classifying organisms both at the specific and supra-specific level.

43.121 Environmental Physiology   S2 L2T4

Prerequisites: 17.031, 17.041, 2.121 and 2.131, or 2.141.
Not offered in 1989.

How plants function in relation to the constraints imposed on them by soil and atmospheric environments. Includes: germination, growth and development, particularly photosynthesis, respiration, inorganic nutrition, water relations, transport processes and reproductive physiology. Important practical applications of various physiological mechanisms.

43.131 Fungi and Man   S1 L2T4

Prerequisites: 17.031 and 17.041.
Not offered in 1989.

An introduction to the biology and taxonomy of fungi followed by a study of their economic importance to man. Includes: fungi as pathogens of plants and animals; use of fungi as food and in the production of useful chemical products; medical uses of fungi, including drugs and hallucinogens; degradation of organic matter, particularly in soils and of timber; interaction of fungi with other organisms; chemical control of fungi.

43.132 Mycology and Plant Pathology   S1 L2T4

Prerequisite: 43.131 or 44.101 or 44.121.

A detailed study of the fungi, including both saprophytic and plant pathogenic species. Includes: hyphal structure and ultra-structure; morphology and taxonomy of members of major taxonomic groups; spore liberation, dispersal, deposition, germination, infection and the establishment of a host-pathogen relationship; morphogenesis of vegetative and fruiting structures; cytology, genetics; ecological considerations of fungi in specialized habitats, survival mechanisms and methods of control of plant pathogens.

43.142 Environmental Botany   S1 L2T4

Prerequisites: 17.031 and 17.041.

The soil and atmospheric environments in which plants live and a study of the interaction of plants with their environment. Energy and mass transfer. Emphasis is placed on the role of environmental science in food production.

45.111 Flowering Plants   S2 L2T4

Prerequisites: 17.031 and 17.041.
Excluded: 43.111

This covers basic aspects of plant biology and provides practical skills required in level III units. It is essential for students intending to specialise in the plant sciences. The course follows the development of plants from seedling stage to maturity, examining the structural and environmental controls, and the close relationship between structure and function in major plant systems. The following topics are dealt with in detail: the properties of plant cells and their walls in relation to growth; differentiation and how cells are organised into different tissues; transport systems and the movement of water and photosynthetic products; seed structure, the physiology of germination and its regulation by internal and external factors; primary and secondary growth and its regulation by plant hormones; shoot systems; leaf development; aborescence; adaptation to particular environments; root systems; mineral acquisition and water unpake; root growth and development; interactions of roots with microorganisms and the impact of symbiotic associations such as mycorrhizas on root structure and physiology; evolution of the land plants; the significance of having an enclosed carpel and the evolution of the gynoecium. Practial work provides: basic skills in plant anatomy and light microscopy; an introduction to the character states of flowering plant families in the Sydney region; how to use a key to identify a plant; growth and mineral nutrition, including collection of numerical data and a statistical approach to data handling; inoculation of plants with microorganisms; an integrated approach to salt secretion in mangroves.

45.152 Plant Community Ecology   S2 L2T4

Prerequisites: 43.111 or 45.111 and 17.012 or or 27.010 and 27.030.
Excluded: 43.152.

Recognition and delimitation of plant communities. Ecology of selected Australian vegetation types. Use of numerical methods and application of community concepts to palaeoecology. Field work is an integral part of this course.

45.172 Phycology and Marine Botany S2 L2T4

Prerequisite: 45.111 or 43.111. Excluded: 43.172.

The biology and taxonomy of algae with particular emphasis on marine algae, both macroalgae (seaweeds) and phytoplankton. The biology of marine angiosperms (seagrasses). The ecology of coastal plant communities, rocky coasts and estuarine shores. The commercial uses of algae and their products; algae mariculture. Fieldwork is part of the subject.

45.192 Ultrastructure and Function of Cells S2 L2T4

Prerequisite: At least 1 core level II Biological Science subject. Excluded: 43.192.

The concepts and techniques in modern ultrastructure and cell biological research will be taught. Emphasis is on areas where ultrastructural and cell biological studies interface with molecular and biochemical studies in understanding how living cells work. The material in this unit covers aspects of cell motility, secretion, cell recognition, development, transport and communication. Practical work: students use transmission and scanning electron microscopes to investigate material they themselves prepare, using negative staining and ultramicrotomy. They are also trained in the principles and practice of fixation and sectioning tissues for light and electron microscopy, techniques that use antibodies to label specific proteins, and methods used in the investigation of nerve cells.

This unit is complementary to 41.122 Cellular Biochemistry and Control and students with a special interest in cell biology are encouraged to take both units.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

43.202 Botany for Landscape Architects S1 L2T3

Prerequisite: Nil.

How green plants function. What is known about how plants grow. Specific topics include: what happens in a plant meristem, hormone interactions and growth, transport systems in plants, water uptake and use, mineral nutrition, the role of light and leaves in photosynthesis, control of flowering process, germination and senescence. Emphasis is on the interaction between plant structure and function.

Animal Science

Students are not admitted to Level III Zoology units, without special permission of the Head of School, unless Chemistry 2.121 and 2.131, or 2.141, has been completed.

45.101 Biometry S2 L2T4

Prerequisites: 17.031, 17.041. Excluded: 10.311A, 10.321A, 10.331.

Statistical methods and their application to biological data, including introduction to probability; the binomial, Poisson, normal distributions; student's t, ^{2} and variance ratio tests of significance based on the above distributions, the analysis of variance of orthogonal and some non-orthogonal designs; linear regression and correlation. Non-linear and multiple regression. Introductory factorial analysis. Introduction to experimental

design. Non-parametric statistics, including tests based on ^{2}, the Kruskal-Wallis test, Fisher's exact probability test and rank correlation methods. Introduction to programming in BASIC.

45.103 Zoology 4

45.112 Marine Ecology S1 L2T4

Prerequisites: 45.201 or 68.302.

A study of the ocean environment and its effect on the life of marine organisms, together with the effects of human intervention. Emphasis is placed on the biology of fishes, fisheries and aquaculture. Estuarine field studies are an essential component of the course.

Students intending to enrol in this unit should register with the School of Biological Science by 13th January so that field work can be arranged.

45.121 Evolutionary and Population Genetics S1 L3T3

Prerequisites: 17.031, 17.041.

Current evolutionary theory, emphasizing the population level. Ecological genetics, speciation, evolution of social behaviour, molecular evolution and general evolutionary genetics. Some background in genetics is desirable.

45.122 Animal Behaviour S2 L2T4

Prerequisites: 45.101, and 45.201 or 45.301.

An introduction to Ethology, the biological study of behaviour. Physiological, ecological, developmental and evolutionary aspects of behaviour are examined as important elements in the analysis of behaviour, particularly social behaviour. Both field and laboratory work are included.

45.132 Ecological Physiology S2 L2T4

Prerequisites: 45.201 or 45.301.

A study of physiological adaptation to habitat in animals. The problems imposed by the basic physiological characteristics of major animal groups under different environmental conditions are examined, especially osmotic and ionic regulation, oxygen availability, metabolism and temperature regulation/acclimation. Particular attentional is given to Australian fauna and conditions.

45.142 Comparative Animal Physiology S1 L2T4

Prerequisite: 45.201 or 45.301.

A study of the physiology of invertebrates and vertebrates including the special features of Australian mammals. The systems and functions examined include reproduction, hormones, nerves, blood, circulation, respiration and kidneys with emphasis on the control and integration of organ systems and body functions.

45.152 Population and Community Ecology S2 L2T4

Prerequisite: 17.041 and 10.001 or both 10.021B and 10.021C.

Examination of the dynamics of one, two or more interacting populations. Systems analysis and simulation in ecology. Theoretical and mathematical analysis of the dynamics and stability of ecosystems. Topics in the optimal management of renewable resources. Unifying concepts in ecology.

45.201 Biology of Invertibrates   S2 L2T4

Prerequisite: 17.031, 17.041.

A comparative study of morphology, taxonomy and functional biology of invertebrate animals. Emphasis is placed on the major groups (Anthropods and Molluscs) and on marine forms. Practical classes and a compulsory field camp illustrate the lecture material.

The morphology and systematics of the major Phyla of invertebrate animals will be considered on a group by group, basis, beginning with relatively simple animals and moving to the more complex. Within this framework the following will be considered:- 1. functional biology including physiology, feeding mechanisms, reproduction and mode of life (free-living, sessile and parasitic); 2. the effect of increasing the body size and complexity of physiological function (internal transport systems, excretion, gas exchange and coordination); 3. detailed coverage of the invertebrate component of zooplankton; 4. evolutionary relationships between Phyla — the Phyla covered will include Porifera, Cnidaria and Ctenophora, Platyhelminthes, Nemertina, Nematoda, Annelida, Arthropoda, Onychophora, Sipuncula, Bryozoa, Mollusca, Echinodermata, Hemichordata, Chaetognatha and non-vertibrate Chordata.

45.301 Vertebrate Zoology   S1 L3T3

Prerequisite: 17.031, 17.041.

A comparative study of the Chordata, with particular reference to the vertebrates, including morphology, systematics, evolution and natural history, with reference to selected aspects of physiology and reproduction. Practical work to supplement the lecture course. Field excursions as arranged.

45.302 Vertebrate Zoogeography and Evolution   S2 L2T4

Prerequisite: 45.301.

A geographic approach to the current distribution, abundance and types of vertebrate species in the Australian region. Particular emphasis is placed on the basic principles of speciation, the history of the Australian continent, vertebrate adaptations and changes in the distribution and abundance of the Australian vertebrate fauna under the influence of humans. Field excursions as arranged.

45.402 Entomology   S1 L2T4

Prerequisites: 17.031, 17.041, 45.201.

Classification, external morphology and internal anatomy of insects, studies on environmental sensory physiology and behaviour— especially reproductive behaviour, social organization, pheromones and rhythms. Practical work to illustrate the lectures.

45.422 Economic Zoology   S1 L2T4

Prerequisite: 45.201 or 45.402.

A study of the biology, ecology and control of vertebrate and invertebrate animals which harm humans and their possessions. Human and domestic animal parasitology, pests on plants, deseases caused or spread by animals, chemicals, biological and physical control, and side effects.

Microbiology

Level II Subjects

44.101 Introductory Microbiology   S1 L2T4

Prerequisites: 17.031 and 17.041.

An optional unit for students enrolled in courses of the Faculties of Applied Science, Arts, Engineering, Law and Science. It is not available for those who wish to major in any of the science programs offered by the Schools of Biochemistry, Biological Science or Microbiology; nor for students enrolled in the Food Technology courses in the Faculty of Applied Science. It is an introduction to the science of Microbiology and does not require any previous knowledge of biology; bridging instruction is given in the first week of the course for students in this category.

The general nature, occurrence and importance of a micro-organisims; a systematic review of the eukaryotic protista (micro-algae, protozoa and fungi), prokaryotic protista (bacteria) and viruses. Relationships between micro-organisms and their environment; their impact on man through medical, industrial and environmental applications. Methods for handling bacteria and other micro-organisms; initial training in scientific method through designing and reporting experiments.

44.121 Microbiology 1   S2 L2T4

Prerequisites: 44.101 and 41.101 or 2.003J.

This subject is mandatory for students wishing to major in program 4400 Microbiology, it is also offered as a single unit elective. Material presented in the prerequsite unit is taken as "assumed knowledge". An essential component of this course is training in scientific methods, particularly designing and reporting experiments and use of the scientific literature.

The general nature, occurrence and structure of bacteria, fungi, viruses, micro-algae and protozoa; methods for laboratory study of these organisms. Principles and applications of modern bacterial taxonomic techniques, characteristics and behaviour of selected groups of bacteria. Bacterial growth in batch and continuous culture; biosynthetic and bioenergetic mechanisms of bacteria and eukaryotic protista. Interactions of microogranisms with their environments.

Level III Subjects

44.102 General Microbiology   S1 L4T8

Prerequisites: 44.101, 44.121.

Systems for the isolation, identification and taxonomic description of microorganisms; fine structure, cyto-chemistry, genetics of bacteria and viruses; metabolic requirements of microorganisms; microorganisms and their environment, growth, inhibition and death; energy-yielding and biosynthesizing systems; geotypic and phenotypic control systems.

44.112 Applied Microbiology   S2 L4T8

Prerequisite: 44.102.

Endeavours to relate the basic facts about microorganisms to a variety of practical conditions. The occurrence, importance, activity and control of microorganisms in soil, air, water and in their relationship with higher organisms (other than humans),

their industrial applications including manufacture, preservation and spoilage of food and dairy products. The nature of bacterial and fungal diseases of humans, their cultural and serological diagnosis, epidemiology, treatment and prevention will be discussed in some detail.

44.122 Immunology   S2 L2T4

Prerequisites: 17.031 and 17.041, 41.101.

Basic immunology and immunological techniques. The interdisciplinary nature of the subject makes this unit suitable for students taking any major sequence in biological science and also for higher degree students who require a background training in immunology. The course includes phylogeny and ontogeny of the immune response, antigen and antibody structure, antigen-antibody reaction, immunochemistry; immunogenetics, clinical immunology; transplantation.

44.132 Virology   S2 L2T4

Prerequisite: 44.102.

The structure, replication and behaviour of animal, plant and bacterial viruses; applications of virological techniques; virus diseases of animals and plants, their epidemiology and control.

Level IV Subject

44.103 Microbiology Honours   F

Advanced training in selected areas of microbiology, **1.** a formal component consisting of seminars, tutorials, introductory electron microscopy and written assignments, **2.** a supervised research program in a specific area of microbiology or immunology.

Servicing Subjects

These are subjects taught within courses offered by other faculties.
For further information regarding the following subject see the Faculty of Medicine Handbook.

44.141 Microbiology

This course is soley for students enrolled in the Food Technology BSc courses 3060 and 3070 in the Faculty of Applied Sciences. For further information regarding the following subject see the Faculty of Medicine Handbook.

80.311 Paraclinical Science

In conjunction with School of Pathology and School of Physiology and Pharmacology.

Chemical Engineering and Industrial Chemistry

48.403 Polymer Science   F L2T1

Prerequisites: 2.102A, 2.102B, 10.031, 10.301. Co- or prerequisites: 48.001, 48.113.

Polymerization processes; step growth and chain growth (free radical and ionic), stereospecific catalysts. Methods of polymerization: bulk suspension, emulsion, solution, high pressure. Industrial examples. Principles of analysis of polymers using chemical and instrumental methods. Molecular weight applied to macromolecules: number-, weight-, viscosity- and z-average weights. Molecular weight distribution. Thermodynamics of polymer solutions, theta solvent. Measurement of molecular weight. Fractionation methods. Conformation of a polymer chain. The crystalline state. The amorphous state. Stress/strain behaviour. Creep. Impact. Rubber elasticity. Dynamic mechanical properties. Principles of operation of polymer processing equipment; safety procedures. Polymer compound design.

Philosophy

Philosophy is a wide-ranging discipline, catering for a great diversity of interests, for instance, in science, reasoning, persons, and social issues, and encouraging critical and imaginative thought about the foundations of other subjects. Apart from providing considerable choices for students majoring in Philosophy, the diversity of Upper Level subjects makes it possible for students majoring in other disciplines to select subjects complementing their main interest.

First Enrolment in Philosophy

There are two Level I subjects:
52.103 Introductory Philosophy A (Session 1)
52.104 introductory Philosophy B (Session 2)

Each of these has 1-unit value they can be taken separately, and a student can gain Upper Level status in Philosophy (quality to enrol in Upper Level subjects) by passing in only one. However, students enrolling in one will normally enrol in both, and students wishing to major in Philosophy must do so.

Value of Upper Level Subjects in Philosophy

With the exception of two which count as *full units*, all upper level subjects in Philosophy are *part units*, of which three together have the value of two full units; otherwise, each one counts as a half-unit.

Major in Philosophy

Students majoring in Philosophy must take the equivalent of two full Upper Level (II/III) units in Year 2, and the equivalent of 4 full Upper Level (II/III) units in Year 3.

Level II/III

Some Upper Level subjects deal with particular philosophical topics; others can be taken in sequence to give more sustained treatments of larger areas. Students may select freely among these, subject to stipulations regarding prerequisites. They are welcome to seek advice and further information from the School.

In certain circumstances the prerequisites specified for units or half-units may be waived; for example, in the case of students who have already studied similar material, or who wish to take

isolated units or half-units relevant to another discipline. Students who feel they have a case for a concession of this kind should consult the School.

52.103 Introductory Philosophy A　　　S1 L3T1 C6

Prerequisite: Nil.

Consult School for details.

52.104 Introductory Philosophy B　　　S2 L3T1 C6

Prerequisite: Nil.

Consult School for details.

52.2001 The Nature of Mind　　　S1 L2 C4

Philip Cam

Prerequisite: Upper Level status in Philosophy.

Not offered in 1989.

52.2002 Contemporary Philosophy of Mind　S1 3CCH C6

Philip Cam

Prerequisite: Upper Level status in Philosophy.

An introduction to some major issues in the field, including: intentionality and intentional systems; mental representations and their physical basis; the psychology of consciousness; mechanism, freedom, and responsibility.

52.2003 Issues in the Philosophy of Psychology　　　S2 3CCH C6

Philip Cam

Prerequisite: Either 52.2001 or 52.2002 or 12.100 (Psychology1).

Philosophical issues in theoretical psychology, drawn from philosophical and psychological writings on personal identity, consciousness, intentionality, perception, mental imagery, psychology and the brain sciences, psychology and artificial intelligence.

52.2010 Reasoning Skills　　　S1 L2 C4

Prerequisite: Any Level I subject. Excluded: 52.233.

Reasoning skills in which practical arguments are examined in classroom exercises; lectures on practical argument in politics and everyday life as compared with arguments in mathematics and theoretical science.

Assessment: Exercises, essay and class examination.

Might not be offered in 1989.

52.2022 Body, Mind, Knowledge and Freedom　　　S1 L2 C4

Ray Walters

Prerequisite: Upper Level status in Philosophy. Excluded: 52.2020.

The philosophical theories, mainly of Descartes and Leibniz, about (a) the natures of mind and body: (b) the mind-body relation; (c) the nature of human knowledge; and (d) the conditions of human freedom.

52.2024 Reason and the Passions: Descartes, Spinoza and Hume　　S2 3CCH C6

Genevieve Lloyd

Prerequisite: Upper Level status in Philosophy. Excluded: 52.2021.

Philosophical distinctions between reason and the passions, and the role that philosophers have given — or denied — reason in understanding and controlling the passions. The reason-passion distinction will be discussed in relation to other distinctions — between mind and body, theoretical and practical reason, interests and passions, male and female; and also in relation to contemporary attitudes to rationality.

Assessment: To be decided in consultation with students.

52.2025 Images　　　S2 L2 C4

Philip Cam

Prerequisite: Upper Level status in Philosophy. Excluded: 52.2980 in 1986 and 1987.

Not offered in 1989.

52.2040 Greek Philosophy: Thales to Plato　　S2 L2 C4

Ray Walters

Prerequisite: Upper Level status in Philosophy. Excluded: 52.183.

The leading ideas of the Greek philosophers from Thales to Plato with special reference to the Pre-Socratics.

Assessment: To be decided in consultation with students.

52.2050 Classical Political Philosophy　　S1 L2 C4

Stephen Cohen

Prerequisite: Upper Level status in Philosophy.

The basis of political society, its various functions and its relation to the individuals in it, investigated primarily through the works of Hobbes, Locke, Rousseau and Mill. Topics include the theory of a social contract, the establishment of political rights and obligations, and the relation of moral and political concerns within a political society.

Assessment: Two short essays and an examination.

52.2060 Sartre　　　S1 L2 C4

Barbara Roxon

Prerequisite: Upper Level status in Philosophy.
May not be offered in 1989.

An examination of Sartre's account of emotion; freedom and contingency; and action.

Assessment: Essays.

52.2130 British Empiricism　　　S2 L2 C4

Neil Harpley

Prerequisite: Upper Level status in Philosophy.

A survey of the empiricist tradition with special concentration on Locke and Berkeley.

Assessment: Exercises and essays or examination.

52.2140 Scientific Method   S1 L2 C4

Ray Walters

Prerequisite: Upper Level status in Philosophy. Excluded: 52.193.

The nature of empirical knowledge as exemplified in the physical and social sciences, with emphasis on the concept of explanation, the nature of induction and scientific laws, and controversies over the nature of scientific knowledge.

Assessment: Exercises or essay and examination.

52.2150 Philosophy of Law   S2 L2 C4

Stephen Cohen

Prerequisite: Upper Level status in Philosophy. Excluded: 52.105.

Selected conceptual and normative issues in the philosophy of law, centring around the broad areas of law (eg, its nature, validity, bindingness, and relation to morality), liberty, justice, responsibility (including strict and vicarious liability), and punishment.

Assessment: Essays, possibly an examination.

52.2170 Hume   S1 L2 C4

Neil Harpley

Prerequisite: Upper Level status in Philosophy.
Might not be offered in 1989.

A study of Hume's epistemology, his discussion of arguments for the existence of God and free will.

Assessment: Essay and exercises or examination.

52.219 Philosophical Foundations of
Marx's Thought   S2 L3 C6

Neil Harpley, Barbara Roxon

Prerequisite: Upper Level status in Philosophy. Excluded: 52.373.

A discussion of the basics of Marx's historical materialism and dialectical materialism.

Assessment: Exercises and essays.

52.2220 The Ethics of Plato and Aristotle   S1 L2 C4

Stephen Cohen

Prerequisite: Upper Level status in Philosophy.
Not offered in 1989.

52.2230 Theories in Moral Philosophy   S2 L2 C4

Stephen Cohen

Prerequisite: Upper Level status in Philosophy.

Three moral theories central in the history and development of moral philosophy. Hume, Kant, and Mill offer differing kinds of moral theories, differing approaches to arriving at a moral theory, and specific theories which are markedly different from each other. Each moral theory in itself and in comparison with the other two theories examined.

Assessment: Two short essays and an examination.

52.2240 Philosophical Study of Woman   S1 L2 C4

Prerequisite: Upper Level status in Philosophy.
Not offered in 1989.

52.2260 Aesthetics   S2 L2 C4

Ray Walters

Prerequisite: Upper Level status in Philosophy.

