The University of New South Wales

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

1990
Faculty Handbook
Heraldic Description of Arms

Argent on a Cross Gules a Lion passant guardant between four Mullets of eight points Or a Chief Sable charged with an open Book proper thereon the word SCIENTIA in letters also Sable.

The lion and the four stars of the Southern Cross on the Cross of St George have reference to the State of New South Wales which brought the University into being; the open book with SCIENTIA across its page reminds us of its original purpose. Beneath the shield is the motto 'Manu et Mente' ('with Hand and Mind'), which is the motto of the Sydney Technical College, from which the University has developed. The motto is not an integral part of the Grant of Arms and could be changed at will; but it was the opinion of the University Council that the relationship with the parent institution should in some way be recorded.
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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 9 October, 1989, but may be amended without notice by the University Council.

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### Psychology

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Graduate Study: Subject Descriptions
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Chemistry
Civil Engineering
Mathematics
Psychology
Economics
Geography
Optometry
Biochemistry
Biotechnology
Microbiology
Biological Science
Safety Science
Faculty of Science
Anatomy
Faculty of Medicine
Faculty of Engineering

Graduate Study: Conditions for the Award of Higher Degrees
Doctor of Philosophy
Master of Chemistry
Master of Engineering, Master of Science
Master of Engineering, Master of Science and Master of Surveying, without supervision
Master of Mathematics
Master of Optometry
Master of Physics
Master of Psychology (Applied) and (Clinical)
Master of Science
Master of Science without supervision
Master of Statistics
Graduate Diploma

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Scholarships
Undergraduate
Graduate
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Undergraduate
Graduate
Calendar of dates

1990

Session 1 (67 teaching days)

Recess
26 February to 12 April
13 April to 22 April
23 April to 7 June

Study Recess
8 June to 13 June

Examinations
14 June to 2 July

Midyear Recess
3 July to 22 July

Session 2 (67 teaching days)

Recess
23 July to 21 September
22 September to 1 October
2 October to 31 October
1 November to 6 November

Study Recess

Examinations
7 November to 23 November
16 April to 22 April
24 September to 30 September

Vacation weeks
22 September to 30 September
28 September to 7 October
8 October to 6 November
24 September to 30 September

common to Australian universities
29 July to 27 September
22 September to 7 October
8 October to 6 November
30 September to 6 October

Important Dates for 1990

January

M 1 New Year’s Day – Public Holiday
F 5 Last day for acceptance of applications by office of the Admissions Section for transfer to another undergraduate course within the University
W 10 Last day for applications for review of assessment
M 15 Term 1 begins – Medicine IV and V
F 26 Australia Day – Public Holiday

February

M 5 Enrolment period begins for new undergraduate students and undergraduate students repeating first year
F 9 Re-enrolment period begins for second and later year undergraduate and graduate students enrolled in formal courses
F 23 Last day for acceptance of enrolment by new and re-enrolling students
M 26 Session 1 begins – all courses except Medicine IV and V and the University College

March

M 5 Session 1 begins – University College, Australian Defence Force Academy
F 9 Last day applications are accepted from students to enrol in Session 1 or whole year subjects
F 30 Last day for students to discontinue Session 1 and whole year subjects so as not to incur HECS liability
S 31 HECS Census Date for Session 1

April

Th 12 Last day for students to discontinue without failure subjects which extend over Session 1 only
F 13 Good Friday – Public Holiday
Mid-session Recess begins
S 14 Easter Saturday – Public Holiday
M 16 Easter Monday – Public Holiday
April
S 14 Easter Saturday – Public Holiday
M 16 Easter Monday – Public Holiday
Su 22 Mid-session Recess ends
W 25 Anzac Day – Public Holiday

May
T 8 Publication of provisional timetable for June examinations
W 16 Last day for students to advise of examination clashes
T 29 Publication of timetable for June examinations

June
Th 7 Session 1 ends
F 8 Study Recess begins
M 11 Queen’s Birthday – Public Holiday
W 13 Study Recess ends
Th 14 Examinations begin

July
M 2 Examinations end
Th 12 Assessment results mailed to students
F 13 Assessment results displayed on University noticeboards
Su 22 Mid-year Recess ends
M 23 Session 2 begins

August
Th 2 Last day for applications for review of Session 1 assessment results
F 3 Last day for students to discontinue without failure subjects which extend over the whole academic year.
Last day applications are accepted from students to enrol in Session 2 subjects.
F 31 HECS Census Day for Session 2.
Last day for students to discontinue Session 2 and whole year subjects so as not to incur HECS liability

September
F 7 Last day for students to discontinue without failure subjects which extend over Session 2 only
S 22 Mid-session Recess begins
F 28 Closing date for applications to the Universities and Colleges Admission Centre

October
M 1 Labour Day – Public Holiday
Mid-session Recess ends
T 2 Publication of provisional timetable for November examinations
W 10 Last day for students to advise of examination clashes
T 23 Publication of timetable for November examinations
W 31 Session 2 ends

November
Th 1 Study Recess begins
T 6 Study Recess ends
W 7 Examinations begin
F 23 Examinations end

December
M 10 Assessment results mailed to students
T 11 Assessment results displayed on University noticeboards
T 25 Christmas Day – Public Holiday
W 26 Boxing Day – Public Holiday
M 31 Public Holiday
Faculty of Biological and Behavioural Sciences*

Staff

Comprises Schools of Biochemistry, Biological Science, Microbiology and Psychology.

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Associate Professor Adrian Lee

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Dave Broutman, BA Calif., PhD Scripps

Professional Officer (Oceanography Group)
Gregory John Nippard, BSc Syd.

Honorary Associate
Simon Jacques Prokhovnik, BA MSc Melb.

Honorary Visiting Professor
Vilim Teodor Buchwald, BSc Manc., MSc PhD Lond., FIMA

Department of Statistics

Associate Professor
Clyde Arnold McGilchrist, BSc BEd Qld., MSc PhD N.S.W.

Senior Lecturers
Peter John Cooke, BSc MSc N.E., MS PhD Stan.
Deborah Jane Street, BSc Qld, PhD Syd.
Manohar Khanderao Vagholkar, MSc Born., DIC PhD Lond.

Lecturers
David Byron, BSc BE PhD N.S.W.
Geoffrey Kennedy Eagleson, BSc PhD Syd.
Marek Musiela, MMath Wroclaw, PhD Polish Acad. Sc., DSc Grenoble

Professional Officer
Sylvano Lucchetti, BSc N.S.W.

Honorary Associate
James Bartram Douglas, BSc MA DipEd Melb.