An examination of the central concepts, types of judgement and theories occurring in the field of aesthetics or theory of art.

Assessment: Exercises or essay and examination.

52.2270 Social and Political Philosophy   L2 C4

Stephen Cohen

Prerequisite: Upper Level status in Philosophy.

Not offered in 1989.

52.2330 Psychoanalysis — Freud and Lacan   S2 L2 C4

Barbara Roxon

Prerequisite: Upper Level status in Philosophy.

A discussion of psychoanalytic theory, particularly for what it shows about the relation between the individual and the social.

Assessment: Essays.

Consult with school before enrolling.

52.2980 Seminar A   S2 T2 C4

Excluded: 52.423.

Admission by permission, based on a student's performance in Upper Level subjects. Topics vary and are influenced by student requests.

Assessment: Essay.

52.2990 Reading Option A   S1 or S2 C4

Excluded: 52.413.

Admission by permission, to suitable students with good Passes in at least two subjects at Upper Level. A course of individually supervised reading and assignments on an approved topic not otherwise offered.

Assessment: Essay.

52.3010 Seminar B   S1 T2 C4

Excluded: 52.433.

As for 52.2980 Seminar A.

52.3020 Seminar C   S2 3CCH C6

Excluded: 52.443.

As for 52.2980 Seminar A.

52.3030 Reading Option B   S1 or S2 C4

Excluded: 52.453.

As for 52.2990 Reading Option A.

52.304 Advanced Philosophy of Science   S1 3CCH C6

Prerequisite: 52.220; either 52.2140 or62.202U.

A seminar subject, to which several members of staff from the schools of Philosophy and Science and Technology Studies contribute. *Topics include:* the role of experiment in science; the cognitive status of theories; explanation; confirmation; intertheoretical reduction; reductionism; models and metaphors; the logic of thwory generation; the revival of realism; problems of classification; theories of measurement; order and entropy; current issues in the philosophy of the physical sciences.

Sociology

53.001 Introduction to Sociology   F 3CCH C12

Not offered in 1989.

An introduction to a critical and reflexive sociology by examination of contemporary Australian society. *Major topics include:* Thinking about Australian society; political economy of Australian society; social movements, social philosophies and State responses; and culture and resistance. *Specific topics:* the analysis of every day life; social class; gender; political party formation; popular culture; media moral panics. Provides a sound basis for further studies in the social sciences.

**53.002 Introduction to the Study
of Culture and Society   F 3CCH C12**

Excluded: 53.001, 53.003, 53.004, 53.005.

An introduction to social anthropology and comparative sociology drawing upon wide ranging materials from small scale subsistence cutlutres and advanced industrialised societies including Australia. The ethnographic areas considered will emphasise examples nearest to Australia in the Pacific and Southeast Asia. Each session is divided into two main sections: Session 1 deals with an introduction to the "History and methodology of the study of culture and society" and "Socialisation & Identity". Session 2 is divided into "Knowledge & Work" and Power & Inequality".

53.003 Introduction to Australian Society   F 3CCH C12

Excluded: 53.001, 53.002, 53.004, 53.005.

Develops da critical understanding of Australian society and introduces students to sociological concepts, theories and methodologies. Key focus is on inequalities (class, gender, ethnicity, race) as they are reflected in areas of social life such as work, family, community, welfare, media and social control.

**53.004 Introduction to Sociology:
New Perspectives on
Australian Socity: F3CCH C12**

Excluded: 53.001, 53.002, 53.003, 53.005.

An introduction to a critical analysis of contemporary Australian society and culture. Section 1 "Questions of meaning and experience"; Section 2 "Introduction to political economy"; Section 3 "Social Movements".

53.005 Society and the 'Individual   F 3CCH C12

Excluded: 53.001, 53.002, 53.003, 53.004.

Approaches the study of society from the standpoint of its members and their experience of social life. Critical examination of this experience and some of its determinants introduce some key concepts of Sociology. Explicit references are made to classical theoretical formulations of enduring significance and, at the same time, the dynamic and changing nature of social interaction is emphasised through the consideration of representative sociological material from the last three decades.

Assessment: On the basis of performance in essays, written assignments, and tutorial classes.

Political Science

54.1003 Australian Political Institutions   S1 3CCH C6

J. Paul

Excluded: 54.1001, 54.1002 and 54.1006.

The nature and history of Australian political institutions in depth. The Australian constitution and federal structure and the role of the High Court in helping determine the nature of the power relationships in Australian politics. The political parties, their history, successes and failures, strengths and weaknesses both in and out of government. The formal institutions of government: parliament, cabinet, the bureaucracy and both Labor and Liberal prime ministers. Elections and voting in Australia and pressure groups.

**54.1004 Government in the
Modern World   S2 3CCH C6**

A. Chan, A.C. Palfreeman

Excluded: 54.1001.

The development, nature and forms of government in the modern world. Particular attention is paid to the major conceptual tools of political analysis with emphasis on a comparative approach to the study of government and case studies drawn from Australia and the industrialized and developing areas. An underlying theme is the management of conflict and the establishment of order in the various systems examined.

**54.1005 A History of
Political Thought   SS 3CCH C6**

C. Condren

Excluded: 54.1001.

An introduction to Western political theory through the study of four major texts taken from three distinctly different political civilisations. Each text is studied against its social and intellectual background and in the context of the political crises to which it was addressed. The main themes of the lectures concern the relationship between political theory and practice and that between language and political awareness.

The texts are Plato, *The Republic;* Machiavelli, *The Prince* and *Discourses;* Hobbes, *Leviathan;* Locke, *The Second Treatise of Government.*

54.1006 The Australian Political System   S1 3CCH C6

R. Lucy

Excluded: 54.1001, 54.1002, 54.1003.

Basic concepts in political science such as power, influence and authority. Models of the Australian political system. The subsequent examination of the Australian political system is designed to illustrate these concepts and to test these models. The Australian political system is understood as the formal governmental institutions, political parties, and political culture. Australian political issues are studied to illustrate the Australian political culture.

54.1008 Politics of Soviet-Type Systems   S1 3CCH C6

S. Fortescue

Excluded: 54.1001.

Examines political concepts and phenomena in Soviet-type systems, with the emphasis on Eastern Europe. Includes legitimacy and authority, economic reform and political pluralism, the party in communist systems, political participation, and others. The approach is strongly comparative, with an effort being made to discern and explain differences within the Eastern bloc, and between that bloc and the Western and developing worlds.

54.1009 Australian Political Culture   S2 3CCH C6

R. Smith

Excluded: 54.1001, 54.1002.

Key concepts, methods and theories of political culture. Focusing particularly on those commonly used to explain Australia's political culture. *Topics include:* democracy; nationalism; political socialization; egalitarianism; class; gender; ethnicity; religion; regionalism; political culture.

Education

58.013 Theory of Education   S1 L9, S2 T6

Three core sections and an options section. The core sections consist of studies of the philosophy of education, psychology of education and the sociology of education. In the last section, known and *Selected Studies in Education,* each student studies three topics selected from a number offered. The topics depend on student interest, current issues in educational thought and the interests and expertise of available staff.

Further details are available from the School of Education.

58.014 Curriculum and Instruction   S1 L2T5½ L2T6

A core section and a special methods section.

General Method: including topics such as classroom management, policy documents, educational technology and language across the curriculum.

Assessment and Measurement including test planning, standardized tests, marking and reporting, essay-type tests, scaling of test scores, uses and effects of assessment.

Special Methods: Students elect two single method subjects or one double method subject.

Further details are available from the School of Education.

58.015 Teaching Experience

Co-requisite: 58.014 Curriculum Instruction

Microteaching involves development of teaching skills by observation of teaching models and participation in peer group microteaching. Success in this strand is prerequisite to placement for teaching practice.

Teaching Practice involves two blocks of 20 days experience, one in Session 1 and the other in Session 2. Each student is placed in a dirrerent high school in each session and works in close association with one or more teachers. In the first block the emphasis is upon a gradual introduction to teaching and in the second it is upon developing teaching competence.

58.793 Advanced Education 1   F 1CCH

Students study *one* of the following segments: *Philosophy of Education segment:* some connected issues in social and political philosophy, and their implications for educational theory and practice. Includes: freedom, compulsion and the aims of education; neutrality of education systems, schools, teachers and courses; and justice and equality. *Educational Psychology segment:* introduction to selected aspects of on-going research activities in educational psychology. The area is selected following discussions with staff members. *Sociology of Education segment:* more detailed and extensive examination of central topics studied in the pass strand. Consideration of selected issues to do with social theory, the nature of the sociological enterprise and sociological methods.

58.794 Advanced Education 2   F 1CCH

Each student engages in twenty-eight hours of supervised study appropriate to his or her proposed research, as approved by the Head of School.

58.795 Advanced Education 3   F 4CCH

Enrolment is subject to approval by the Head of School.

In their full-time Honours year, all students enrol in four twenty-eight-hour units of study appropriate to their research, as approved by the Head of School.

58.799 Thesis

Science and Technology Studies

Students undertaking subjects in Science and Technology Studies are required to supplement the class contact hours by study in the Library.

Level I

62.101I Science, Technology and Social Change S1 L2T1 C6

Prerequisite: Nil. Excluded: 62.110.

Only 2 level units may be counted towards Course 3970.

Relations between science, technology and society which have evolved in the 20th century. **1.** Topics which illustrate the effects of scientific and technological development on society — especially those, such as pollution and unemployment, which are apparently unintended; and **2.** Selected theories which have been proposed to explain and evaluate the nature of technological change. Topics include: the use of pesticides; the implications of microprocessor technology; the development of nuclear energy and the debate about recombinant DNA research. Theories of Galbraith, Commoner, Dickson and others — particularly in relation to the question as to whether unintended consequences of scientific and technological development can be eliminated by 'technological fixes' or whether they are inevitable in modern industrial society.

Assessment: Essay (40 percent); tutorials (30 percent); class tests (30 percent).

62.102I Man, Megalith and Cosmos S1 L2T1 C6

Prerequisite: Nil. Excluded: 62.111, 62.219U.

Only 2 level I units may be counted towards course 3970.

The roots of scientific thinking in antiquity, and the development of the central traditions which were to form the foundations of modern science, stressing origins of geometry, astronomy, astrology and cosmology. Emphasis on the interpretation of evidence from archaeology, particularly that relating to the megalithic cultures, and on the assessment of the relevance of anthropological studies, particularly of Australasia and the Pacific region. Topics include: evidence for archaeoastronomical interpretations of prehistoric sites; theories of the origins of geometry; inter-relationships of science and religion; traditional Pacific navigation; patterns of reasoning in early times, and in primitive cultures today; the evolution of mythology; cosmology and astronomy in mythology; the scientific and philosophical legacy of Greek science, particularly of Aristotle, Euclid and Ptolemy; a comparative study of the astronomy and cosmology of Mesopotamia, Egypt, Greece, America, etc; the background to the Copernican Revolution; the Von Daniken phenomenon; the mystery of the Dogons; an appraisal of astrology.

Assessment: 2 short essays (33⅓ percent); 2 tests (33⅓ percent); tutorials (33⅓ percent).

62.104I The Seventeenth Century Intellectual Revolution S2 L2T1 C6

Prerequisite: Nil. Excluded: 62.211, 62.219U.

Only 2 level I units may be counted towards course 3970.

The intellectual revolution, centred upon science of the 17th and early 18th centuries, which led on to the Enlightenment. The Mediaeval and Renaissance background. Bacon and Baconianism; empiricism; experimentation and the virtuosi; the idea of progress. The mechanization of the world picture; Descartes and Cartesianism; rationalism; the revival of atomism, materialism. The Copernican Revolution. Locke. Hobbes.

Assessment: Essay (40 percent), tutorials (30 percent); examination (30 percent).

62.115I Science: Good, Bad and Bogus. An Introduction to the Philosophy of Science S2 L2T1 C6

Prerequisite: Nil.

What is science? What are its distinctive characteristics as a form of inquiry? Why are astrology and 'creationism' widely considered to be pseudosciences? A critical consideration of the claims of astrology, psychoanalysis, parapsychology and creation-science provides a vehicle for raising central questions concerning the nature of science, involving issues such as the nature of observation and evidence, theories and laws, explanation and prediction, etc. Centgral concerns throughout the history of philosophy have been the nature of knowledge and justified belief, and the demarcation between science and pseudoscience. These questions are placed in an historical context: from the Pre-Socratics, to Hume, Kant and the twentieth-century philosophers Wittgenstein, Popper and the 'Logical Positivists'.

Assessment: Essay (30 percent); tutorials (30 percent); class tests (40 percent).

Level II/III

62.201U Materials, Machines and Men S2 L2T1 C6

Prerequisite: Completion of Arts subjects carrying at least 24 credit points, or a Pass in four Level I Science units. Excluded: 26.251, 62.022.

The rise of technology in its social and cultural context before, during and since the Industrial Revolution. This Revolution, which has been described as the most significant event in human history since the Agricultural Revolution of the New Stone Age, is examined in some detail, and concentrates on technology and its effects on human beings. Considers the professionalization of engineering, the spread of industrialization in Britain, in Europe and the USA, and examines the Second Industrial Revolution. Emphasis on the social and economic effects of the interactions of technology and society.

Assessment: Tutorial paper (30 percent); performance in class (40 percent); class test (10 percent); examination (20 percent).

62.202U The Scientific Theory   S2 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.032, 62.505, 62.219U.

A critical examination of the scientific theory — its origins, nature and nurture. With particular reference to selected historical examples chosen from both the physical and biological sciences, a number of philosophically interesting problems relating to scientific theories are subjected to analysis. Topics include: the principles of theory construction; perception and observation; the structure of scientific revolutions; scientific explanation; the status of laws and theoretical terms; the 'existence' of theoretical entities; relationships between theory and observation; the structure of scientific revolutions; scientific explanation; the status of lwas and theoretical terms; the 'existence' of theoretical entities; relationships between theory and observation; the functions of models; the principles of theory establishment and rejection.

Assessment: One essay (33⅓ percent); tests (33⅓ percent); tutorials (33⅓ percent).

62.203U Scientific Knowledge and Political Power   S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.052, 62.252.

Not offered in 1989.

An introduction to the political dimensions of 20th century science. Topics include: growth of expenditure on science in the 20th century; attempts to define the social function of science in the inter-war years; the radical scientists' movement of the 1930s — the freedom *versus* planning debate; science and politics in the Second World War; government patronage and political expectations in the post-war period; science and economic growth; the science-technology relationship; the rejection of *laissez-faire* in the 1960s; approaches to science policy; critiques of the role of science in contemporary society; scientists as experts; the question of social responsibility in science.

Assessment: Essays (50 percent) tutorials (50 percent).

62.204U The Social System of Science   S2 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.062.

Not offered in 1989.

An introduction to the social dimension of the practice of science. The production and application of scientific knowledge as an activity in constant interaction with its socio-economic, political and cultural environments. The principal features of this interaction in relation to each of the following aspects of scientific activity: the processes of research and discovery; the dissemination of research findings and their acceptance or rejection; the development or abandonment of accepted theories; and the technological applications of scientific knowledge.

Assessment: Essays and tutorial work.

62.205U Historical Origins of the American Scientific Estate   S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.072.

The development of American scientific institutions and research from the early years of the Republic, when that country was a scientific backwater, to its present position of global dominance in terms of research resources. Questions about the historical roots of organized research in universities, industrial corporations and government organizations. The American case illustrates well the processes whereby the rapidly emerging scientific profession and its varied specialisms forged links between these sectors of society. Topics: the place of science in a young resource-rich democracy, the uses of science in Progressive ideology, and the war-born relationship of science, government and the military.

Assessment: 2 essays (60 percent); tutorial assessment (40 percent).

62.206U Science, Technology and Developing Countries   S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.082, 62.282.

The disparities between the scientific and technical capabilities of industrialized and developing societies. The reasons for these disparities and their economic and social consequences. Aspects include: the problems of dependency; the product cycle and its impact on location of production; concepts of the 'learning curve', aspects of technology choice; bargaining processes; transnational corporations and the 'truncation' of the industrial sector; efforts to define 'appropriate' technologies; modes of technology transfer; alternate models and policies for scientific and technological development; the role of traditional technology; the impact of modern technology on international relations. Issues: the consequences of modern science and technology for the role of the military in developing countries; food and population problems; energy use; environmental impacts; class structure, etc. The social role and function of scientific communities in less developed countries and the process of diffusion of science from the centre to the periphery and the evolution of national scientific communities and institutions are addressed through the use of case studies.

Assessment: Essay (50 percent); tutorials (50 percent).

62.207U The Discovery of Time   S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.103.

The history of time, from the Ancient World through the Twentieth Century. The principal strands studied are: clocks and other instruments for the measurement of time, civil and religious calendars, concepts of time, philosophy and theology of time, conceptions of history and of progress, the cognition of time, the age of the Earth and the antiquity of humanity, time and the development of modern science. Throughout, attention will be paid to the historical context within which specific episodes and developments occurred and to cultural consequences of changes in the cognition of time.

Assessment: Essay (33⅓) percent); tutorials (33⅓ percent); 2 class tests (33⅓ percent).

62.208U The Darwinian Revolution   S1 L1T1 C6

Prerequisite: As for 62.201U. Excluded: 62.104.

Scientific, philosophical, and social antecedents and consequences of Darwin's theory of evolution. The prevailing ideas in biology before Darwin in the context of the general climate of ideas in the 18th and early 19th centuries. Darwin's life and

work in some detail, followed by a consideration of the work of Mendel and the establishment of the 'synthetic' theory of evolution. The impact of evolutionary ideas in such diverse fields of thought as religion, literature, music, political theory, epistemology, ethics, and the social and behavioural sciences.

Assessment: Examination (30 percent); tutorial exercises (40 percent); essay (30 percent).

62.209U Mind, Mechanism and Life   S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.106.

The development of scientific ideas concerning the nature of life, mind and behaviour. While the subject includes both a brief treatment of early ideas and reference to issues in contemporary biological and behavioural sciences, the main focus is on the period from the Proto-Scientific Revolution of the 16th century to the advent of the general purpose computer. Topics include: Vesalius and the School of Padua; the biological thought of William Harvey; machines and the mechanical philosophy; Cartesianism and the mechanization of biology; classical theories of the relationship between mind and body; neurophysiology from the 18th to the early 20th century; the mechanist-vitalist disputes; Wundt, Fechner and the rise of experimental psychology; the Freudian revolution; Pavlov and the conditioned reflex; behaviorism and its critics; mind, brain, life and the computer.

Assessment: Essay (33⅓ percent); tutorial assessment (33⅓ percent); tests (33⅓ percent).

62.210U History of Medicine   S L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.109, 62.273, 62.309, 26.568, 26.2506.

Development of theory and practice in Western medicine from the time of Hippocrates to the 20th century. Material covered in four sections: 1. 'bedside' medicine from antiquity to the French Revolution; 2. 'Hospital' medicine in the early 19th century; 3. 'laboratory' medicine in the late 19th century; and 4. 'technological' medicine in the 20th century, with particular emphasis on the social role of modern medicine.

62.211U Relations Between Science and the Arts   S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.241.

The relationships between science, literature, painting and music in the history of Western culture. 'Art' and 'Science' in the ancient world. Pythagoreanism and its cultural influences. Science, painting and architecture in the Renaissance. The Scientific Revolution and its influences on English literature. Optical theories of Newton and Goethe and their effect on literature and painting. Science, philosophy, technology and their influence on painting, literature and music in the 19th and 20th centuries. Creativity in science and the arts. Scientific and humanistic cultures in the modern world. The 'two-cultures' debate.

Assessment: Tutorial exercises (40 percent); essay (30 percent); examination (30 percent).

62.212U The New Biotechnologies and Their Social Context   S2 L2T1 C6

Prerequisite: 62.101I or by permission of the Head of School for Biological Science students in Years 3 and 4. Excluded: 62.245.

The social implications of the new biotechnologies, including recombinant DNA techniques, genetic manipulation of animals and test tube babies. The present achievements and likely future developments of the new genetic and reproductive technologies, together with detailed discussions of the social, ethical and political implications of these developments. *Topics include:* the debate on the safety of genetic engineering; *in vitro* fertilization and related reproductive technologies; the ethics of human genetic engineering; university-industry interactions in biotechnology; the release into the environment of engineered organisms; mechanisms for public participation in the control of biotechnology.

62.213U Technological Development in 20th Century Australia   S2 L2T1 C6

Prerequisite: 62.101U. Excluded: 62.246.

The historical development of technology in Australia during the 20th century, with an analytic focus on three key dimensions: linkages between scientific research, industrial development and economic growth, technological change and its impact on Australian society: the distinctive features of Australia's geopolitical situation. *Topics include:* The origin, expansion and transformation of the CSIRO, the maturation and professionalization of the Australian research community; the politicization of science and the post-war legacy; the failure of Australian research to serve an industrialized economy; science policy and technological change in the 1970s and 1980s; comparison with the Canadian situation and the experience of newly industrializing countries.

62.214U Man, Woman and Deity   S2 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.285.

Conceptions of deity, from earliest times to the present, in relation to changing notions of sexuality and generation; the place of human beings in relation to their environment and the cosmos; the roles of the sexes within different cultures. Topics: Archaelogical evidence for early ideas concerning generation and for the relations of man to the cosmos; the Earth Mother Goddess; biology, religion and mythology; feng-shui and geomancy; the symbolism of city, temple and dwelling; religion, sexuality and generation in ancient civilizations and primitive societies, with special reference to the Australian Aborigines; the Medieval and Renaissance world views; the tyranny of the machine; conservation and stewardship in the Middle Ages; the *cultus* of the Virgin Mary in relation to scientific and social change; theories of biological generation; concepts of Deity and Nature in relation to science and the environmentalist movement; the Gaia hypothesis.

Assessment: 1 essay (33⅓ percent); 2 tests (33⅓ percent); tutorials (33⅓ percent).

62.217U Computers, Brains and Minds:
Foundations of the Cognitive
Sciences   S2 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.554.

Introduction to contemporary discussions of the mind, thought, intelligence and consciousness. Focus on the issues which arise in connection with the so-called 'cognitive sciences' — the disciplines which include such fields as computer science, the various neuro-sciences, cognitive psychology, linguistics and the philosophy of mind. Stress on the recent revolutionary developments in the computer simulation of thought or 'artificial intelligence' and linguistics, since both these areas shed new light on traditional questions concerning the mind. Questions are: Can computers think? and Is the brain a machine? Exploration of the theories, methods and philosophical issues which arise from the 'computational' or 'information processing approach' to the mind.

Assessment: Essay (40 percent); tests (30 percent); tutorials (30 percent).

62.218U Language and Mind:
The Impact of Chomsky's
Revolution   S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.570.

Chomsky's theories of language and mind which have revolutionised linguistics, psychology and philosophy. History of linguistics and psychology, especially the Behaviourist approach of Skinnner. Chomsky's impact on traditional philosophical debate between Rationalists and Empiricists concerning innate ideas.

62.219U Knowledge and Belief
in the Sciences   F L1½T½ C6

Prerequisite: As for 62.201U. Excluded: 26.222, 62.111, 62.102I, 62.211, 62.104I, 62.032, 62.202U.

An introduction to the philosophy and sociology of scientific knowledge. The way in which beliefs about the natural world become accepted as knowledge in various cultures, and especially in modern scientific culture. Topics are organised historically and include: oral traditions and the introduction of writing; the impact of the invention of printing; the origins and development of the experimental method; the effect of the political and social environment on scientific thought; rhetoric and rationality in scientific controversies; the nature of progress and theory change in the sciences; the relations between science and technology as forms of theoretical and practical knowledge.

62.220U Technology and
the Sociology of Risk   S1 L2T1 C6

Prerequisite: 62.101I or completion of Arts subjects carrying at least 24 credit points, or a Pass in four Level 1 Science units.

The growth of concern in advanced industrial societies over the risks associated with the development of resource-based and other technological and environmental degradation. The relationships between perceived risk and social trust and institutional arrangements. The basis of much of the present concern in anxieties over social control and in changing perceptions of the relationships between ethics and politics. Case studies examine nuclear energy, hazardous wastes and information technology.

Assessment: Essays and tutorial participation.

62.221U Information and Communication
Technologies in Society   S1 L2T1 C6

Prerequisite: As for 62.220U.

Issues involved in information technology (IT) developments and how these relate to pressing social and economic concerns in industry and the workplace. *Topics include:* ITs, their history and contemporary developments; the information economy (methodological issues); policy issues; regulation and promotion role of State; integration and prospects for the 'wired world'; organization, management and education restructuring to assist diffusion and to reskill the workforce; impact on service industries (banking, finance and retail) and on the public sector (telecommunications, broadcasting, libraries); implications for industry policy and innovation strategies; ITs and international issues; transborder data flows; microelectronics in newly industrializing countries and their impact on countries like Australia and Canada.

Assessment: Essay and tutorial participation.

62.222U The Politics of Energy S2 L2T1 C6

Prerequisite: As for 62.220U.

The fundamentals of energy, force, work and power; the social construction of energy use; resources and reserves; the 'energy crisis'; the nuclear energy process; solar and alternative sources; political economy of energy use — coal, oil, nuclear; institutional power; market arrangements and the role of the State; energy in the 1980s and 1990s. Case studies include N.S.W. and Victorian power inquiries; coal *vs* oil *vs* gas; the nuclear industry today; the future of solar power.

Assessment: Essay, tutorial participation and class tests.

62.224U History of the Philosophy
and Methodology of Science S2 L2T1 C6

Prerequisites: As for 62.201U. Excluded: 62.543, 62.551, 62.561, 62.215U, 62.216U.

A survey of the history of ideas about the nature and method of science, considering such issues as Aristotelianism, Galileo's mathematization of nature, rationalism and empiricism, Kantianism, positivism, pragmatism, conventionalism, logicism, falsificationism, the realist/instrumentalist debate, and 'sociologism'.

Assessment: Essays (50 percent); tutorials (50 percent).

Level III

62.300U Research Methods in Science
and Technology Studies   S1 T2 C6

Arts prerequisite: Completion of Arts or other approved subjects, carrying at least 72 credit points; including at least 12 credit points gained in Science and Technology Studies subjects completed with an average grade of Credit or better. Excluded: 62.105.

A weekly seminar designed to prepare students to carry out Honours level research. The historiography of science, ware analysed through discussion of texts representing predominant approaches to Science and Technology Studies. In addition, bibliographical, editorial, and other research exercises are carried out.

Assessment: Essay, seminars and written exercises.

62.301U Philosophical Problems in Evolutionary Biology   S2 L2 C4

Arts prerequisite: Completion of Arts or other approved subjects, carrying at least 73 credit points. Co-requisite: 62.202U or 62.208U. Sciences prerequisite: Third year standing. Excluded: 62.3001.

Current controversies in evolutionary theory, with consideration of topics such as essentialism and population thinking, falsifiability of the principle of natural selection, the group selection controversy, sociobiology, problems in classification and cladism, the neutral theory of evolution and the role of chance, punctuated equilibrium theory, the origin of life, neo-Lamarckism, and creationism.

62.3002 Not offered in 1989.

62.3003 Not offered in 1989.

62.3004 Not offered in 1989.

62.305U Issues in the Philosophy of Science   S2 L2 C4

Prequisitie: As for 62.300U.

Selected topics in contemporary philosophy of science chosen from among the following: Scientific Laws, Theories and Explanations, Observation, Evidence, Confirmation, Induction, Models and Metaphors, Realism and Instrumentalism, Verification and Falsification, Scientific Discovery and Scientific Revolutions, Theoretical Reduction, Methodological Problems of Social Sciences, Teleological and Purposive Explanation, Rationality and Scientific Method, Science and Pseudo-Science Demarcation.

Level IV Honours Program

62.400H Science and Technology Studies Honours.

Prerequisite: Completion of years 1-3 of program 6200, with marks that result in an average of Credit or better in the eight S & T units included in that program.

In the Honours program, candidates are required to present a thesis and to complete course work as approved by the Head of School. In certain circumstances, generally relating to the proposed honours thesis topic, the Head of School may also require a student to complete one or more specified units offered by other Schools in the University.

Board of Studies in Science and Mathematics

68.302 Introductory Marine Science   S1 L3T1

Ocean basins, sediments, properties of seawater, ocean circulation, coasts and coastal processes. Marine biology and ecology, primary and secondary productivity.

Field work in mid-year recess.

68.304 Marine Science 4

68.313 Physical Oceanography   S2 L2T2

Prerequiste: 10.001 or 10.011, 1.001.

The physical properties and motions of the oceans, and their measurement, Oceanographic instrumentation. The design of small and large scale ocean experiments. Laboratory and field work.

68.404 Genetics 4

68.430 Geology and Physics Honours

An honours program combining Geology and Physics in Program 0100, made by arrangement with the Heads of the two Schools.

68.601 Genetics of Behaviour 1   S1 L2T3

Prequisite: 17.031

Introductory behaviour genetics with most examples coming from human genetics. Single gene, polygene and chromosomal genetics which illuminate normal and abnormal behaviour; mathematical treatment of data, non-human mammalian behaviour. Practical classes and limited clinical contact.

68.602 Genetics of Behaviour 2   S2 L2T3

Prerequisite 68.601

The topics of 68.601 at a more advanced level. Continued emphasis on human behaviour with essential consideration of microbial and invertebrate studies. Extended mathematical treatment of data. Projects involving community contact replace some of the practical sessions.

Anatomy

70.011A Histology 1   F L1T2

Prerequisites: 17.031, 17.041. Co-requisite: 70.011C

Elementary theory of light and electron microscopy. Cell morphology and cell ultrastructure. Introduction to simple histological techniques. Basic histology, including the morphological and functional properties of epithelial, connective, muscle and nervous tissues. Systematic histology, including a histological examination of the major systems of the body; cardiovascular, respiratory, lymphatic, integumentary, digestive, endocrine, urinary, reproductive and nervous (including eye and ear). Emphasis on the ability to interpret histological sections and selected electron micrographs of mammalian tissues and organs and to relate morphology to tissue and organ function. One lecture per week followed by a 2-hour practical-tutorial class.

70.011B Mammalian Embryology   F L1T2

Co-requisites: 70.011A, 70.011C

History of embryology and its development as a science. The mammalian reproductive system. Gametogenesis. Fertilization and cleavage. Development and implantation of blastocyst. Develop

ment of embryonic disc, embryonic membranes, placenta. Comparative mammalian placentation. Human embryogenesis. Development of human fetus. Characteristics of external form. Teratology. Human organogenesis. Comparative mammalian development. Biochemistry and embryogenesis.

70.011C Introductory Anatomy   S1 L2T4

Prerequisites: 17.031, 17.041.

Introduction to gross anatomy, based on a study of prosected specimens. Musculoskeletal, cardiovascular, respiratory, gastrointestinal, genitourinary and nervous systems. General topographical and surface anatomy.

70.012B Visceral Anatomy   S2 L2T4

Prerequisite: 70.011C.

A detailed study of the visceral system, including autonomic nervous system, head and neck regions and the cardiovascular, respiratory, gastrointestinal and genitourinary systems. In addition, tutorials include clinical cases and surface and radiological anatomy.

70.012C Neuroanatomy 1   S1 L2T4

Prerequisites: 70.011A, 70.011C.

Nerve cells and neuronal satellite cells, cytoarchitecture of brain and spinal cord, comparison of peripheral and central nervous systems. Functional anatomy of sensory and motor processing, and higher cerebral functions such as language and emotions. Blood supply of the central nervous system, cerebrospinal fluid and membranous coverings. Comparative anatomy of the brain.

70.013 Anatomy 4   F

Prerequisite: Completion of the first three years of any Science program with a major in Anatomy (see Table 3 of Combined Sciences Handbook).

An honours program consisting of the preparation of an undergraduate thesis and participation in School seminars.

70.304 Histology 2   S2 L2T4

Prerequisite: 70.011A. Excluded: 70.3041. (If 70.304 is taken after 70.3041, total counts only 1 unit.)

Not offered in 1989.

Mammalian histology, with particular reference to the human. Practical histological procedures: fixation, section preparation, staining. Microscopy. Theoretical, practical and applied histochemistry.

70.3041 Histological and Histochemical
Techniques   S2 L1T2

Prerequisites: 17.031, 17.041 and either 41.101 or 45.301 or 70.011A. Excluded: 70.304.

Not offered in 1989.

Practical histological procedures: fixation, section preparation, staining. Microscopy. Theoretical, practical and applied histochemistry.

70.305 Neuroanatomy 2   S2 L1T2

Prerequisite: 70.012C.

In seminar format, topics in contemporary neuroanatomy, working from original papers. Includes: sensory and motor areas of the neocortex, hippocampus, cerebellum, and sense organs. Recent work on the development of the central nervous system. Recent advances in neurohistochemistry and neuroendocrinology. Students are required to undertake a substantial amount of private study.

70.306 Functional Anatomy 1   S1 L2T4

Prerequisite: 70.011C.

Introduction to fundamental issues in the morphology and dynamics of human movement systems. Includes: physical properties of bone, muscle and connective tissue; biomechanics, movement analysis and neuromuscular control. These basic principles are applied to a study of musculoskeletal components of head and neck and upper limb. Emphasis on modern analytical techniques and findings. Tutorials include limb and joint dissections plus study of surface and radiological anatomy.

70.307 Functional Anatomy 2   S2 L2T4

Prerequisite: 70.306.

A continuation of 70.306. Includes: a detailed study of the musculoskeletal components of trunk and lower limb, functional morphology of muscle, biomechanics and energetics of walking and running.

Medicine

71.001 Principles of Medicine for
Optometry Students   FL1

Prerequisite: Nil. Students normally take the subject in Year 4 of course 3950.

An overview of all aspects of current clinical medical practice. Included are historical, epidemiological, pathophysiological, diagnostic, therapeutic and public health aspects of disease in man and the various clinical categories of practice.

Pathology

72.301 Basic and Applied Pathology   F L2T1

Prerequisites: 70.011A, 70.011C, 73.111 or equivalent.

Lectures and practical class demonstrations. Includes exposition of the basic classification of pathological processes, study of the processes of cell and tissue degeneration, acute and chronic inflammation, vascular disease, including thrombosis, embolism, ischaemia and infarction. Coverage of the process

es of healing and regeneration with specific reference to healing of skin wounds and the healing of fractures. Aberrations of cell growth used to introduce the subject of neoplasia and carcinogenesis. Exposure to examples of specific disease entities of general practical importance exemplifying the basic or fundamental processes such as appendicitis, pneumonia, arthritis, pulmonary and myocardial infarction as well as lung, alimentary and cerebral tumours. Correlation of pathological processes with development of specific clinical syndromes.

72.304 Pathology Honours

Physiology and Pharmacology

73.011 Principles of Physiology (Optometry)   F L2T4

Prerequisites: As for Physiology 1, except that 2.131 may be accepted as a co-requisite. Excluded 73.111.

Covers the same general areas of physiology as Physiology 1 but in less detail and with less intensive practical courses. Principles of Physiology is taken only by students in the POptom degree course.

73.012 Physiology 2   F L4T8

Prerequisites: 73.111, 41.101.

A major subject offered in third year, providing a more advanced course of study in Physiology. Students spend considerable time performing laboratory experiments which illustrate various physiological principles and introduce them to the techniques used in physiological investigation. The course is orientated towards the areas of physiology constituting the major research interests of the School. It is divided into several sections which may be available in special circumstances as separate 1 and 2 unit Level III courses, including Membrane Biology, Neurophysiology and Organ Physiology, details of which are given below.

73.012A Membrane Biology   S1 L2T4

For entry consult Head of School of Physiology and Pharmacology.

The properties of cell membranes including permeation of ions, solutes and water across membranes, generation of electrical signals in nerve and muscle cells produced by ion movements, and transmission of information between cells. Stress on modern research techniques and on a critical examination of appropriate classical papers.

73.012B Neurophysiology   S1 L2T4

For entry consult Head of School of Physiology and Pharmacology.

A detailed study in two broad areas, neural mechanisms in sensation and the control of posture and movement. Includes the regulation of visceral and other autonomic effector structures and the neural substrates and correlates of certain higher functions

such as speech, memory and consciousness. Directed towards the experimental analysis of nervous system function, to introduce the techniques and approaches used in neurophysiological research. Sensation: an integrated lecture and experimental course is given on somatic, visual and auditory sensory mechanisms. Laboratory work: students conduct psychophysical experiments to evaluate subjective sensory capabilities. The neural mechanisms underlying these subjective abilities are examined in animals in electrophysiological experiments which involve recording the impulse patterns from individual neurones within the sensory systems. Students are required to analyze the mechanisms employed by the nervous system to code information about specific parameters of sensory stimuli.

Lectures and experiments on motor function are directed towards an understanding of the various reflex and voluntary mechanisms controlling posture and movement. The section dealing with nervous control of visceral function is concerned mainly with regulation of cardiorespiratory activity.

73.012C Organ Physiology   S2 L4T8

Prerequisite: Normally as for 73.012.
For entry consult Head of School of Physiology and Pharmacology.

An advanced study dealing with major physiological systems of the body and usually includes detailed segments from: the cardiovascular and respiratory systems; endocrines, kidney, fetal physiology, gastrointestinal physiology and exercise physiology. Emphasis on the functions of individual organs as well as the overall operations of particular body systems including their neural control mechanisms. Emphasis on the approaches and techniques involved in physiological research. Students are therefore required to carry out an extensive series of experiments which usually employ mammalian (including human) preparations.

73.012F Clinical Physiology   F T3

Excluded: 73.012. Prerequisites: 73.111; 41.101; 2.002B; 70.011A; 70.011C; 80.014.

This Level III subject is only available in course 3820, and only to those students not undertaking Physiology 2. The subject is intended to supplement the Level II, Physiology 1A course in order to provide an adequate grounding for double degree students in applied or clinical aspects of physiology before they enter Year 3 of the Medical Course.

Covers aspects of normal and disordered physiology in the following areas: cardiovascular and cardiorespiratory mechanisms; body fluid balance and kidney function; the endocrine system; central nervous system; gastrointestinal physiology.

73.013 Physiology 4 Honours

73.022 Pharmacology   F L2T4

Prerequisite: 73.111 or 73.121. Co-requisites: 73.012 or 41.102 & 41.122 or two Level III Chemistry units.

Includes a study of the absorption, distribution and metabolism of drugs, as well as a study of the pharmacology of the autonomic nervous system, the cardiovascular system, the central nervous system, the kidney, the endocrine system and also a

study of pharmacokinetics. A practical class program complements the lecture program by demonstrating a variety of basic pharmacological techniques.

73.023 Pharmacology 4 Honours

73.111 Physiology 1   F L2T4

Prerequisites: 17.031 & 17.041; 2.121 & 2.131, or 2.141; 10.001 or 10.011 or 10.021B & 10.021C. Excluded: 73.121, 73.011. Co-requisite: 41.101.

Introduction to fundamental physiological principles, dealing first with basic cellular function in terms of chemical and physical principles, and, second, with the operation of the various specialized systems in the body, for example, the cardiovascular system, whose function it is to transport materials to and from the tissues of the body; the respiratory system which must maintain the exchange of oxygen and carbon dioxide between the atmosphere and the blood; the gastrointestinal system which enables food materials to be modified by digestion and absorbed into the circulation; the kidney which is involved in the regulation of body fluid and electrolyte balance and with the excretion of the waste products of metabolism; the endocrine system which releases chemical messengers, called hormones, that are carried in the blood stream to regulate a great variety of body functions, eg metabolism and reproductive activity; the nervous system which by means of very rapidly propagated electrical impulses is responsible for all our movements, sensations, memories, emotions and consciousness itself. A substantial series of practical class experiments on these different areas of physiology is included in the course. This subject is taken by students enrolled in any of the Physiology program.

Community Medicine

79.201 Population Genetics   S1 L2T3

Prerequisite: one unit of statistical methods, or theory, as approved by the Head of School.

The genetic structure of populations: demographic structure, genetic relationships, mating systems (random and assortative mating, inbreeding, sexual selection), finite populations, systematic forces (selection, mutation, migration), genetic distance between populations, genetic load, stable populations, molecular population genetics, evolutionary trees; observed human population structures; computer methods.

79.202 Human Genetic Analysis   S2 L2T3

Prerequisites: one unit of genetics and one unit of statistical methods, or theory, as approved by the Head of School.

Principles and methods of human genetics: design of surveys, including twin and family studies; estimation and applications of genic and genotypic frequencies, selective values, mutation and migration rates, coefficients of kinship, inbreeding and assortative mating, effective population sizes, recombination fractions and heritabilities; segregation analysis; risks of recurrence of

disease; genetical consequences of human intervention; computer methods.

79.302 Biochemical Genetics of Man   S1 L2T4

Prerequisite: 41.101.

Inherited variation of blood group antigens, serum proteins and red-cell enzymes, their possible selective roles, and their application to the study of differences between and within populations. Applicaton of statistical techniques to analyzing population data.

Faculty of Medicine

80.014 Human Behaviour   F L3

Prerequisites: No formal prerequisites. Students may take the subject in Year 2 or Year 3 of Course 3820.

As for 80.012. See **Undergraduate Study: 3800 Medicine Course,** earlier in this handbook.

Graduate Study:
Faculty of Biological and
Behavioural Sciences
Faculty of Science

Faculty of Biological and Behavioural Sciences and Faculty of Science Enrolment Procedures

All students re-enrolling in 1989 or enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1989* available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

Faculty of Biological and Behavioural Sciences

Facilities are available in each of the Schools for research leading to the degrees of Master of Science and Doctor of Philosophy. The School of Biotechnology offers a graduate diploma course in Biochemical Engineering, a graduate diploma in Biotechnology and a Master's course in Biotechnology by formal study, and the School of Psychology offers Master of Psychology (Clinical) and Master of Psychology (Applied) degree courses.

Higher Degree Qualifying Program

Students without a BSc Honours degree wishing to register as higher degree candidates must usually complete a qualifying program, admission to which is subject to the approval of the Faculty Higher Degree Committee.

Applicants must normally have a degree or diploma in an appropriate field of study from an approved university or institution, and in the case of a diploma, appropriate professional experience.

Undergraduate of this University may be admitted to the full-time or part-time Honours undergraduate course. Other applicants may be admitted to a full-time, part-time or external qualifying program. The duration of the qualifying program is a minimum of one year for full-time and two years for part-time or external students.

Content of Qualifying Program

The qualifying program consists of the whole of the usual program for the final Honours year of the undergraduate course, the following being the prescribed Level IV subjects:

41.103	Biochemistry Honours
42.103	Biotechnology Honours
43.103	Botany Honours
44.103	Microbiology Honours
12.403	Psychology 4 (Thesis)
12.404	Psychology 4
45.103	Zoology Honours

The qualifying program is graded in the usual way, and in appropriate cases the results are expressed as a grading equivalent to Honours.

Alternative Qualifying Program

Applicants who cannot attend the University regularly for the above programs may be admitted as external qualifying students to a program similar to a standard Honours year. The following are the alternative qualifying subjects:

41.999G	Biochemistry
42.999G	Biotechnology
43.999G	Botany
44.999G	Microbiology
12.999G	Psychology
45.999G	Zoology

The results in alternative qualifying subjects are graded Pass or Fail only.

Fees

Candidates enrolled in the Alternative Qualifying Program are exempt from student service fees.

the arid and coastal zones of eastern Australia, and a range of modern equipment for measuring and monitoring relevant environment variables.

Courses are offered in a wide range of zoological fields, notably ecology, marine and fisheries biology, genetics and evolution, comparative physiology and mammalian studies.

GRADUATE DIPLOMA
GradDip

The Graduate Diploma is designed as a one year full-time period of study and research. It is intended primarily as an advanced training programme for graduates from overseas universities who wish to obtain specialised training in particular areas of biological science. The expectation is that for suitably qualified students, the course would allow entrance to a higher degree programme (MSc or PhD) provided suitable supervision and facilities were available. In special circumstances, the course would also be available to graduates of Australian universities who wish to pursue postgraduate study in a discipline other than that in which they obtained their first degree.

Biochemistry

The course is tailored according to the background and requirements of the individual student. In most cases it would include advanced formal undergraduate training, including lectures in general and medical biochemistry, training in the use of modern biochemical techniques, eg scintillation counting, gas-liquid chromatography (GLC), high performance liquid chromatography (HPLC), molecular biology, spectrophotometry, nuclear magnetic resonance (NMR) spectroscopy, and animal and plant cell culture. The student would also carry out a research project in the laboratory of an academic member of staff.

The School of Biochemistry has a wide range of interests and can offer research projects in most areas of biochemistry. Specialised areas of research which may interest students from overseas are molecular biology, marine biochemistry, parasite biochemistry, plant biochemistry and toxicology.

Biological Science

The course is designed to fulfil the needs and objectives of individual students, building on that student's competence and experience.

It includes a formal teaching component and a research project carried out under the supervision of a member of the academic staff. Students would receive instruction, via existing undergraduate courses, to provide them with background information relevant to their research project.

Training and research are offered in both the botanical and zoological sciences.

Areas of plant biology for which the School can provide both facilities and appropriate supervision include ecology and taxonomy, mycology, environmental and developmental physiology, and plant ultrastructure. The School is well equipped with plant growth facilities and can provide a wide range of modern equipment for microscopy. There is access to University field stations in both

Biotechnology

5014
Biochemical Engineering Graduate Diploma Course

Graduate Diploma
GradDip

The Department of Biotechnology, conjointly with the School of Chemical Engineering and Industrial Chemistry, offers a course in biochemical engineering which leads to the award of a graduate diploma (GradDip). The course is open to graduates in the biological sciences, chemistry, chemical engineering or agriculture, and can be completed in one year of full-time or over a longer period by part-time study. It contains a component of graduate level 'bridging' subjects, designed to facilitate the introduction of graduates with a variety of backgrounds to the current practice of biochemical engineering.

The normal entrance requirement is an appropriate degree or equivalent qualification in biological sciences, chemistry, chemical engineering or agriculture. Intending students are referred to the conditions for the award of Graduate Diplomas set out later in this handbook.

		Hours per week	
		S1	S2
Session 1			
42.211G	Principles of Biology	3	0
42.212G	Principles of Biochemistry	3	0
44.101	Introductory Microbiology	6	0
48.282G	Thermodynamics	4	0
48.284G	Mass Heat and Momentum Transfer	4	0
Session 2			
42.213G	Biochemical Methods	0	3
42.214G	Biotechnology	0	3
48.283G	Process Dynamics and Biochemical Engineering Design	0	8

5015
Biotechnology Graduate Diploma Course

Graduate Diploma
GradDip

The graduate diploma course provides the opportunity for graduates with no previous tuition in biotechnology to undertake training in this discipline.

A degree in a science-based course is required for admission. If the degree course has not included a biology component, the candidate is required to undertake some basic biology training as a prerequisite or co-requisite.

Under normal circumstances, students whose previous training has included a substantial component of biotechnology will not be admitted to the course.

The course comprises study of undergraduate and graduate formal subjects, plus extensive laboratory training in biotechnology.

The diploma is awarded after one year's full-time study, consisting of an average of 19 hours per week, or two years part-time study, consisting of an average of 9½ hours per week. The program includes the listed obligatory subjects plus sufficient of the listed elective subjects to meet the hours of study required. The electives include subjects necessary for students without previous tuition in biochemistry and/or microbiology, as well as alternatives for those with previous tuition in these disciplines. The choice of electives in each individual case is subject to approval by the Head of School.

		Hours per week	
		S1	S2
Obligatory Subjects			
Full Year			
42.215G	Practical Biotechnology	7	7
Session 1			
42.102A	Biotechnology A	6	
Elective Subjects			
Full Year			
42.104G	Graduate Seminars	2	2
42.111G	Reading List in Biotechnology (Microbiology)	3	3
42.112G	Reading List in Biotechnology (Biochemistry)	3	3
42.305G	Case Studies	0	2
Session 1			
44.101	Introductory Microbiology	6	
42.212G	Principles of Biochemistry	3	
Session 2			
42.102B	Biotechnology B		6
44.121	Microbiology 1		6

Master of Science
(Biotechnology)

The Department also offers a formal graduate course at the master's level (Master of Science (Biotechnology)). The course includes advanced treatments of all areas of biotechnology. It is open to graduates with a four-year degree in biotechnology or a related discipline, or who have, in the opinion of the Higher Degree Committee, acquired equivalent qualifications or experience. Intending students are referred to **Conditions for the Award of Graduate Degrees** set out later in this handbook.

The course consists of lectures, tutorials, practical sessions, case history studies and a supervized project. The minimum period of registration before the award of the degree is two sessions for full-time students and four sessions for part-time students.

To qualify for the degree students must satisfy the examiners in the prescribed examinations, which include the submission and assessment of a report on the specified project.

8041
Master of Science (Biotechnology) Graduate Course

Master of Science (Biotechnology)
MSc(Biotech)

		Hours per week	
		S1	S2
Full Year			
42.306G	Project	7	7
Session 1			
42.303G	Biochemical Process Control	5	0
42.304G	Biodeterioration and Biodegradation	5	0
Session 2			
42.301G	Microorganism Productivity	0	5
42.302G	Enzyme Technology	0	5
42.305G	Case Studies	0	2
		17	19

Psychology

Head of School
Professor B.J. Gillam

Administrative Officer
Mr. T.J. Clulow

The School offers courses leading to the award of the degrees of Master of Psychology (Clinical) and Master of Applied Psychology.

Master of Psychology (Applied)

The Master of Psychology (Applied) degree course is aimed at providing psychology graduates with a postgraduate qualification which will equip them to make a distinctive contribution in work and other organizations. The emphasis of the program will

be on developing applied research skills that integrate theory and practice. When combined with their undergraduate training and the required work experience, this program will equip psychologists with an understanding of organizational, social and cultural influences on behaviour. They will be able to apply this understanding to many problems through a critical, empirical orientation based on experimental methods, measurement and statistics. Areas of specialization offered are occupation psychology, health management and ergonomics.

The normal entrance requirement is completion of an honours Class 1 or Class 2 degree in Psychology from the University of New South Wales or a qualification considered equivalent.

Applicants who do not satisfy the above entrance requirements may be admitted to the program. Such admissions will be based on an assessment of the applicant's knowledge, experience and occupation. Some additional qualifying subjects may be required of those who are admitted under this provision.

The minimum period of registration before the award of the degree is four sessions for full-time students and six sessions for part-time students. Students with advanced standing may have the minimum period reduced by up to one half of the program (ie a reduction of one session if a student has completed a PhD in an approved area of Psychology and one session if a student has completed part of the course work program).

Assessment of student performance is by sessional examinations, class tests, seminar papers and a research thesis.

The course consists of 1. a 24 credit core program, 2. a 12 credit thesis, 3. a 9 credit elective program, and 4. Professional Practice component. Except for the thesis component, each credit normally corresponds to one hour of class contact per week over the 14 weeks of session.

Students wishing to specialise in ergonomics, occupational psychology or health management are advised to include the following among their elective courses:

Ergonomics Strand
12.355G Advanced Ergonomics
70.201G Introductory Ergonomics
80.701G Occupational Disease

Occupational Psychology Strand
12.352G Psychological Principles of Training
12.359G Cross-Cultural Perspectives in Applied
Psychology
12.360G Vocational Psychology

Health Management Strand
12.245G Behavioural Health Management
12.251G Human Neuropsychology

Courses from other graduate programs, including the School's Clinical Master's degree, may be included with the permission of the School concerned and of the Head of the School of Psychology.

8252
Applied Psychology Graduate Course
Full-time
Master of Psychology (Applied)
MPsychol(App)

Core Program Year 1

		Credits S1	S2
12.239G	Research and Evaluation Methods	2	
12.241G	Graduate Colloquium	1	1
12.244G	Psychological Assessment 2		2
12.250G	Psychological Assessment 1	3	
12.351G	Industrial and Organizational Psychology	2	2
12.353G	Applied Experimental Psychology	2	2
12.354G	Principles of Ergonomics	3	
12.356G	Professional Practice (Applied): 250 hours		

Core Program Year 2

		Credits S1	S2
12.241G	Graduate Colloquium	1	1
12.356G	Professional Practice (Applied): 430 hours		
12.357G	Seminars in Applied Psychology	2	
12.358G	Research Thesis	6	6

Elective Program Year 2

		Credits S1	S2
12.230G	Developmental Disabilities and Disorders		3
12.245G	Behavioural Health Management	2	2
12.251G	Human Neuropsychology		3
12.352G	Psychological Principles of Training		2
12.355G	Advanced Ergonomics	3	
12.359G	Cross-Cultural Perspectives in Applied Psychology	2	
12.360G	Vocational Psychology	3	
12.361G	Special Topic		2
47.062G	Applied Ergonomics		3
47.090G	Introduction to Occupational Health and Safety Law	3	
70.201G	Introductory Functional Anatomy	3	
80.701G	Occupational Disease		3

Note: Part-time students normally are expected to take half the full-time program in any one session.

Master of Psychology (Clinical)

This course is designed to provide professional training at an advanced level for honours graduates in psychology.

The normal entrance requirements are:

1. a degree of Bachelor, with Honours Class I or Class II in Psychology;

2. completion of a research thesis or research project in the Honours fourth year;

and

3. completion of approved courses in learning, perception and cognition, physiological psychology, psychological statistics, psychometrics and abnormal psychology, or in such other fields as may be prescribed by the Head of the School.

Selection of students is based on academic qualifications and suitability for the course. It may be necessary to limit the number of new enrolments in any year.

The minimum period of registration before the award of the degree is four sessions for full-time students and six sessions for part-time students. Students with advanced standing may have the minimum period reduced by up to one half of the program (ie. a reduction of one session if a student has completed a PhD in an approved area of Psychology or part of the course work program).

To qualify for the degree, students must satisfy the examiners in respect of their academic attainments, and their skill and competence in relevant aspects of practical professional work.

The course consists of lectures, seminars, demonstrations and practical work, supervized clinical and community work, and a research thesis.

The major aims of the course are: **1.** to acquaint students with the issues, findings and problems of contemporary clinical and community psychology; and **2.** to equip them with basic clinical skills and techniques. A total of 250 hours of supervised clinical practice must be completed in the first year, and a further 430 hours in the second year.

Assessment of student performance is by sessional examinations, class tests, seminar papers and a research thesis.

It should be noted that the course extends over two calendar years and not just four academic sessions with vacation breaks.

8251
Clinical Psychology Graduate Course — Full-time

Master of Psychology (Clinical)
MPsychol (Clin)

Year 1		Hours per week	
		S1	S2
Full Year			
12.230G	Developmental Disabilities and Disorders		3
12.231G	Professional Practice: 250 hours		
12.237G	Biological and Environmental Bases of Behavioural Disturbance	2	2
12.239G	Research and Evaluation Methods	2	
12.241G	Graduate Colloquium	1	1
12.242G	Research Thesis*		
12.243G	Experimental Clinical Psychology	4	4
12.244G	Psychological Assessment 2		2
12.245G	Behavioural Health Management	2	2
12.249G	Child Clinical Psychology	2	
12.250G	Psychological Assessment 1	3	
12.251G	Human Neuropsychology		3

Year 2		Hours per week	
		S1	S2
Full year			
12.231G	Professional Practice: 180 hours in Session 1		
	250 hours in Session 2		
12.235G	Community Psychology	3	
12.240G	Graduate and Clinical Seminars	2	2
12.241G	Graduate Colloquium	1	1
12.242G	Research Thesis*		
12.243G	Experimental Clinical Psychology	2	

*Contributes approximately 40 per cent to the overall grading for the degree.
Note: Part-time students normally are expected to take half the full-time program in any one session.

Faculty of Science

Facilities are available in each of the schools for research leading to the award of the higher degrees of Master of Science and Doctor of Philosophy.

The following formal courses leading to graduate awards are also offered:

Faculty of Science	Graduate Diploma in Physical Oceanography
School of Optometry	Master of Optometry
School of Chemistry	Master of Chemistry
	Graduate Diploma in Food and Drug Analysis
School of Mathematics	Master of Mathematics
	Master of Statistics
School of Physics	Master of Physics

For admission to registration for all degrees of Master (except Master of Statistics), candidates must have completed one of the following:

1. An approved degree of Bachelor with Honours.

2. An approved three year course leading to the degree of Bachelor plus an approved qualifying program. Suitable professional and/or research experience may be accepted in lieu of the qualifying program.

3. An approved four year course leading to the degree of Bachelor.

Applicants for registration for the degree of Master of Statistics shall have been admitted to the degree of Bachelor with major studies in the field of statistics in the University of New South Wales or other approved university.

The manner of presentation and examination of reports of projects undertaken as part of formal courses shall be determined by the Head of the School.

The conditions governing these awards are set out later in this handbook.

5530
Physical Oceanography Graduate Diploma Course

Graduate Diploma in Physical Oceanography
GradDip

This graduate diploma is intended to train graduates in the physical sciences or engineering in the basic techniques of physical oceanography.

It is intended to develop student skills in planning and execution of oceanographic experiments, in the theory of oceanographic fluid mechanics, the applications and limitations of oceanographic equipment and of commonly used data analysis techniques.

Recent rapid developments in marine science coupled with the relative scarcity of persons able to take up support positions demonstrate the need for skilled persons who will be able to assist oceanographic research with minimum training. This program is aimed at providing such skilled graduates.

Intending students are referred to the conditions for the award of graduate diplomas set out elsewhere in this handbook. Basic entry qualifications for this program are a degree in Engineering or in Science with major studies in mathematics or physics.

The program, requiring 28 credits for completion, consists of a major project (67.001G) worth 50% of the total accreditation for the program, the remaining 50% being comprised as indicated below.

1. Compulsory Subjects

67.001G	Experimental Project	14 credits
67.002G	Geophysical Fluid Dynamics	4 credits
67.003G	Instrumentation	1 credit
67.004G	Applied Data Analysis	2 credits

2. Elective Subjects

6.580G	Image Analysis in Remote Sensing	3 credits
6.581G	Microwave Remote Sensing	3 credits
8.863G	Estuarine Hydraulics	3 credits
27.043G	Remote Sensing Applications	3 credits
67.005G	Theoretical Project	7 credits
	Appropriate existing subjects within mathematics, physics or engineering chosen on the basis of individual background	

Here 1 credit is defined as being 1 hour per week for one session. The course may be taken over one year (full-time) or two years (part-time).

Chemistry

Head of School
Professor P.J. Derrick
Executive Assistant to Head of School
Dr. D.S. Alderdice

8770
Master of Chemistry Graduate Course

Master of Chemistry
MChem

Three programs are available, emphasizing different areas of chemistry. Each program consists of a number of lecture courses (each separately examinable), laboratory instruction and visits to laboratories. In addition each student undertakes a short research project, with a research report assessed by two examiners. The student may also be required to undergo an oral examination.

Program 2.581G Advanced Analytical Chemistry and 2.583G Analytical Science (Chemistry) are available only on a full-time basis; however, the qualifying program may be taken part-time.

Program 2.582G Food and Drug Chemistry may be taken either full-time or part-time.

Details of the programs are:

2.581G Advanced Analytical Chemistry

This program should be of interest to chemistry graduates who are involved in the practice or teaching of analytical chemistry.

1. *2.581G Advanced Analytical Chemistry Lecture Courses*

Students are required to take *all* of the following nine core courses of lectures:

(1) Analytical flame spectroscopy;
(2) Advanced electrochemical analysis;
(3) Chromatography;
(4) Analytical chemistry of pollutants;
(5) Emission, IR, Mass and XRF spectroscopy;
(6) Calculations and statistics in analytical chemistry;
(7) Chemical analysis of organic and biological materials;
(8) Operations and applications of minicomputers in chemistry;
(9) Chemical microscopy.

The lecture time for the whole course is a minimum of 140 hours.

2. *Laboratory Instruction and Visits to Laboratories*

An additional minimum of 150 hours is spent by students in selected areas of laboratory practice, instruction and visits to laboratories.

3. *Research Project*

A short research project (with report) of approximately 4 months' duration full-time (400 hours laboratory work) is selected in relation to the combined interests of the student and the supervisor.

2.582G Food and Drug Chemistry

This program involves an advanced study of the chemistry, stability, mode of action (where applicable) and analysis of food constituents, food additives and selected drugs. Entry to this program is excluded in the case of applicants who have completed the Graduate Diploma in Food and Drug Analysis (course 5510).

1. *Food and Drug Chemistry Lecture/Laboratory Courses*

(1) Food and Drugs 1
(2) Treatment of Analytical Data
(3) Instrumental Techniques in Food and Drug Analysis
(4) Food and Drugs 2
(5) Toxicology, Occupational and Public Health
(6) Introductory Microbiology

The lecture time for the whole course is 160 hours. An additional 392 hours is spent by students in formal laboratory work. Students who have not previously taken an approved course in microbiology are required to complete unit 44.101 Introductory Microbiology (84 hours) in addition to the above program.

2. *Research project*

A short research project (with report) of approximately 4 months' duration full-time (400 hours laboratory work) is selected in relation to the combined interests of the student and the supervisor.

2.583G Analytical Science (Chemistry)

This program provides a more broadly based training in methods of chemical analysis than 2.581G.

1. *Formal course work*

Students are required to complete all of the following courses of lectures and associated laboratory work.

(1) Classical methods of chemical analysis
(2) Instrumental analysis
(3) Toxicology, occupational and public health
(4) Special instrumental analysis methods

The lecture time for the whole course is 98 hours. An additional 196 hours is spent in formal laboratory sessions.

2. *Project*

A short project (with report) requiring 400 hours of laboratory work, which may be either original research work or development work. The field of work will be selected considering the combined interests of the student and supervisor.

5510
Food and Drug Analysis Graduate Diploma Course

Diploma in Food and Drug Analysis
DipFDA

According to demand the course may be available on a full-time basis over one year or on a part-time basis over two years.

The course in food and drug analysis is designed to provide systematic training at an advanced level for chemists who wish to extend their acquaintance with analytical techniques, and thus is suitable for those who may wish to practice as public analysts. It is also suitable for those who wish to work in the food or pharmaceutical industry. The prime aim is to present discussions of the principles and design of analytical methods which are therefore presented on a comparative basis.

It is considered that the techniques involved in the handling of foods and drugs together with those discussed in the ancillary subjects of the course provide a firm basis of approach to many other fields.

Intending students are referred to the conditions for the award of graduate diplomas set out later in this handbook.

Year 1

Part-time**		Hours per week
2.231G	Food and Drugs 1	4
2.371G	Treatment of Analytical Data	1
2.281G	Instrumental Techniques in Food and Drug Analysis	4
		9

Year 2

2.242G	Food and Drugs 2	4
2.251G	Toxicology, Occupational and Public Health	4
44.101	Introductory Microbiology	3*
		11

*Offered in Session 1 only, at 6 hpw.
**Full-time students take Years 1 and 2 in the one year.

Mathematics

Head of School
Professor I.H. Sloan

The School offers graduate courses leading to the award of the degrees of Master of Mathematics (MMath) and Master of Statistics (MStats). (The School also offers the pass degree of MA. For further details see the Faculty of Arts Handbook.)

8740
Master of Mathematics Graduate Course

Master of Mathematics
MMath

The Master of Mathematics Course is intended for honours graduates in pure or applied mathematics, but others may be admitted after completing a qualifying course. The course may be completed in one year of full-time or two years of part-time study. The course may be taken as a preliminary step towards the award of a PhD in mathematics. It also provides advanced training for persons specializing in the teaching of mathematics in tertiary institutions. In addition an appropriate program may provide training for those employed or seeking employment in the area of industrial mathematics.

The program consists of seven lecture courses from 10.194G, the duration of each being two hours per week for one session. With the approval of the Head of the School of Mathematics a student may substitute for one or more of these lecture courses a reading course supervized by a member of staff. Again with this approval a student may substitute for at most two of these courses graduate courses offered either within or outside the School of Mathematics. Students are also required to participate in relevant departmental seminars. In addition, students are required to undertake a project supervized by a staff member,

consisting of either a critical review of the literature in a specific field of mathematics, or a short research project. It is anticipated that students will spend three hours per week for two sessions on their project. Each candidate's proposed program of study requires the approval of the Head of the School of Mathematics.

The conditions for the award of the degree are set out later in this handbook.

8750
Master of Statistics Graduate Course

Master of Statistics
MStats

The Master of Statistics Course covers a wide range of statistical theory and practice and provides advanced training for practising statisticians. The course may be completed in two years of full-time or four years of part-time study, and it is available to graduates with a pass degree in statistics or an honours degree in a related field (commonly mathematics) with supporting study in statistics. Honours graduates in statistics may be exempted from a maximum of half the course. The conditions for the award of the degree are set out later in this handbook.

The academic requirement for the degree is 24 credits.

Each candidate's program of study must be approved by the Head of the School.

Compulsory Subjects

		Credits
10.381G	Experimental Design 1	2
10.383G	Stochastic Processes	2
10.385G	Multivariate Analysis 1	2
10.390G	Statistical Inference	2
10.392G	Project	2

Elective Subjects

10.382G	Experimental Design 2	2
10.384G	Time Series	2
10.386G	Multivariate Analysis 2	2
10.387G	Sample Survey Design	2
10.388G	Sequential Analysis	2
10.389G	Non-Parametric Methods	2
10.391G	Special Topic* A	2
10.393G	Special Topic* B	2
10.394G	Discrete Distributions	2
10.212M	Optimal Control Theory or	
10.222M	Higher Optimal Control Theory	3

Up to 6 credits may be taken in graduate subjects offered by other Departments or Schools within the University, subject to the approval of the Head of School. Such subjects include:

8.403G	Theory of Land Use/Transport Interaction	2
8.405G	Urban Transport Planning Practice	2
8.417G	Transport and Traffic Flow Theory	4
10.212L	Optimization Methods or	
10.222L	Higher Optimization Methods	3
15.304M	Econometrics B	2
18.711G	Simulation in Operations Research	2

*To be arranged: eg biological statistics, further work on order statistics, population statistics, non-linear programming.

Optometry

Head of School
Professor H. B. Collin

The School offers a formal graduate course leading to the award of the degree of Master of Optometry (MOptom). This course comprises the study of three elective graduate subjects and of advanced Clinical Optometry, together with the preparation of a thesis on an assigned project. It may be completed in one year of full-time study, or (to meet the needs of practising optometrists) in two or three years of part-time study. The course provides advanced training in clinical and theoretical aspects of Optometry, with opportunities for specialization in fields such as contact lenses, occupational optometry, and orthoptics.

Conditions for admission and for the award of the degree of Master of Optometry are set out later in this handbook.

8760
Master of Optometry Graduate Course

Master of Optometry
MOptom

		Hours per week
31.701G	Advanced Clinical Optometry	4
	Three elective graduate subjects chosen from the list below (each 4 hours)	12
31.799G	Project	8
		24

Elective Graduate Subjects

31.702G	Advanced Physiological Optics	4
31.703G	Pleorthoptics and Binocular Vision	4
31.704G	Advanced Contact Lens Studies	4
31.705G	Advanced Contact Lens Practice	4
31.706G	Occupational Optometry	4
31.707G	Clinical Photography	4

The six elective graduate subjects offered are quite independent, and any three of them are suitable for a student seeking advanced professional training of a general nature. If clinical specialization is aimed at, the student would be advised to elect the graduate subjects shown below:

Specialization	Graduate Subjects
Contact Lenses	1. Advanced Contact Lens Studies
	2. Advanced Contact Lens Practice
	3. Clinical Photography
Occupational Optometry	1. Occupational Optometry
	2. Pleorthoptics and Binocular Vision
	3. Advanced Physiological Optics
Orthoptics	1. Pleorthoptics and Binocular Vision
	2. Clinical Photography

Physics

Head of School
Associate Professor J. C. Kelly

Executive Assistant to Head of School
Dr J. R. Hanscomb

Administrative Officer
Mrs P. Shaw

8730
Master of Physics Graduate Course

Master of Physics
MPhysics

The School offers a graduate course leading to the award of the Master of Physics degree (MPhysics).

The Master of Physics degree course is intended for honours graduates in physics. Others may be admitted if they have submitted evidence of such academic and professional attainments as may be approved by the Faculty of Science on the recommendation of its Higher Degree Committee. Applicants with other qualifications may be admitted after completing a qualifying examination approved by the Faculty of Science.

The subject matter of the course provides an advanced training in a branch of physics, the topic of which is determined during the year preceding that in which it is offered.

Students undertaking the masters course by formal study must enrol in *one* of the following subjects:

1.801G   Energy Alternatives
1.802G   Astrophysics
1.803G   Acoustics
1.804G   Biophysics
1.805G   Applied Physics

Enrolment in any one of the above subjects normally involves at least five units of lecture material, a literature survey, and small research project.

Graduate Study

Subject Descriptions

Identification of Subjects by Number

A subject is defined by the Professorial Board as 'a unit of instruction approved by the University as being a discrete part of the requirements for a course offered by the University'.

Each approved subject of the University is identifiable both by number and by name as this is a check against nomination of subject other than the one intended.

Subject numbers are allocated by the Academic Registrar and the system of allocation is based on the following guidelines:

1. The authority offering the subject, normally a School of the University, is indicated by the number before the decimal point.

2. Each subject number is unique and is not used for more than one subject title.

3. Subject numbers which have not been used for some time are not used for new subject titles.

4. Graduate subjects are indicated by a suffix 'G' to a number with three digits after the decimal point. In other subjects three or four digits are used after the decimal point.

Subjects taught are listed in full in the handbook of the faculty or board of studies responsible for the particular course within which the subjects are taken. Subject descriptions are contained in the appropriate section in the handbooks.

The **identifying numerical prefixes** for each subject authority are set out on the following page.

Servicing Subjects are those taught by a school or department outside its own faculty. Their subject descriptions are published in the handbook of the faculty which originates the subject and are also published in the handbook of the Faculty in which the subject is taught.

HSC Exam Prerequisites

Subjects which require prerequisites for enrolment in terms of the HSC Examination percentile range, refer to the **1978 and subsequent Examinations.**

Candidates for enrolment who obtained the HSC in previous years or hold other high school matriculation should check with the appropriate school on what matriculation status is required for admission to a subject.

Information Key

The following is the key to the information which may be supplied about each subject:

S1 Session 1, **S2** Session 2

F Session 1 *plus* Session 2, ie full year

S1 or S2 Session 1 *or* Session 2, ie choice of either session

SS single session, but which session taught is not known at time of publication

CCH class contact hours

L Lecture, followed by hours per week

T Laboratory/Tutorial, followed by hours per week

hpw hours per week

C Credit point value

CR Credit

DN Distinction

HD High Distinction

Physics

Not all graduate subjects are necessarily offered in any one year.

1.118G Methods of Theoretical Physics

For PhD degree, MSc and MPhysics degree course students.

Response functions and Green's functions. Symmetry and group theory. Many particle systems. Tensor calculus and variational techniques.

1.128G Methods of Experimental Physics

For PhD degree, MSc and MPhysics degree course students.

Signal processing and retrieval. Resonance spectroscopy techniques. Diffraction and scattering techniques. Electron microscopy.

1.801G Energy Alternatives

For MPhysics degree course students.

Details are determined during the year preceding that in which it is offered.

1.802G Astrophysics

As for 1.801G Energy Alternatives

1.803G Acoustics

As for 1.801G Energy Alternatives

1.804G Biophysics

As for 1.801G Energy Alternatives

1.805G Applied Physics

As for 1.801G Energy Alternatives

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subject see the Faculty of Architecture handbook.

1.927G Acoustic Theory   S2 L1½T½

2 credit points.

Sources of acoustic radiation; simple, dipole, quadrupole, plane, impulsive source, random source, aerodynamic sources. Free field propagation in fluids, interference and diffraction, absorption, shock waves. Boundary effects: reflection and transmission at fluid/fluid and fluid/solid interfaces, fluid waveguides, solid waveguides. Reception and analysis; transducers. Fourier analysis, statistical methods, impulse measurement.

Chemistry

2.231G Food and Drugs 1   F L1T3
and
2.242G Food and Drugs 2   F L1T3

These two units contain common subject material but are subdivided to enable them to be taken over one or two years.

Treatment of the food section develops from considerations of proximate analysis — gross determination of classes of food components — to detailed examinations within the groups for more important compounds. Conversely the course in drug work progresses from the examination of simple materials, including identification of unknowns by macro and micro procedures to the examination of compounded materials. A background section on food handling is included, while some attention is given to chemotherapy etc in the drug course.

Subject-matter covers treatment of the main classes of foodstuffs, such as: *Foods:* Origin, general introduction to analytical methods, relation to likely adulterations and impurities, groups of constituents; carbohydrates, sugars, by physical and chemical methods, jams and preserves, pectin, agar, alginates, oils and fats; protein foods, meat, gelatin, fish products; dairy products, milk, cream, cheese, etc; fermented liquids, beer, wine, spirits, minor constituents. Principles of food processing, dehydration, quick freezing, canning; cereal products; beverages and flavouring essences; nutritional aspects, vitamins in detail; preservatives and food additives; radiation chemistry of food products. *Drugs:* Elements of pharmacology chemotherapy and modes of action, galenicals, identification tests for alkaloids, etc. Analytical chemistry of analgesics, sedatives, hypnotics, steroid hormones, antihistamines, etc. Antibiotics, penicillin, streptomycin, aureomycin, sulphonamides. Activity of enzyme preparations; antiseptics and disinfectants; soaps and detergents.

2.251G Toxicology, Occupational and
Public Health   F L1T3

Important classes of toxic materials found in the environment; treatment of pesticide residues, industrial chemicals of various types, toxic gases, mould metabolites and bacterial toxins occurring in food, carcinogenic substances, toxic metals, etc. Effects of these substances on living organisms, particularly man. Practical work: pesticide residue analysis, blood and urine analysis, gas sampling and analysis, trace metal determination and experiments on the animal metabolism of toxic substances.

2.271G Chemistry and Analysis of Foods   F L1T3

Illustrates the bases and application of analytical techniques as applied to foods. Emphasis is placed on the design of methods, on the preparation of material for instrumental analysis and on the interpretation of data. Includes: proteins and flesh foods, carbohydrates and saccharine foods, fats and oils, dairy and fermentation products, vitamins, food additives — preservatives and colouring matters, pesticide residues, metal contaminants — food microscopy.

**2.281G Instrumental Techniques in
Food and Drug Analysis**   **F L1T3**

Principles involved in modern instrumental techniques; detailed application and interpretation of results. UV, IR, NMR, and ESR, emission and atomic adsorption spectroscopy, polarography, X-ray methods, fluorescence spectroscopy and gas chromatciated data and problems involving analysis of variance. Topics: Description of sets of measurements, graphical representations, calculation of measures of location and spread; probability and random errors, binomial, normal and Poisson distributions; comparisons of sets of measurements, tests of significance; associated data, linear regression analysis; analysis of variance; biological assays, bacteriological counts, sampling problems.

2.581G Advanced Analytical Chemistry

Lectures: 1. Analytical flame spectroscopy. 2. Advanced electrochemical analysis. 3. Chromatography. 4. Analytical chemistry of pollutants. 5. Emission, IR, mass and XRF spectroscopy. 6. Calculations and statistics in analytical chemistry. 7. Chemical analysis of organic and biological materials. 8. Operations and applications of minicomputers in chemistry. 9. Chemical microscopy. *Laboratory:* Practice, instruction and visits. *Research Project.*

2.582G

2.583G

Civil Engineering

→ **8.403G Theory of Land Use/Transport
Interaction**   **S1 C3**

Theoretical aspects of land use/transport planning. Basic concepts, data collection methods, systems models and equation of state (function behavioural, optimizing). Introduction to land use-transport modelling (land use, generation, distribution, modal assignment, network assignment, evaluation). Planning methodologies (short-, medium-, long-term; action planning, strategic planning; local, urban, regional national).

→ **8.405G Urban Transport Planning Practice**   **SS C3**

Analytical techniques for urban land use/transport planning practice. Planning methodology: traffic generation, trip distribution, modal-choice, traffic assignment, evaluation. Land use forecasting; calibration and verification of behavioural models, application of mathematical programming models, case studies, public transport problems.

→ **8.417G Transport and Traffic Flow Theory**

Analysis of deterministic and stochastic models of the traffic stream. Topics covered include the following. Definition and measurement of traffic stream parameters. Space and time distribution of speed. Overtaking models and the moving-observer method. Fundamental diagram of traffic. Car-following theory. Headway and counting distributions. Introduction to queueing theory. Simulation techniques. Signalized and unsignalized intersections.

8.863G Estuarine Hydraulics   **SS C3**

Classification of estuary types and their characteristics. Tides, their origin, prediction and effect on estuarine circulation. Entrainment and mixing process in estuaries. Salinity intrusion, tidal flushing, dispersion of pllutants. Sediment transport, channel stability.

Mathematics

10.194G Advanced Mathematics Lecture Courses

Each year a selection of courses is offered in the following areas:

Algebraic geometry; algebraic topology; categorical and homological algebra: commutative algebra: group theory; Lie groups and algebras; representation theory; group theory and its physical applications; advanced quantum mechanics; differential geometry; differential equations; optimal control theory; functional analysis: applied functional analysis; operator theory; harmonic analysis; advances numerical analysis; theory of functions; finite mathematics: number theory; logic; theoretical astrophysics: history of mathematics; recent advances in mathematics; mathematical economics; optimization and control.

10.302G Regression Analysis and
Experimental Design   **S1 L1½T½**

Prerequisite: First course in Statistics or equivalent.

A revision of linear regression with extension to multiple and stepwise linear regression. Analysis of block designs, Latin squares, factorial designs, variance component and mixed model analyses. Bioassay, logic models. Contingency tables.

10.303G Applied Stochastic Processes   **S2 L1½T½**

Prerequisite: First course in Statistics or equivalent.

An introduction to processes in discrete and continuous time. Markov chains and Markov processes, branching processes, time series with moving average models.

10.372G Statistical and Experimental Design

The concepts of random variables, means, variances, the common tests and confidence intervals based on the normal distribution, some simple analyses of variance.

Comparative experiments: requirements of a good experiment, assumptions underlying the conventional models of standard designs and their analyses, purpose of randomization; how the physical circumstances of an experiment are related to its formal model on which its analysis is based; the internal estimate of error obtained from the variation left after accounting for all sources of systematic variation, these points illustrated by considering in some detail the fully randomized design, the randomized block design, the 2^2 factorial fully randomized design, and the fully randomized design with one concomitant variable.

Survey sampling: the distinction between a survey sample and an experiment planned to compare a set of treatments, and how it affects the inferences that may be made; simple random sampling, stratified random sampling.

10.381G Experimental Design 1

Modified designs for fixed effects models. Incomplete and balanced incomplete block designs. Confounding and fractional replication. Randomization theory. Multiple comparisons.

10.382G Experimental Design 2

Extensive treatment of random and mixed models. Combinatorial structure of designs, cross-over and lattice designs, response surfaces.

10.383G Stochastic Processes

Discrete parameter, continuous time Markov processes. Brief survey of birth-and-death, immigration, epidemic and predator-prey processes. Introduction to dam and storage problems. Queueing processes. Diffusion approximations.

10.384G Time Series

Spectral estimates, discrete and continuous spectra. Periodogram analysis. Probability theory, special processes. Ergodicity, harmonic analysis and linear filters. Estimation and hypothesis testing.

10.385G Multivariate Analysis 1

Likelihood ratio tests for means, variances and structure. Discriminant, principal component, canonical and factor analysis.

10.386G Multivariate Analysis 2

The general linear hypothesis and analysis of dispersion. Tests based on roots, distribution theory.

10.387G Sample Survey Design

Simple, stratified and systematic random sampling. Estimation of proportions, ratios, and sample sizes. Multi-stage sampling.

10.388G Sequential Analysis

The sequential probability ratio test — OC and ASN functions. General theory of sequential tests. Sequential estimation.

10.389G Non-Parametric Methods

Sign test, run tests, goodness-of-fit tests. Order statistics and range. Rank-order statistics. Wilcox and signed-rank tests, one- and two-way rank analyses of variance. Rank correlation. Randomization theory and permutation tests. Paired comparisons. Censoring and truncation.

10.390G Statistical Inference

Decision theory. General theory of estimation and hypothesis testing.

10.391G Special Topic A

To be arranged, eg biological statistics, further work on order statistics, population statistics, non-linear programming, discrete distribution theory.

10.392G Project
10.393G Special Topic B

To be arranged, eg biological statistics, further work on order statistics, population statistics, non-linear programming, and other topics.

10.394G Discrete Distributions

Discrete and lattice distributions — their general properties mostly via generating functions. The structures of contagious (clustered) distributions, with a study of specific examples such as the negative binomial. Neyman and Poisson-Pascal families, together with estimation and fitting procedures.

10.401G Seiches and Tides

The equations of motion of a shallow liquid. Shallow water waves, oscillations of rectangular and circular lakes. The tides, their observation and measurement. Newton's equilibrium theory. Harmonic analysis and prediction. Local tides. Oscillations and resonance of harbours and bays.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subject see the Faculty of Arts Handbook.

10.062G Advanced Mathematics General

For research workers throughout the University requiring employment of advanced mathematics. Topics vary from year to year according to demand and interest.

For further information regarding the following subjects see the Faculty of Engineering Handbook.

10.061G Advanced Mathematics for Electrical Engineers   C3

Boundary value problems in partial differential equations. Selected topics from complex variable analysis, integral transforms, and orthogonal functions and polynomials.

10.361G Statistics   C3

Probability theory, a survey of random processes with engineering applications — processes in discrete and continuous time. Markov processes, ergodicity, stationarity, auto-correlation, power spectra, estimation of auto-correlation and power spectra.

10.371G Statistics   C3

Revision of probability and distribution theory, including estimation of hypothesis testing. Extension of this to include topics such as more complex probabilistic modelling, analyses of modified data (censored, truncated and missing observations), general statistical inference (decision theory), acceptance testing, and reliability analysis (hazard functions).

32.012G Biomedical Statistics   SS L2½T1½ C4

Statistical assessment of normal and diseased states. Statistical relationships between multiple variables used to assess disease; analysis of variance, regression, factor analysis, discriminant analysis. Progression of diseases over time. Diagnosis and assessment of treatments. Experimental design and sampling. Computation methods.

**32.101G Mathematical Modelling for
Biomedical Engineers**   **S1 L3T1 C4**

Model formulation and validation of ordinary and partial differential equations by analytical and numerical techniques.

Psychology

12.230G Developmental Disabilities and Disorders

An essentially practical course focusing on childhood disorders, such as mental retardation, infantile autism, physical and sensory handicaps, specific learning difficulties, and hyperactivity. Methods of assessment to be studied include standardized tests of child development, behavioural checklists and interviews, and observation of present behaviour. Behavioural change procedures that may be effective in the treatment and management of the behavioural problems in question.

12.231G Professional Practice

Supervised work with clients in the School's clinic, and in approved institutions.

12.235G Community Psychology

A range of basic theoretical issues, community problems and intervention strategies using recent concepts in behavioural community psychology as a framework. Development of community psychology and relationships with other areas of psychology and other disciplines, theoretical systems and models, factors related to community problems, values and intervention, intervention strategies at different systems levels, prevention, health promotion, institutional change, service delivery systems, needs assessment, planning and evaluation of programs, and psychologists' current and likely future roles in the community.

12.237G Biological and Environmental Bases of Behavioural Disturbance

A series of lectures and seminars on biological aspects of the aetiology and treatment of behavioural disturbance. Includes: behavioural genetics; organic brain syndromes; schizophrenia; depression; psychophysiology of stress; metabolic and endocrinological aspects of behavioural disturbance; nutrition and behavioural disturbance; psychopharmacology and pharmacotherapy; somatic treatments.

12.239G Research and Evaluation Methods

Problems of experimental design in applied fields; measurement and scaling; analysis of change, including sequential analysis, and the application of the experimental methods to the individual cases. Design and evaluation of programs.

12.240G Graduate and Clinical Seminars

A series of seminars on topics of particular relevance to the practice of clinical psychology, eg the organization and regulation of psychology as a profession; ethical standards in relation to clients, members of other professions, and the public; legal aspects of psychological practice. Additional topics dealing with contemporary issues in clinical psychology are chosen in consultation with students undertaking the seminars.

12.241G Graduate Colloquium

Participation in the staff-graduate student colloquium.

12.242G Research Thesis

A research thesis involving an investigation into some aspect of clinical or community psychology.

12.243G Experimental Clinical Psychology

The theoretical basis of clinical practice in individual, group, institutional, and community settings. The application of the principles of experimental psychology to the analysis of both adaptive and maladaptive patterns of behaviour. The study of a wide range of techniques of behavioural intervention.

12.244G Psychological Assessment 2

Prerequisite: 12.250G or equivalent.

The application of the principles of experimental psychology to problems of behavioural assessment in a wide variety of situations, eg organisational behaviour; lifestyle change; the management of behavioural disorders; institutional behavioural programs. Assessment procedures studied include: psychological tests, behavioural analysis and case history taking, psychophysiological and other objective measures.

12.245G Behavioural Health Management

Lectures, practical classes and supervized clinical experience concerned with the theoretical and practical issues associated with the design, implementation and evaluation of behavioural programs for the promotion of positive mental and physical health.

12.249G Child Clinical Psychology

Description, assessment and treatment of child psychopathology. Role of environmental factors in maintenance of maladaptive behaviour, practical implications for assessment and treatment. Theoretical bases of behavioural, cognitive, medical and family treatment approaches.

12.250G Psychological Assessment 1

A theoretical basis, background information and practical skills in methods of assessment typically used in clinical and industrial psychology.

Theory and research on interviewing, introduction to DSM III-R assessment interviewing, assessment of intellectual functioning, test access and use and computerised testing, neuropsychological and organicity assessment, personality assessment and its use, assessment and goal attainment scaling, and ethical, legal and professional issues.

12.251G Human Neuropsychology

Neural bases of human behaviour, with particular emphasis on clinical applications. Issues in assessment and rehabilitation, functional analysis of each cerebral lobe, and particular disorders such as the dementias and aphasias.

12.351G Industrial and Organisational Psychology

General framework for working in organisational settings and understanding how structures and procedures affect work motivation, job satisfaction, performance and mental health. Psychologists' contribution to job analysis, selection and performance appraisal through the application of sound measurement principles and through an understanding of the influence of social psychological processes involved in interpersonal perception.

12.352G Psychological Principles of Training

Relevant principles from learning theory and cognitive psychology applied to training in industry and retraining for new technology. Training for adaptability and transfer; the important role of automaticity and attitudes in training. Development of work related cognitive, motor and social skills, and the use of computerised packages. Research on the effectiveness of different methods of training.

12.353G Applied Experimental Psychology

An in-depth study of selected topics in experimental psychology applied to practical problems. Topics such as the following will be included: psychophysics; scaling procedures (eg multidimensional scaling); decision making (eg experimental studies of business, industry, government and consumer decision making); applied perception studies; applied memory research, vigilance and related series.

12.354G Principles of Ergonomics

Selected topics within the area of ergonomics drawn from: anthropometrics and biomechanics; the design of displays and controls, including visual display units, keyboards, and workstations; work physiology and energy expenditure, fatigue and its measurement; the sources and control of stress at the workplace; social and equipment-related workplace design problems; the effects on human performance of environmental stressors such as noise, heat, cold and sleep loss (including shiftwork).

12.355G Advanced Ergonomics

Prerequisite: 12.354G or equivalent.

The application of ergonomic principles and methods to the design and analysis of work tasks involving a high cognitive component, such as those involving human-computer interaction.

12.356G Professional Practice (Applied)

The application of theoretical aspects covered in the course to a variety of situations. There will be supervised work experience in a variety of settings together with a weekly meeting to allow systematic discussion of relevant professional, ethical and legal issues.

12.357G Seminars in Applied Psychology

A series of seminars on topics of particular relevance to the practice of applied psychology eg the organisation and regulation of psychology as a profession; ethical standards in relation to clients, members of other professions and the public; legal aspects of psychological practice. Additional topics dealing with contemporary issues in applied psychology will be chosen in consultation with students undertaking the seminars.

12.358G Research Thesis

A research thesis involving an investigation into some aspect of applied psychology.

12.359G Cross-cultural Perspectives in Applied Psychology

General issues in cross-cultural psychology; problems of conducting research in more than one cultural setting. Cross-cultural organisational psychology including a comparative analysis of production systems. Culture training and orientation including programs aimed at preparing managers to become culturally mediating persons will be given special attention.

12.360G Vocational Psychology

Individual career counselling, decision-making and work adjustment throughout life, traditional and computerised approaches to occupational information and psychological testing; staff development; relationships between work, leisure, retirement and unemployment. Vocational problems of groups such as minorities and those with disabilities.

12.361G Special Topic

An occasional elective dealing with applications of some special field of psychology.

12.999G Alternative Higher Degree Qualifying Program

Refer to the School of Psychology for details.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subjects see the Faculty of Arts Handbook.

12.710G Experimental Psychology in Cognitive Science

Theory of experimental psychology pertinent to cognitive science. Learning, memory, decision making, problem solving, perception, and language comprehension.

12.711G Behavioural Neuroscience

The neurophysiological substrates of learning, memory, perception and cognition. Introduction to the basic structure and physiology of the nervous system.

12.712G Human Information Processing

Human information processing: advanced topics in cognitive psychology with particular reference to temporal dynamics of attention, organisation, integration and retrieval processes for sensory and linguistic information.

12.713G Neuroscience: Human Neuropsychology

Advanced topics in the neurophysiology of human cognitive functioning, including consideration of the influence of brain disease and brain damage.

Economics

15.114G Economics A   S1 L2T1

Prerequisite: Nil.

Microeconomic theory and applications including consumer behaviour and the theory of demand; costs, production and the theory of the firm price determination under competition, monopolistic and oligopolistic markets; investment and technology; wages, and the distribution of income; welfare, economic efficiency and public policy.

15.125G Economics B   S2 L2T1

Prerequisite: 15.114G or equivalent.

Overview of the macroeconomy; determination of aggregate income, interest rate and employment in closed and open economies; theories of inflation; inflation and unemployment policy; monetarist and Keynesian controversies.

Geography

27.043G

The application of remotely-sensed data and information in the description, classification and assessment of earth resources and environmental conditions. Different types of remote sensing data and imagery, their attributes, acquisition and uses. Relevance of remote-sensing data and imagery to a range of applications, including assessment of conditions of terrain, soils and surface materials, multitemporal monitoring and inventory of rangelands, croplands and forests; rural and urban land use assessment; surveillance of surface water resources and sedimentation; appraisal of changes in coastal zone. Use of remote sensing in environmental management and in environmental impact assessment.

Optometry

31.701G Advanced Clinical Optometry   F T4

Clinical work on selected patients, with special emphasis on advanced techniques and new developments. All areas of optometric examination procedures are covered, including: external and internal examination of the eyes; visual functions; tonometry; objective optometry; evaluation of binocular functions; aniseikonia; sub-normal vision; geriatic and pediatric optometry; the clinical application of electrophysiological techniques. The assessment of new instruments, methods and treatment.

31.702G Advanced Physiological Optics   F L2T2

Advanced studies in a number of areas of physiological optics. *Refractive state of the eye:* physiological basis of ocular refraction, advanced study of the schematic eye, modern concepts of ocular image formation, resolution of the ocular image. Scatter, absorption and reflection of light within the eye, illumination of the retina, receptor density and the retina image, image-forming properties of the rods and cones. Ultrasonic, X-ray and optical techniques for defining the parameters of the refractive state. Aetiology of the refractive state. *Perceptual organization of the retinal image:* neural networks in the retina and their mathematical analogs, visual transfer functions. Mach bands, retinal inhibition, spatial and temporal resolution of the retina, static and dynamic visual acuity. Stabilization of the retinal image. Periodic stimulation processes. *Electrophysiology of vision:* electrical fields of the eye, monitoring the ocular potential. Electro-oculography, electro-retinogram, electro-myogram, electro-encephalogram. Electro-pathology of vision. *Autonomic servo-mechanisms of the eyes:* pupillometry. Accommodation. *Colour vision:* basic mechanics of colour vision; visual pigments, fundus reflectometry, Stiles' increment threshold technique. Derivation of fundamental response curves. Differential and incremental colour thresholds. Temporal and spatial effects. Defective colour vision. Parafoveal colorimetry. Colour scales and colour spaces.

31.703G Pleorthoptics and Binocular Vision   F L2T2

An integrated subject, in which binocular vision and pleorthoptics are studied from theoretical and clinical viewpoints. Clinical experience is provided by selected patients. Includes: The nature and control of eye movements and their role in maintaining the perception of a stable visual world. Binocular and monocular subjective visual directions. The neurophysiological substrate of binocular vision and its phenomena. Stereopsis and its measurement. Accommodation, convergence, and oculo-motor imbalance. Laboratory and clinical methods of measuring eye position and visual directions. The aetiologies, measurement, and treatment of strabismus, anomalous correspondence, eccentric fixation and amblyopia.

31.704G Advanced Contact Lens Studies   F L1T3

Contact lens materials: polymer chemistry, physical and chemical properties of soft and hard lens materials. *Contact lens design:* the relationship of theoretical contact lens design and corneal topography. Clinical evaluation of current and new soft and hard lens designs. *Contact lens care and maintenance:* theory and performance of various soft and hard lens care and maintenance systems. Soft and hard lens parametric variations. *Contact lens patient:* systems and techniques for evaluating contact lens patients; new techniques for patient instruction and management. Evaluation of patient responses to lenses.

31.705G Advanced Contact Lens Practice   **F L1T3**

The examination, evaluation and aftercare of contact lens patients.

31.706G Occupational Optometry   **F L2T2**

Visual job analysis, human aspects of people-machine systems. Information theory, channel capacity. Visual aspects of people-machine relationships. Visual presentation of information, visual detection, identification and estimations, visual coding. Layout of workplaces, illumination, effects of environment on human performance. Relevant aspects of anthropometry. Visual screening techniques. Industrial eye protection and elements of Safety Engineering. Research techniques in Human Engineering. Visual factors in driving and road safety. Visual factors in aviation.

31.707G Clinical Photography   **F L2T2**

Introduction to clinical photography, cameras and lens systems, colour films, black-and-white films and filters, apparatus and accessories. Patient preparation and positioning, backgrounds and foregrounds, lighting, the 'safe-set' method. Copying, slide making, macrophotography, microphotography. 'Invisible light' photography (ultra-violet and infra-red), photofluorography, speedlight techniques, fundus photography. Dark-room techniques, portable dark-rooms. Quantitative photographic data analysis.

31.799G Project

Biochemistry

41.999G Alternative Higher Degree Qualifying Program

Similar in content and standard to 41.103 Biochemistry Honours but designed specifically for students who cannot regularly attend the University.

Biotechnology

42.104G Graduate Seminars

42.111G Reading List in Biotechnology (Microbiology)

42.112G Reading List in Biotechnology (Biochemistry)

42.211G Principles of Biology   **SS L3**

A study of the characteristics of living systems, including a functional treatment of cytology, metabolism, bioenergetics; structure, function and characteristics of single and multicellular systems; growth; cell division; reproduction; heredity and evolution.

42.212G Principles of Biochemistry   **SS L3**

A condensed treatment of biochemistry comprising the following aspects: the elemental and molecular composition of living organisms; the chemistry and roles of the biological elements and molecules; the thermodynamics and enzymatic catalysis of metabolism; catabolic, anabolic, amphibolic and anaplerotic processes, with emphasis on hydrolysis and synthesis of polymers, glycolysis and gluconeogenesis of glucose. O-oxidation and synthesis of fatty acids, deamination and decarboxylation of amino acids, the tricarboxylic acid cycle, electron transport and oxidative phosphorylation; metabolic regulation and integration.

42.213G Biochemical Methods   **SS T3**

A laboratory program in practical biochemistry. The basic instrumentation and methodology of the biochemist will be introduced by practical exercises and demonstrations. A comprehensive treatment of the relevance and applicability of biochemical techniques is covered in tutorials.

42.214G Biotechnology   **SS L2T1**

The selection, maintenance and genetics of industrial organisms; metabolic control of microbial synthesis; fermentation kinetics and models of growth; batch and continuous culture; problems of scale-up and fermenter design; control of the microbial environment; computer/fermentor interactions. Industrial examples will be selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial leaching. *Tutorial/practical sessions* include: problem solving, instrumentation, continuous culture techniques, and mathematical modelling and simulation of industrial processes.

42.215G Practical Biotechnology   **F T7**

Illustration, demonstration and operation of laboratory-scale and pilot-scale equipment. Visits to appropriate industries. Experimental project or critical review.

42.301G Micro-organism Productivity   **SS L2T3**

Mechanisms of metabolic control: induction, repression and forms of activation and inhibition; microbial genetics; mutation, selection, genetic transfer and manipulation; environmental parameters; oxygen tension, pH, temperature, energy source etc. as are relevant to productivity in industrially important microorganisms.

Detailed studies: choice of substrate, screening and isolation of microorganisms, systematic application of techniques of genetic and physiological manipulation required to optimize product formation (products include amino acids, nucleotides, enzymes and other macromolecules, antibiotics and other physiologically active compounds), potential strain improvement of micro-organisms involved in other industrial processes (for example, mineral leaching, single cell protein production, detoxification and waste disposal).

Laboratory component includes current techniques of micro-organism isolation and maintenance, genetic manipulation and physiological manipulation.

42.302G Enzyme Technology　　　　　　**SS L2T3**

Enzymes in vivo; properties; roles; sources; optimization of enzyme concentration, for example by nutritional control, environmental control and by genetic manipulation. Isolation of enzymes: methods of extraction and purification; stabilizing safeguards; assay procedures; kinetics of isolated enzymes. Immobilization of enzymes: entrapment in insoluble matrices; adsorption on high molecular weight inert carriers; ionic binding to ion-exchange materials; covalent enzyme-enzyme linkage via a low molecular weight bifunctional reagent; covalent linkage to a high molecular weight support; changes in kinetic parameters and stability after immobilization; advantages and disadvantages of immobilization. Enzyme Reactor Engineering: design of batch and continuous systems, including open and closed plug flow and stirred reactors; comparison of kinetics in various designs; scale-up. Enzyme application: analysis; fabric, food and biochemical industries; medical treatment; medical diagnosis. Occupational hazards: allergic responses to enzymes; infection from pathological samples.

Methods of isolation, immobilization and application of enzymes for analytical, industrial and medical purposes will be illustrated by laboratory exercises and short projects. Practical comparison of various reactor designs will also be made.

42.303G Biochemical Process Control　　　**SS L2T3**

Biochemical reactors; range of basic designs; range of biocatalysts, from microbial conglomerates to free enzymes; heat and mass transfer; design; scale-up; sterility; kinetics; economic considerations. Techniques for efficient operation and control of batch, single-stage continuous and multi-stage continuous processes.

Use of computers: aids to understanding the effects of operating variables for process optimization and control. Detailed examples: microbial processes such as production of antibiotics, organic acids, amino acids and enzymes; enzymic processes.

Practical illustration of: sample processes such as yeast and antibiotic production; mathematical simulation by analog computation; computer control of biochemical processes.

**42.304G Biodeterioration and
　　　　　Biodegradation**　　　　　　　**SS L2T3**

Basic mechanisms of biodeterioration and biodegradation; direct and indirect attack mechanisms; co-metabolism and mixed population phenomena; factors controlling rates of degradation and recalcitrance of materials to biological attack; biological accelerators.

Detailed treatment of: biological corrosion of metals and alloys; biodeterioration of fuels, petrochemical products, synthetic materials, timber and cellulosic products, building materials etc.; degradation of rocks and minerals; biological leaching of ores and mineral processing residues.

The laboratory component includes assessment of biodegradability of common industrial materials (detergents, surface coatings, fuels, biocides etc); evaluation of protective methods; determination of biological leachability of minerals and mineral processing residues.

42.305G Case Studies　　　　　　　　　**SS T2**

Critical evaluation of industrial processes and research and development procedures. Includes: study of isolated and selected areas of biotechnology, detailed study and evaluation of all aspects of an industrial process from the isolation of the appropriate organism or other biological starting material to the production and use of the final products, critical evaluation of techniques arising from current research and development programs.

42.306G Project　　　　　　　　　　　　**F T7**

An experimental or technical investigation or design project in the general field of biotechnology.

42.407G Biological Principles　　　　　　**S1 L3**

Characteristics of living systems. Biological molecules: carbohydrates, lipids, proteins and nucleic acids. Cell structure and function: prokaryotic and eukaryotic cells. Basic biochemistry: thermodynamics and catalysis of metabolism; catabolic and anabolic processes; properties of enzymes; DNA replication; protein synthesis. Comparative metabolism of viruses, bacteria, fungi, plants and animals. Metabolic regulation. Modes of nutrition and nutrient cycles. Reproduction and genetics: eukaryotic and prokaryotic systems; sexual and asexual reproduction; bacterial genetics; recombinant DNA technology. Micro-organisms of commercial significance. Biodeterioration and diodegradation. Pathogenic micro-organisms; aetiology and epidemiology of infection; host defence mechanisms; chemotherapy; mechanisms of drug action; drug resistance.

42.408G Bioengineering Principles　　　　**S1 L3**

Steady state and differential balances as a basis for quantification of complex real systems. Concepts in rate processes and kinetic analysis with application to biological systems. Experimental determination of rate data. Correlation of simple lumped rate processes and simultaneous distributed processes and the concepts involved in dimensionless numbers.

Lamina and turbulent flow. The structure of homogeneous and boundary layer turbulence flow in pipes and channels. Mixing theory. Process vessel (reactor) models.

Fluid viscosity, Newtonian and non-Newtonian fluids, convective and molecular transport processes. Heat and mass transport, film coefficients. Film, boundary layer, penetration and surface renewal theories (descriptive only).

Quantification of complex systems. Empirical and mechanistic models in biological systems.

42.999G Alternative Higher Degree Qualifying Program

Training similar in content and standard to 42.103 Biotechnology (Honours), but designed specifically for students who cannot regularly attend the University.

Microbiology

44.999G Alternative Higher Degree Qualifying Program

Similar in standard to 44.103 Microbiology Honours, but designed for students who cannot regularly attend the University.

Biological Science

43.999G Alternative Higher Degree Qualifying Program

Similar in content and standard to 43.103 Botany Honours but designed specifically for students who cannot regularly attend the University.

45.900G Ecological Studies in Arid Lands Management   S2 L2T4

Prerequisite: Degree with background in bioscience or equivalent.

Techniques in ecological studies of animal communities. Adaptations to an arid environment — environmental and social determinants. Behaviour, diet and condition of native and feral animals. Competition between native and introduced herbivores. Strategies in the management of arid zone wildlife. Concurrent studies in relevant units in the School of Biological Science are prescribed to cover aspects of vegetation description and plant/environment interactions.

45.999G Alternative Higher Degree Qualifying Program

Similar in content and standard to 45.103 Zoology Honours but designed specifically for students who cannot regularly attend the University.

Safety Science

47.062G Applied Ergonomics

Prerequisite: 47.061G at credit level or equivalent.

Cognitive ergonomics. Decision making, vigilance, effects of workload and stress, applications to screen-based equipment. Work systems: the systems approach, practical evaluation and redesign of work systems. Experimental methodology: experimental design in ergonomics, critical evaluation of the literature.

47.090G Introduction to Occupational Health and Safety Law   C3

The concept of law; the creation and interpretation of statutes; the judicial and court systems; locus stand; common law and equity; basic principles of legal liability of the Crown; the common law of employment; statutory regulation of employment; compulsory arbitration of industrial disputes. Outline of occupational health, safety and compensation legislation of the Australian States. Actions under the common law.

Sociology

53.309G Social and Technological Forecasting   F L2
Not offered in 1989.
Sol Encel

The interaction between science, technology and society, and the role of science and technology in social change and their potential contribution to the future shape of social existence; the potential contribution of science and technology to the solution of social problems and the relationship of forecasting to fundamental views about history and society; the nature of various contemporary approaches to social and technological forecasting; and the uses to which forecasting has been put by industry and government.

Faculty of Science

67.001G Experimental Project in Physical Oceanography   F L9

A report of an experimental project, including recording, preparation, analysis and interpretation of field or laboratory data.

67.002G Geophysical Fluid Dynamics   F L2

Aspects of the physical features of the oceans. Includes ocean waves (rotational and gravitational), tides, large scale wind driven ocean circulation, coastal dynamics, thermohaline circulations and mixing processes.

67.003G Instrumentation   S1 L1

Laboratory, moored, shipborne, airborne and space instrumentation commonly used in oceanographic experiments; their applications and limitations.

67.004G Applied Time Series Analysis   S1 L1½T½

Classification of random processes, sampling for discrete analysis, Fourier analysis, spectra, filtering. Cross-spectra, estimation and hypothesis testing, confidence limits, application to experiment planning. Emphasis on computer analysis of actual data.

67.005G Theoretical Project in Physical Oceanography

A theoretical project aimed at developing the prediction of oceanographical phenomena, tailored to meet individual student background but taken only by those students with a strong theoretical background.

Anatomy

70.201G Introductory Functional Anatomy

An overview of basic human anatomy and physiology with an emphasis on structures and systems such as the eye, ear and

skin, which are most vulnerable to chemical and physical trauma under industrial conditions. Other systems studied include the musculo skeletal system, central and peripheral nervous systems, circulatory, respiratory, gastrointestinal, endocrine and urogenital systems.

Faculty of Medicine

80.701G Occupational Disease   **S2L3 C3**

Prerequisite: 70.201G or equivalent.

Physical environment and disease; Musculoskeletal system, physical trauma; heat and cold, burns, electric shock; rediation, pressure, vibration, noise hearing. *Chemical environment and disease:* Metallic poisons, carcinogens, allergens, *Microbial environment and disease. Systems approach:* gastrointestinal tract; renal system; central and peripheral nervous systems; visual system, respiratory system, airborne particulates; skin.

Faculty of Engineering

97.580G Image Analysis in Remote Sensing   **C3**

Prerequisite: 10.361 or similar.

Techniques for extracting information from remotely sensed data with particular emphasis on satellite imagery. Topics taken from: nature and characteristics of earth resources and related satellites; satellite sensors and data formats; image enhancement techniques; image classification; image classification methodologies; new horizons in remote sensing image analysis.

97.581G Microwave Remote Sensing   **C3**

Use of passive and active (radar) microwave techniques in remote sensing of earth resources. Topics include; real and synthetic aperture radar systems; passive microwave radiometry; energy-surface interactions; interpretation of microwave image data: applications in agriculture, geology, oceanography and hydrology; issues in signal and image processing; characteristics of airborne and spaceborne microwave sensors.

Graduate Study

Conditions for the Award of Higher Degrees

First Degrees

Rules regulations and conditions for the award of first degrees are set out in the appropriate **Faculty Handbooks.**

For the list of undergraduate courses and degrees offered see **Faculty (Undergraduate Study)** in the Calendar.

Higher Degrees

The following is the list of higher degrees and graduate diplomas of the University, together with the publication in which the conditions for the award appear.

For the list of graduate degrees by research and course work, arranged in faculty order, see **Disciplines of the University: Table of Courses (by faculty): Graduate Study** in the Calendar.

For the statements **Preparation and Submission of Project Reports** and **Theses for Higher Degrees** and **Policy with respect to the Use of Higher Degree Theses** see the Calendar.

Title	Abbreviation	Calendar/Handbook
Higher Degrees Doctor of Science	DSc	Calendar
Doctor of Letters	DLitt	Calendar
Doctor of Laws	LLD	Calendar
Doctor of Medicine	MD	Calendar Medicine
Doctor of Philosophy	**PhD**	Calendar **and all handbooks**
Master of Applied Science	MAppSc	Applied Science
Master of Architectural Design	MArchDes	Architecture
Master of Architecture	MArch	Architecture
Master of Archives Administration	MAchivAdmin	Professional Studies

Title	Abbreviation	Calendar/Handbook
Master of Arts	MA	Arts
		University College
Master of Biomedical Engineering	MBiomedE	Engineering
Master of of Building Management	MBM	Architecture
Master of the Built Environment	MBEnv	Architecture
Master of the Built Environment (Building Conservation)		
Master of Business Administration	MBA	AGSM
Master of Chemistry	**MChem**	**Sciences***
Master of Cognitive Science	MCogSc	Arts
Master of Commerce (Honours)	MCom(Hons)	Commerce
Master of Commerce	MCom	Commerce
Master of Community Health	MCH	Medicine
Master of Construction Management	MConst Mgt	Architecture
Master of Education	MEd	Professional Studies
Master of Educational Administration	MEdAdmin	Professional Studies
Master of Engineering	**ME**	**Applied Science**
		Engineering
Master of Engineering without supervision		Engineering
		Applied Science
		University College
Master of Engineering Science	MEngSc	Engineering
		Applied Science
		University College
Master of Environmental Studies	MEnvStudies	Applied Science
Master of Health Administration	MHA	Professional Studies
Master of Health Personnel Education	MHPEd	Medicine
Master of Health Planning	MHP	Professional Studies
Master of Industrial Design	MD	Architecture
Master of Landscape Architecture	MLArch	Architecture
Master of Laws	LLM	Law
Master of Librarianship	MLib	Professional Studies
Master of Management Economics	MMgtEc	University College
Master of Mathematics	**MMath**	**Sciences***
Master of Music	MMus	Arts
Master of Nursing Administration	MNA	Professional Studies
Master of Optometry	**MOptom**	**Sciences***
Master of Paediatrics	MPaed	Medicine
Master of Physics	**MPhysics**	**Sciences***
Master of Project Management	MPM	Architecture
Master of Psychology (Clinical)	**MPsychol**	**Sciences§**
Master of Psychology (Applied)	MPsychol	Sciences§
Master of Safety Science	MSafetySc	Engineering
Master of Science	MSc	Applied Science
Master of Science *without supervision*		Architecture
		Engineering
		Medicine
		Military Studies
		Sciences*§
Master of Science (Acoustics)	MSc(Acoustics)	Architecture

Higher Degrees (continued)

Title	Abbreviation	Calendar/Handbook

Higher Degrees (continued)

Title	Abbreviation	Calendar/Handbook
Master of Science and Society	MScSoc	Sciences*
Master of Science (Building)	MSc(Building)	Architecture
Master of Science (Industrial Design)	MS(IndDes)	Architecture
Master of Science and Society	MScSoc	Arts*
Master of Social Work	MSW	Professional Studies
Master of Statistics	MStats	Sciences*
Master of Surgery	MS	Medicine
Master of Surveying Master of Surveying *without supervision*	MSurv	Engineering
Master of Surveying Science	MSurvSc	Engineering
Master of Town Planning	MTP	Architecture
Master of Welfare Policy	MWP	Professional Studies

Graduate Diplomas

Title	Abbreviation	Calendar/Handbook
Graduate Diploma	GradDip	Applied Science Architecture Engineering Sciences*§
	DipPaed	Medicine
	DipEd	Professional Studies
	DipIM-ArchivAdmin DipIM-Lib DipFDA	Sciences*

*Faculty of Science
*Faculty of Biological Sciences

Higher Degrees

Doctor of Philosophy (PhD)

1. The degree of Doctor of Philosophy may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty or board (hereinafter referred to as the Committee) to a candidate who has made an original and significant contribution to knowledge.

Qualification

2. (1) A candidate for the degree shall have been awarded an appropriate degree of Bachelor with Honours from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Committee.

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment as a candidate for the degree.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Academic Register at least one calendar month before the commencement of the session in which enrolment is to begin.

(2) In every case, before permitting a candidate to enrol, the head of the school* in which the candidate intends to enrol shall be satisfied that adequate supervision and facilities are available.

(3) An approved candidate shall be enrolled in one of the following categories:

(a) full-time attendance at the University;

(b) part-time attendance at the University.

(4) A full-time candidate shall be fully engaged in advanced study and research except that the candidate may undertake not more than five hours per week or a total of 240 hours per year on work which is not related to the advanced study and research.

(5) Before permitting a part-time candidate to enrol, the Committee shall be satisfied that the candidate can devote at least 20 hours each week to advanced study and research for the degree which (subject to (8)) shall include regular attendance at the school* on an average of at least one day per week for 48 weeks each year.

(6) A candidate shall be required to undertake an original investigation on an approved topic. The candidate may also be required to undergo such assessment and perform such other work as may be prescribed by the Committee.

(7) The work shall be carried out under the direction of a supervisor appointed from the full-time academic members of the University staff.

(8) The work, other than field work, shall be carried out in a school* of the University except that the Committee:

(a) may permit a candidate to spend not more than one calendar year of the program in advanced study and research at another institution provided the work can be supervised in a manner satisfactory to the Committee;

(b) may permit a candidate to conduct the work at other places where special facilities not possessed by the University may be available provided the direction of the work remains wholly under the control of the supervisor;

(c) may permit a full-time candidate, who has been enrolled as a full-time candidate for at least six academic sessions, who has completed the research work and who is writing the thesis, to transfer to part-time candidature provided the candidate devotes at least 20 hours each week to work for the degree and maintains adequate contact with the supervisor.

(9) The progress of a candidate shall be reviewed annually by the Committee following a report by the candidate, the supervisor and the head of the school* in which the candidate is enrolled and as a result of such review the Committee may cancel enrolment or take such other action as it considers appropriate.

(10) No candidate shall be awarded the degree until the lapse of six academic sessions from the date of enrolment in the case of a full-time candidate or eight academic sessions in the case of a part-time candidate. In the case of a candidate who has had previous research experience the committee may approve remission of up to two sessions for a full-time candidate and four sessions for a part-time candidate.

(11) A full-time candidate for the degree shall present for examination not later than ten academic sessions from the date of enrolment. A part-time candidate for the degree shall present for examination not later than twelve academic sessions from the date of enrolment. In special cases an extension of these times may be granted by the Committee.

4. (1) On completing the program of study a candidate shall submit a thesis embodying the results of the investigation.   **Thesis**

(2) The candidate shall give in writing to the Academic Registrar two months notice of intention to submit the thesis.

(3) The thesis shall comply with the following requirements:

(a) it must be an original and significant contribution to knowledge of the subject;

(b) the greater proportion of the work described must have been completed subsequent to enrolment for the degree;

(c) it must be written in English except that a candidate in the Faculty of Arts may be required by the Committee to write a thesis in an appropriate foreign language;

(d) it must reach a satisfactory standard of expression and presentation;

*Or department where a department is not within a school or schools or departments where the research is being undertaken in more than one school or department.

(e) it must consist of an account of the candidate's own research but in special cases work done conjointly with other persons may be accepted provided the Committee is satisfied about the extent of the candidate's part in the joint research.

(4) The candidate may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or other similar award but may submit any work previously published whether or not such work is related to the thesis.

(5) Four copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of theses for higher degrees.

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

Examination

5. (1) There shall be not fewer than three examiners of the thesis, appointed by the Academic Board on the recommendation of the Committee, at least two of whom shall be external to the University.

(2) At the conclusion of the examination each examiner shall submit to the Committe a concise report on the thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree without further examination; or

(b) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*, or

(c) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or

(d) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(3) If the performance at the further examination recommended under (2)(c) above is not to the satisfaction of the Committee, the Committee may permit the candidate to re-present the same thesis and submit to further examination as determined by the Committee within a period specified by it but not exceeding eighteen months.

(4) The Committee shall, after consideration of the examiners' reports and the results of any further examination, recommend whether or not the candidate may be awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate be permitted to resubmit the thesis after a further period of study and/or research.

Fees

6. A candidate shall pay such fees as may be determined from time to time by the Council.

Master of Chemistry (MChem), Master of Mathematics (MMath), Master of Optometry (MOptom) and Master of Physics (MPhysics)

Qualifications

1. The degree of Master of Chemistry or Master of Mathematics or Master of Optometry or Master of Physics by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

2. (1) A candidate for the degree shall have been awarded an appropriate four-year degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar two calendar months before the commencement of the session in which enrolment is to begin.

*Or department where a department is not within a school or schools or departments where the research is being undertaken in more than one school or department.

(2) A candidate for the degree shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually be the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of two academic sessions from the date of enrolment in the case of a full-time candidate or four sessions in the case of a part-time candidate. The maximum period of a candidature shall be four academic sessions from the date of enrolment for a full-time candidate and eight sessions for a part-time candidate. In special cases an extension of these time may be granted by the Committee.

4. A candidate shall pay such fees as may be determined from time to time by the Council. **Fees**

1. The degree of Master of Engineering or Master of Science by research may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation. **Master of Engineering (ME) and Master of Science (MSc)**

2. (1) A candidate for the degree shall have been awarded an appropriate degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Committee. **Qualifications**

(2) An applicant who submits evidence of such other academic or professional attainments as may be approved by the Committee may be permitted to enrol for the degree.

(3) When the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant, before being permitted to enrol, to undergo such examination or carry out such work as the Committee may prescribe.

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Academic Registrar at least one calendar month before the commencement of the session in which enrolment is to begin. **Enrolment and Progression**

(2) In every case, before permitting a candidate to enrol, the head of the school* in which the candidate intends to enrol shall be satisfied that adequate supervision and facilities are available.

(3) An approved candidate shall be enrolled in one of the following categories:

(a) full-time attendance at the University;

(b) part-time attendance at the University;

(c) external — not in regular attendance at the University and using research facilities external to the University.

(4) A candidate shall be required to undertake an original investigation on an approved topic. The candidate may also be required to undergo such examination and perform such other work as may be prescribed by the Committee.

(5) The work shall be carried out under the direction of a supervisor appointed from the full-time members of the University staff.

(6) The progress of a candidate shall be reviewed annually by the Committee following a report by the candidate, the supervisor and the head of the school* in which the candidate is enrolled and as a result of such review the Committee may cancel enrolment or take such other action as it considers appropriate.

(7) No candidate shall be granted the degree until the lapse of three academic sessions in the case of a full-time candidate or four academic sessions in the case of a part-time or external candidate from the date of enrolment. In the case of a candidate who has been awarded the degree of Bachelor with Honours or who has had previous research experience the Committee may approve remission of up to one session for a full-time candidate and two sessions for a part-time or external candidate.

(8) A full-time candidate for the degree shall present for examination not later than six academic sessions from the date of enrolment. A part-time or external candidate for the degree shall present for examination not later than ten academic sessions from the date of enrolment. In special cases an extension of these times may be granted by the Committee.

*Or department where a department is not within a school or schools or departments where the research is being undertaken in more than one school or department.

Thesis **4.** (1) On completing the program of study a candidate shall submit a thesis embodying the results of the original investigation.

(2) The candidate shall give in writing two months notice of intention to submit the thesis.

(3) The thesis shall present an account of the candidate's own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate's part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses.

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

Examination **5.** (1) There shall be not fewer than two examiners of the thesis, appointed by the Academic Board on the recommendation of the Committee, at least one of whom shall be external to the University unless the Committee is satisfied that this is not practicable.

(2) At the conclusion of the examination each examiner shall submit to the Committee a concise report on the merits of the thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree without further examination; or

(b) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*; or

(c) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or

(d) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(3) If the performance at the further examination recommended under (2)(c) above is not to the satisfaction of the Committee, the Committee may permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by it but not exceeding eighteen months.

(4) The Committee shall, after consideration of the examiners' reports and the reports of any oral or written or practical examination, recommend whether or not the candidate may be awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate may resubmit the thesis after a further period of study and/or research.

Fees **6.** A candidate shall pay such fees as may be determined from time to time by the Council.

Master of Engineering (ME), Master of Science (MSc) and Master of Surveying (MSurv) *without supervision* **1.** The degree of Master of Engineering or Master of Science or Master of Surveying without supervision may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

2. A candidate for the degree shall have been awarded an appropriate degree of Bachelor from the University of New South Wales with at least three years relevant standing in the case of Honours graduates and four years relevant standing in the case of Pass graduates, and at a level acceptable to the Committee.

*Or department where a department is not within a school or schools or departments where the research is being undertaken in more than one school or department.

3. An application to enrol as a candidate for the degree without supervision shall be made on the prescribed form which shall be lodged with the Academic Registrar not less than six months before the intended date of submission of the thesis. A graduate who intends to apply in this way should, in his or her own interest, seek at an early stage the advice of the appropriate head of school* with regard to the adequacy of the subject matter and its presentation for the degree. A synopsis of the work should be available.

Enrolment

4. (1) A candidate shall submit a thesis embodying the results of the investigation.

Thesis

(2) The candidate shall give in writing to the Academic Registrar two months notice of intention to submit the thesis.

(3) The thesis shall present an account on the candidate's own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate's part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of theses for higher degrees.

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

5. (1) There shall be not fewer than two examiners of the thesis, appointed by the Academic Board on the recommendation of the Committee, at least one of whom shall be external to the University unless the Committee is satisfied that this is not practicable.

Examination

(2) Before the thesis is submitted to the examiners the head of the school* in which the candidate is enrolled shall certify that it is *prima facie* worthy of examination.

(3) At the conclusion of the examination each examiner shall submit to the Committee a concise report on the thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree without further examination; or

(b) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*; or

(c) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or

(d) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(4) If the performance at the further examination recommended under (3)(c) above is not to the satisfaction of the Committee, the Committee may permit the candidate to re-present the same thesis and submit to further examination as determined by the Committee within a period specified by it but not exceeding eighteen months.

(5) The Committee shall, after consideration of the examiners' reports and the results of any further examination, recommend whether or not the candidate may be awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate may resubmit the thesis after a further period of study and/or research.

6. A candidate shall pay such fees as may be determined from time to time by the Council.

Fees

See Master of Chemistry above.

Master of Mathematics (MMath)

*Or department where a department is not within a school.

Master of Optometry
(MOptom)

See Master of Chemistry above.

Master of Physics
(MPhysics)

See Master of Chemistry above.

Master of Psychology
(Applied) (MPsycholApp)
and Master of Psychology
Clinical) (MPsychol (Clin))

1. (1) The degree of Master of Psychology (Applied) or Master of Psychology (Clinical) by formal course work and thesis may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study. The degree shall be awarded at the Pass level or with the grade of Honours Class 1 or with the grade of Honours Class 2 (two divisions).

Qualifications

2. (1) A candidate for the degree shall have been awarded a degree of Bachelor with Honours in psychology from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution, at a level acceptable to the Higher Degree Committee of the Faculty of Biological and Behavioural Sciences (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and
Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Academic Registrar by 30 November of the year before the year in which enrolment is to begin.

(2) A candidate for the degree shall be required to undertake such formal subjects and, except in exceptional circumstances, pass at the first attempt such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of four academic sessions from the date of enrolment in the case of a full-time candidate or six sessions in the case of a part-time candidate. A candidate who has been granted exemptions may have the minimum period reduced by up to one-half. The maximum period of candidature shall be six academic sessions from the date of enrolment for a full-time candidate and ten sessions for a part-time candidate. In special cases an extensions of these times may be granted by the Committee.

Fees

4. A candidate shall pay such fees as may be determined from time to time by the Council.

Master of Science (MSc)

See Master of Engineering above.

Master of Science (MSc)
without supervision

See Master of Engineering above.

1. The degree of Master of Statistics by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advance study.

Master of Statistics (MStats)

2. (1) A candidate for the degree shall have been awarded a degree of Bachelor with major studies in statistics from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee).

Qualifications

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Academic Registrar at least two calendar months before the commencement of the session in which enrolment is to begin.

Enrolment and Progression

(2) A candidate for the degree shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of four academic sessions from the date of enrolment in the case of a full-time candidate or eight sessions in the case of a part-time candidate. In the case of a candidate who has been awarded a degree of Bachelor with Honours in statistics the Committee may approve remissions of up to two sessions for a full-time candidate and four sessions for a part-time candidate. The maximum period of candidature shall be six academic sessions from the date of enrolment for a full-time candidate and ten sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

4. A candidate shall pay such fees as may be determined from time to time by the Council.

Fees

Graduate Diploma

1. A Graduate Diploma may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

Graduate Diploma (GradDip or DipFDA)

2. (1) A candidate for the diploma shall have been awarded an appropriate degree of Bachelor from the University of New South Wales or a qualificaions considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the appropriate faculty (hereinafter referred to as the Committee).

Qualification

(2) An applicant who submits evidence of such other academic or professional attainments as may be approved by the Committee may be permitted to enrol for the diploma.

(3) If the Committee is not satsified with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

3. (1) An application to enrol as a candidate for diploma shall be made on the prescribed form which shall be lodged with the Academic Registrar at least two calendar months before the commencement of the session in which enrolment is to begin.

Enrolment and Progression

(2) A candidate for the diploma shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the diploma until the lapse of two academic sessions from the date of enrolment in the case of a full-time candidate or four sessions in the case of a part-time candidate. The maximum period of candidature shall be four academic sessions from the date of enrolment for a full-time candidate and six sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

Fees **4.** A candidate shall pay such fees as may be determined from time to time by the Council.

Scholarships and Prizes

The scholarships and prizes listed below are available to students whose courses are listed in this handbook. Each faculty handbook contains in its **Scholarships and Prizes** section the scholarships and prizes available with that faculty. The **General Information** section of the Calendar contains a comprehensive list of scholarships and prizes offered throughout the University.

Scholarships

Undergraduate Scholarships

Listed below is an outline only of a number of scholarships available to students. Full information may be obtained from Room G20, located on the Ground Floor of the Chancellery.

Unless otherwise indicated in footnotes, applications for the following scholarships should be made to the Registrar by 14 January each year. Please note that not all of these awards are available every year.

Donor	Value	Year/s of Tenure	Conditions
General			
Bursary Endowment Board*	$200 pa	Minimum period of approved degree/ combined degree course	Merit in HSC and total family income not exceeding $6000
Sam Cracknell Memorial	Up to $3000 pa payable in fortnightly instalments	1 year	Prior completion of at least 2 years of a degree or diploma course and enrolment in a full-time course during the year of application; academic merit; participation in sport both directly and administratively; and financial need

*Apply to The Secretary, Bursary Endowment Board, PO Box 460, North Sydney 2060, immediately after sitting for HSC.

Undergraduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions

General (continued)

Donor	Value	Year/s of Tenure	Conditions
Girls Realm Guild	Up to $1500 pa	1 year renewable for the duration of the course subject to satisfactory progress and continued demonstration of need	Available only to female students under 35 years of age who are permanent residents of Australia enrolling in any year of a full-time undergraduate course on the basis of academic merit and financial need.
W.S. and L.B. Robinson**	Up to $4200 pa	1 year renewable for the duration of the course subject to satisfactory progress	Available only to students who have completed their schooling in Broken Hill or whose parents reside in Broken Hill; for a course related to the mining industry. Includes courses in mining engineering, geology, electrical and mechanical engineering, metallurgical process engineering, chemical engineering and science.
Universities Credit Union	$500 pa	1 year with the possibility of renewal	Prior completion of at least 1 year of any undergraduate degree course. Eligibility limited to members of the Universities Credit Union Ltd of more than one year's standing or members of the family of such members.

Science
Chemistry

Donor	Value	Year/s of Tenure	Conditions
John Ragnar Anderson Memorial Bequest	Up to $1500 pa	1 year renewable for the duration of the course subject to satisfactory progress	Permanent residence in Australia and eligibility for admission to a full-time degree course in Chemistry

Mathematics

Donor	Value	Year/s of Tenure	Conditions
George Szekeres Award	$200 pa	1 year	Open to students entering the final year of the honours degree course in Pure Mathematics

Optometry

Donor	Value	Year/s of Tenure	Conditions
Gibb and Beeman	Up to $750 pa	1 year renewable for the duration of the course, subject to satisfactory progress	Available to students under 21 years of age who are permanent residents of Australia enrolling in Year 1 of the full-time degree course in Optometry

The UNSW Co-op Program

The University of New South Wales has industry-linked education scholarship programs to the value of $8000 per annum in the following areas: Business Information Technology, Chemical Engineering, Civil Engineering, Electrical and Computer Engineering, Industrial Chemistry, Mechanical and Industrial Engineering, Mining/mineral Engineering and Applied Geology.

Further information can be obtained by writing to The Co-ordinator, UNSW Co-op Programs Industry-Linked Education Office, C/- Vice-Chancellors Unit.

**Applications close 30 September each year.

Graduate Scholarships *

Application forms and further information are available from the Student Enquiry Counter, located on the Ground Floor of the Chancellery unless an alternative contact address is provided. Information is also available on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.

The following publications may also be of assistance: 1. *Awards for Postgraduate Study in Australia and Awards for Postgraduate Study Overseas,* published by the Graduate Careers Council of Australia. PO Box 28, Parkville, Victoria 3052; * 2. *Study Abroad,* published by UNESCO; * 3. *Scholarships Guide for Commonwealth Postgraduate Students,* published by the Association of Commonwealth Universities. *

Details of overseas awards and exchanges administered by the Department of Employment, Education and Training can be obtained from: Awards and Exchanges Section, Department of Employment, Education and Training, PO Box 826, Woden, ACT 2606.

Where possible, the scholarships are listed in order of faculty.

Donor	Value	Year/s of Tenure	Conditions
General			
University Postgraduate Research Scholarships	Living allowance of $7600 pa. Other allowances may also be paid.	1-2 years for a Masters and 3-4 years for a PhD degree	Applicants must be honours graduates (or equivalent). Applications to Dean of relevant Faculty.
Commonwealth Postgraduate Research Awards			Applicants must be honours graduates (or equivalent) or scholars who will graduate with honours in current academic year, and who are domiciled in Australia. Applications to Academic Registrar by 31 October.
Commonwealth Postgraduate Course Awards	Living allowance of $8882 pa. Other allowances may also be paid.	1-2 years; minimum duration of course	Applicants must be graduates or scholars who will graduate in current academic year, and who have not previously held a Commonwealth Post-graduate Award. Applicants must be domiciled in Australia. Preference is given to applicants with employment experience. Applications to Academic Registrar by 30 September.
Australian American Educational Foundation Travel Grant Foundation (Fulbright)	Travel expenses and $A2000 as establishment allowance	1 year, renewable	Applicants must be graduates who are domiciled in Australia and wish to undertake research or study for a higher degree in America. Applications close 30 September with The Secretary, DEET, AAEF Travel Grants, PO Box 826, Woden ACT 2606.
Australian Federation of University Women	Amount varies, depending on award	Up to 1 year	Applicants must be female graduates who are members of the Australian Federation of University Women
Commonwealth Scholarship and Fellowship Plan	Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable.	Usually 2 years, sometimes 3	Applicants must be graduates who are Australian citizens and who are not older than 35 years of age. Tenable in Commonwealth countries other than Australia. Applications close with Academic Registrar in September or October each year.

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions

General (continued)

Donor	Value	Year/s of Tenure	Conditions
The English-Speaking Union (NSW Branch)	$5000	1 year	Applicants must be residents of NSW or ACT. Awarded to young graduates to further their studies outside Australia. Applications close mid-April with The Secretary, Ground Floor, Sydney School of Arts, 275c Pitt Street, Sydney NSW 2000.
Frank Knox Memorial Fellowships tenable at Harvard University	Stipend of US$7000 pa plus tuition fees	1, sometimes 2 years	Applicants must be British subjects and Australian citizens, who are graduates or near graduates of an Australian university. Applications close with the Academic Registrar mid-October.
Robert Gordon Menzies Scholarship to Harvard	Up to $US 15,000	1 year	Tenable at Harvard University. Applicants must be Australian citizens and graduates of an Australian tertiary institution. Applications close 31 December with the Registrar, A.N.U., GPO Box 4, Canberra ACT 2601.
Gowrie Scholarship Trust Fund	$4000 pa. Under special circumstances this may be increased.	2 years	Applicants must be members of the Forces or children of members of the Forces who were on active service during the 1939-45 War. Applications close with Academic Registrar by 31 October.
Harkness Fellowships of the Commonwealth Fund of New York	Living and travel allowances, tuition and research expenses, health insurance, book and equipment and other allowances for travel and study in the USA	12 to 21 months	Candidates must be Australian citizens and 1. Either members of the Commonwealth or a State Public Service or semi-government Authority. 2. Either staff or graduate students at an Australian university. 3. Individuals recommended for nomination by the Local Correspondents. The candidate will usually have an honours degree or equivalent, or an outstanding record of achievement, and be not more than 36 years of age. Applications close 29 August with the Academic Registrar. Forms available from Mr J Larkin, Bureau of Agriculture and Resource Economics, GPO Box 1563, Canberra ACT 2601.
The Packer, Shell and Barclays Scholarships to Cambridge	Living and travel allowances, tuition expenses.	1-3 years	Applicants must be Australian citizens who are honours graduates or equivalent, and under 26 years of age. Applications close 15 October.
The Rhodes Scholarship	Approximately £4,200 stg pa	2 years, may be extended for a third year	Unmarried Australian citizens aged between 19 and 25 who have an honours degree or equivalent. Applications close in August each year with The Secretary, University of Sydney, NSW 2006.

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions
Biological and Behavioural Sciences			
John Clark Memorial Award in Psychology	$1000	1 year	Applicants must be enrolled in a graduate course in psychology undertaking research in an area concerned with the ongoing problems of the community, particularly the behaviour of the 'whole person' in a social milieu. Applications close 1 July with the Academic Registrar.
Science Research Scholarship of the Royal Commission of the Exhibition of 1851	See under **Science**		
National Heart Foundation The National Health and Medical Research Council	See under **Medicine**		

Science

Donor	Value	Year/s of Tenure	Conditions
Australian Telecommunications and Electronics Research Board	$11,500 pa if only scholarship held or $5000 if additional to another scholarship	1 year for a Masters and up to 3 years for a PhD degree	Applicants must be first class honours graduates (or equivalent) or scholars who will graduate with honours in the current academic year, who are Australian citizens or permanent residents and who are aged under 25 years at 1 January. Applications close late September with ATERB, PO BOX 76, Epping NSW 2121.
Australian Institute of Nuclear Science and Engineering Studentships Contact Lens Society of Australia	See under **Engineering**. $2000 pa		To enable a graduate in optometry, medicine, or other appropriate discipline to undertake the degree of Master of Science or PhD in the School of Optometry. Enquiries to Associate Professor B. Holden, School of Optometry.
Gordon Godfrey Scholarship in Theoretical Physics	$1500 pa	1-3 years	To enable a suitable graduate to undertake a research degree in Theoretical Physics. May be held concurrently with another award. Enquiries to School of Physics.
Shell Scholarship in Science or Engineering	Adequate funds for living allowance tuition and travel expenses	2 years, sometimes 3	Applicants must be Australian citizens, under 25 years of age, with at least 5 years' domicile in Australia and who are completing the requirements for an honours degree in Science or Engineering. The successful candidate will attend a British university to pursue a higher degree. Applications close 30 September with Shell Australia, 140 Phillip Street, Sydney NSW 2000.

Prizes

Undergraduate University Prizes

The following table summarizes the undergraduate prizes awarded by the University. Prizes which are not specific to any School are listed under General. All other prizes are listed under the Faculty or Schools in which they are awarded.

Information regarding the establishment of new prizes may be obtained from the Examinations Section located on the Ground Floor of the Chancellery.

Donor/Name of Prize	Value$	Awarded for

General

Donor/Name of Prize	Value$	Awarded for
Sydney Technical College Union Award	300.00 and medal	Leadership in the development of student affairs, and academic proficiency throughout the course
University of New South Wales Alumni Association	Statuette	Achievement for community benefit — students in their final or graduating year

Donor/Name of Prize	Value$	Awarded for

School of Chemistry

Donor/Name of Prize	Value$	Awarded for
Inglis Hudson Bequest	15.00	2.002B Organic Chemistry 1
Jeffery Bequest	100.00	2.043L Chemistry and Enzymology of Foods
Merck Sharp & Dohme (Aust) Pty Ltd	52.50	Chemistry — Level II subjects in the Science and Mathematics Course
	52.50	Chemistry — Level III subjects in the Science and Mathematics Course
RACI Analytical Chemistry Group	150.00	2.013D Advanced Analytical Chemistry
UNSW Chemical Society Parke-Pope	100.00 ⎤	Subject selected by Head of School
UNSW Chemical Society George Wright	100.00 ⎦	
June Griffith Memorial	60.00	Best performance in 2.121 and 2.131 Year 1 Chemistry in the Bachelor of Science degree course

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for

School of Mathematics

Donor/Name of Prize	Value $	Awarded for
Amatil Limited	200.00	Best performance in Theory of Statistics 3 or Higher Theory of Statistics 3
Applied Mathematics	50.00	Excellence in Level III Applied Mathematics subjects
C. H. Peck	50.00	Best performance in Year 2 Mathematics proceeding to Year 3 in the School of Mathematics
Head of School's	50.00	Excellence in 4 or more Mathematics units in Year 2
IBM	200.00	Final year of an honours degree course
ICI Theory of Statistics IV	100.00	Best performance in 10.323 Theory of Statistics 4
I. P. Sharp Associates	100.00	Excellence in Higher Theory of Statistics 2
J. R. Holmes	75.00	Excellent performance in at least 4 pass-level (up to 1 pass-level unit may be replaced by a higher-level unit) Pure Mathematics Level III units taken over no more than two consecutive years
Michael Mihailavitch Erihman	750.00	Best performance by a student enrolled in a Mathematics Program, in examinations conducted by the School of Mathematics in any one year
Pure Mathematics	50.00	Best performance in Level III Pure Mathematics subjects
School of Mathematics	50.00	Best performance in 10.001 Higher Mathematics 1
	50.00	Best performance in basic Year 2 Higher Mathematics units
	50.00	Excellence in 4 or more Mathematics units in Year 2
Statistical Society of Australia (New South Wales (Branch)	100.00	General proficiency — Theory of Statistics subjects

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for

School of Optometry

Donor/Name of Prize	Value $	Awarded for
Australian Optometrical Association	200.00	Best performance in Year 3 of the Optometry degree course
Bausch & Lomb Soflens	Diagnostic set of contact lenses valued at 700.00	31.841 Clinical Optometry
Contavue	Trial fitting set of contact lenses	Best essay or project on contact lenses
G. Nissel & Co Aust Pty Ltd	Trial fitting set of contact lenses	31.871 Optometry B and 31.841 Clinical Optometry — Contact Lenses sections
Hoya Lens Australia Pty Ltd	250.00	Highest academic record in the Optometry degree course
Hydron (Australia) Pty Ltd	100.00	31.871 Optometry B
	100.00	Optometry Year 4
The Keith Woodland Memorial	100.00	Binocular vision component of 31.871 Optometry B and 31.841 Clinical Optometry
Martin Wells Pty Ltd	200.00	31.821 Anatomy and Physiology of the Eye and Visual System
	200.00	31.862 Diagnosis and Management of Ocular Disease
	200.00	Final Year Essay
Optical Products Pty Ltd	100.00	Subject selected by Head of School
Optometric Vision Research Foundation	100.00	Research project in the final year
Optometrists' Association of NSW	100.00	Subject selected by Head of School
Optyl (Australia) Pty Ltd	100.00	31.864 Clinical Methods practical work
Safilo Australia	150.00	Subject selected by Head of School
Theo Kannis	250.00	31.841 Clinical Optometry

School of Physics

Donor/Name of Prize	Value $	Awarded for
Australian Institute of Physics	100.00 and one years' membership of the Institute	Highest aggregate in any 3 units chosen from 1.0133 Quantum Mechanics, 1.0143 Nuclear Physics, 1.023 Statistical Mechanics and Solid State Physics, 1.0333 Electromagnetism, 1.0343 Advanced Optics, and 1.043 Experimental Physics A in the Bachelor of Science

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for

School of Physics (continued)

Donor/Name of Prize	Value $	Awarded for
ETP-Oxford	200.00	Most meritorious design study of an optical system in the subject 1.713 Advanced Laser and Optical Applications
Gordon and Mabel Godfrey in Theoretical Physics 3	200.00	Best performance in selection of Year 3 Theoretical Physics subjects chosen from 1.5133, 1.5233, 1.5333, 1.5433 and 1.5533
Gordon and Mabel Godfrey in Theoretical Physics 4	200.00	Excellence in the subject 1.504 Theoretical Physics 4 in the Bachelor of Science degree course with Honours in Physics
Head of School's in Physics	50.00	Best Year 4 Honours Thesis in Physics in the Bachelor of Science degree course
Laser Electronics	200.00	Excellence in the laboratory work of 1.763 Laser and Optical Technology Laboratory 1
Physics Staff for Physics 1	100.00	Best performance in 1.001 Physics 1
Physics Staff for Physics 2	150.00	Highest aggregate in 1.002 Mechanics, Waves and Optics, 1.012 Electromagnetism and Thermal Physics, 1.022 Physics and 1.032 Modern Laboratory in the Bachelor of Science degree course
Physics Staff for Physics Honours	2000.00	Best performance in the Physics Honours Year of the Bachelor of Science degree course
The Bodal	100.00	Best performance in a competition based on the use of microcomputers in 1.061 Computer Applications in Experimental Science 1
The Laser Dynamics	200.00	Excellence in the subject 1.713 Advanced Laser and Optical Applications
The Parameters	200.00	Excellence in 1.133 Electronics, or, if no student of sufficient merit 1.043 Experimental Physics A and 1.763 Laser and Optical Technology Laboratory 1

School of Psychology

Donor/Name of Prize	Value $	Awarded for
Australian Psychological Society	100.00	A Year 4 Psychology subject selected by Head of School
Milon Buneta	80.00	Best Psychology Year 2 performance by a student in the Bachelor of Science degree course in Psychology
Psychology Staff	80.00	Psychology Year 2

Graduate University Prizes

The following table summarizes the graduate prizes awarded by the University.

Donor/Name of Prize	Value $	Awarded

School of Chemistry

Smith Kline and French	100.00	Best performance in the Food and Drug Analysis graduate diploma course

School of Mathematics

Applied Mathematics	50.00	Excellence in Level 3 subjects in a bachelor degree or diploma course.
J. R. Holmes	50.00	Master of Arts pass degree course in Mathematics
Head of School	50.00	Excellence in four or more Mathematics units in Year 2 or a bachelor degree or diploma course
Pure Mathematics	50.00	Best performance in level 3 Pure Mathematics subjects in a bachelor degree or diploma course
School of Mathematics	50.00	Best performance in 10.001 Mathematics 1 in a bachelor degree or diploma course
	50.00	Best performance in basic Year 2 Higher Mathematics units in a bachelor degree or diploma course
	50.00	Excellence in four or more Mathematics units in Year 2 of a bachelor degree or diploma course

School of Optometry

Hydron Contact Lens	A trial fitting set of contact lens	31.705G Advanced Contact Lens Theory and Practice
Theo Kannis	250.00	31.701G Advanced Clinical Optometry

The University of New South Wales Kensington Campus

Theatres

Biomedical Theatres   E27
Central Lecture Block   E19
Classroom Block (Western Grounds)   H3
Rex Vowels Theatre   F17
Keith Burrows Theatre   J14
Main Building (Physics) Theatrette   K14
Mathews Theatres   D23
Parade Theatre   E3
Science Theatre   F13
Sir John Clancy Auditorium   C24

Buildings

Affiliated Residential Colleges
New (Anglican)   L6
Shalom (Jewish)   N9
Warrane   M7
Applied Science   F10
Architecture   H14
Arts (Morven Brown)   C20
Banks   F22
Barker Street Gatehouse   N11
Basser College   C18
Biological Sciences   D26
Central Store   B13
Chancellery   C22
Chemistry
Dalton   F12
Robert Heffron   E12
Civil Engineering   H20
Commerce and Economics (John Goodsell)   F20
Dalton (Chemistry)   F12
Electrical Engineering   G17
Geography and Surveying   K17
Goldstein College   D16
Golf House   A27
Gymnasium   B5
House at Pooh Corner   N8
International House   C6
Io Myers Studio   D9
John Goodsell (Commerce and Economics)   F20
Kanga's House   O14
Kensington Colleges   C17 (Office)
Basser   C18
Goldstein   D16
Philip Baxter   D14

Link   B6
Maintenance Workshop   B13
Materials Science and Engineering   E8
Mathews   F23
Mechanical and Industrial Engineering   J17
Medicine (Administration)   B27
Menzies Library   E21
Morven Brown (Arts)   C20
New College (Anglican)   L6
Newton   J12
NIDA   D2
Parking Station   H25
Philip Baxter College   D14
Robert Heffron (Chemistry)   E12
Sam Cracknell Pavilion   H8
Shalom College (Jewish)   N9
Sir Robert Webster (Textile Technology)   G14
Squash Courts   B7
Swimming Pool   B4
Unisearch House   L5
University Regiment   J2
University Union (Roundhouse) – Stage I   E6
University Union (Blockhouse) – Stage II   G6
University Union (Squarehouse) – Stage III   E4
Wallace Wurth School of Medicine   C27
Warrane College   M7

General

Academic Staff Office   C22
Accounting   F20
Admissions   C22
Adviser for Prospective Students   F15
Anatomy   C27
Applied Economic Research   G14
Applied Geology   F10
Applied Science (Faculty Office)   F10
Architecture (including Faculty Office)   H14
Arts (Faculty Office)   C20
Audio Visual Unit   F20
Australian Graduate School of Management   G27
Banking and Finance   F20
Biochemistry   D26
Biological and Behavioural Sciences
   (Faculty Office)   D26
Biomedical Engineering   A28
Biomedical Library   F23
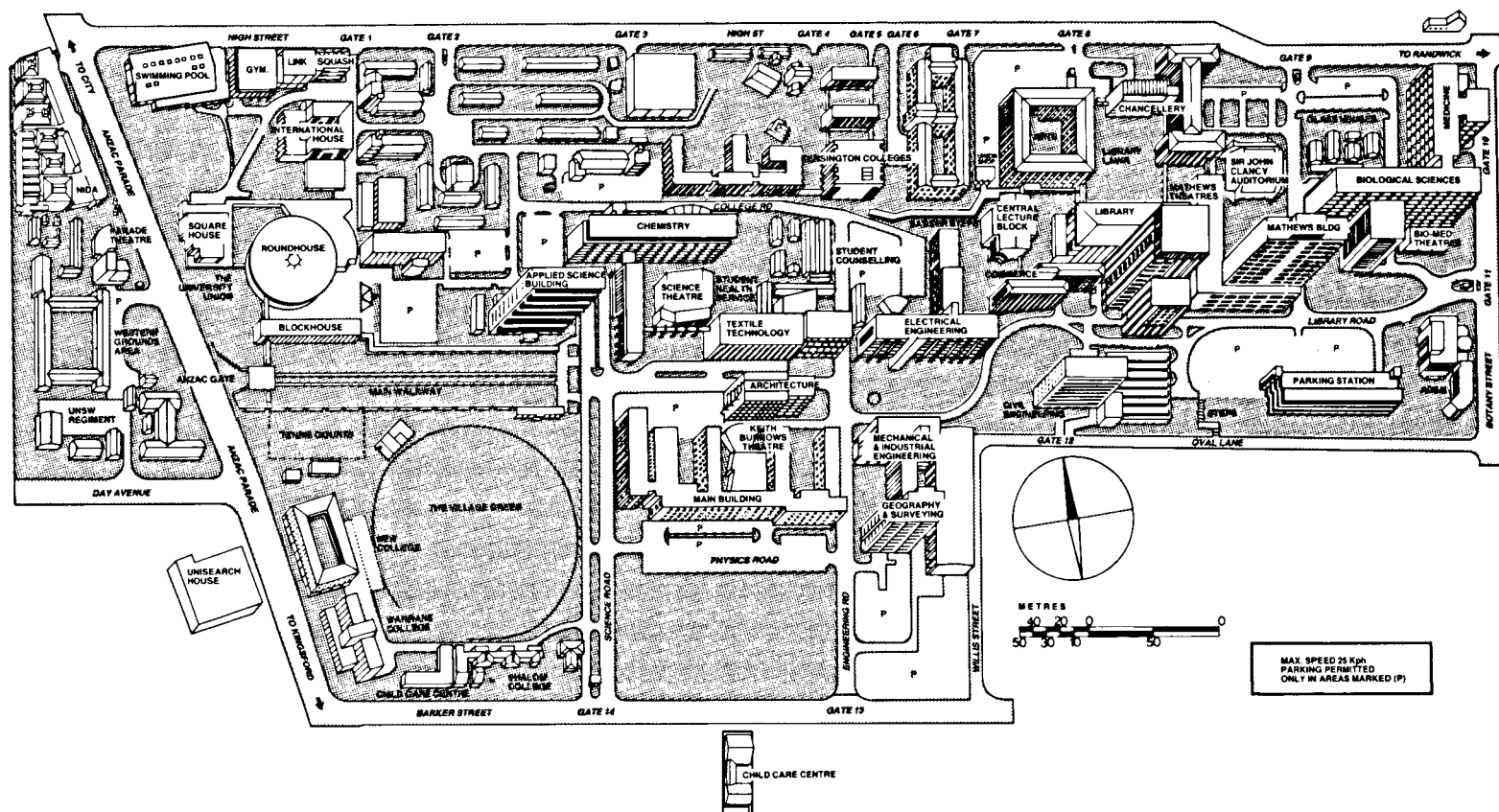Biotechnology   D26

Bookshop   G17
Building   H14
Careers and Employment   F15
Cashier's Office   C22
Chaplains   E15
Chemical Engineering and
   Industrial Chemistry   F10
Chemistry   E12
Child Care Centres   N8, O14
Civil Engineering   H20
Commerce and Economics (Faculty Office)   F20
Community Medicine   D26
Computing Services Department   F21, D26
Continuing Education Support Unit   F23
Counselling and Careers Service   F15
Economics   F20
Education   G2
Education Testing Centre   E15
Electrical Engineering and
   Computer Science   G17
Energy Research, Development and
   Information Centre   F10
Engineering (Faculty Office)   K17
English   C20
Ethics Committees Secretariat   B8
Examinations   C22
Fees Office   C22
Food Science and Technology   F10
French   C20
General Staff Office   C22
Geography   K17
German Studies   C20
Graduate Office and Alumni Centre   E4
Graduate School of the Built Environment   H14
Groundwater Management and
   Hydrogeology   F10
Health Administration   C22
History   C20
Industrial Arts   H14
Industrial Relations and Organizational
   Behaviour   F20
Information Systems   F20
Kanga's House   O14
Kindergarten (House at Pooh Corner)   N8
Landscape Architecture   K15
Law (Faculty Office)   F21
Law Library   F21
Legal Studies and Taxation   F20
Liberal and General Studies   C20
Librarianship   F23
Library   E21

Lost Property   C22
Marine Science   D26
Marketing   F20
Materials Science and Engineering   E8
Mathematics   F23
Mechanical and Industrial Engineering   J17
Medical Education   C27
Medicine (Faculty Office)   B27
Microbiology   D26
Mineral Processing and Extractive
   Metallurgy   E8
Mining Engineering   K15
Music   B11
National Institute of Dramatic Art   D2
Off-campus Housing   C22
Optometry   J12
Pathology   C27
Patrol and Cleaning Services   C22
Petroleum Engineering   D12
Philosophy   C20
Physics   K15
Physiology and Pharmacology   C27
Political Science   C20
Printing Unit   C22
Psychology   F23
Public Affairs Unit   C22
Publications Section   C22
Remote Sensing   K17
Russian Studies   C20
Safety Science   J17
Science and Mathematics Course Office   D26
Science and Technology Studies   C20
Social Work   G2
Sociology   C20
Spanish and Latin American Studies   C20
Sport and Recreation Centre   B6
Student Health   E15
Student Records   C22
Students' Union   E4 and C21
Surveying   K17
Tertiary Education Research Centre   E15
Textile Technology   G14
Theatre Studies   B10
Town Planning   K15
Union Shop (Upper Campus)   D19
University Archives   E21
University Press   A28
University Union (Blockhouse)   G6
Waste Management   H20
WHO Regional Training Centre   C27
Wool and Animal Science   B8

Grid columns: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Grid rows: A B C D E F G H J K L M N O

HIGH STREET GATE 1 GATE 2 GATE 3 HIGH ST GATE 4 GATE 5 GATE 6 GATE 7 GATE 8 GATE 9 TO RANDWICK

TO CITY

ANZAC PARADE

SWIMMING POOL
GYM.
LINK
SQUASH
INTERNATIONAL HOUSE
NIDA
PARADE THEATRE
SQUARE HOUSE
THE UNIVERSITY UNION
ROUNDHOUSE
BLOCKHOUSE
WESTERN GROUNDS AREA
UNSW REGIMENT
ANZAC GATE
TENNIS COURTS
MAIN WALKWAY
DAY AVENUE

UNISEARCH HOUSE

TO KINGSFORD

ANZAC PARADE

THE VILLAGE GREEN
NEW COLLEGE
WARRANE COLLEGE
CHILD CARE CENTRE
PHILIP BAXTER COLLEGE

BARKER STREET GATE 14 GATE 13

SCIENCE ROAD

APPLIED SCIENCE BUILDING
CHEMISTRY
COLLEGE RD
SCIENCE THEATRE
STUDENT HEALTH SERVICE
TEXTILE TECHNOLOGY
ARCHITECTURE
KEITH BURROWS THEATRE
MAIN BUILDING
PHYSICS ROAD

KENSINGTON COLLEGES
STUDENT COUNSELLING
CENTRAL LECTURE BLOCK
COMMERCE
ELECTRICAL ENGINEERING
CIVIL ENGINEERING
MECHANICAL & INDUSTRIAL ENGINEERING
GEOGRAPHY & SURVEYING
ENGINEERING RD
WILLIS STREET
GATE 18
GATE 19

CHANCELLERY
UNION
LIBRARY LAWN
LIBRARY
MATHEWS THEATRES
MATHEWS BLDG
SIR JOHN CLANCY AUDITORIUM
BIOLOGICAL SCIENCES
BIO-MED THEATRE
MEDICINE
GATE 10
GATE 11
BOTANY STREET
LIBRARY ROAD
PARKING STATION
OVAL LANE
GLASS HOUSE

METRES
50 40 30 20 10 0 50

MAX. SPEED 25 Kph
PARKING PERMITTED
ONLY IN AREAS MARKED (P)

CHILD CARE CENTRE

This Handbook has been specifically designed as a source of reference for you and will prove useful for consultation throughout the year.

For fuller details about the University – its organization, staff membership, description of disciplines, scholarships, prizes, and so on, you should consult the Calendar.

The Calendar and Handbooks also contain a summary list of higher degrees as well as the conditions for their award applicable to each volume.

For detailed information about courses, subjects and requirements of a particular faculty you should consult the relevant Faculty Handbook.

Separate Handbooks are published for the Faculties of Applied Science, Architecture, Arts, Commerce and Economics, Engineering, Law, Medicine, Professional Studies, Science (including Biological and Behavioural Sciences and the Board of Studies in Science and Mathematics), and the Australian Graduate School of Management (AGSM).

The Calendar and Handbooks, which vary in cost, are available from the Cashier's Office.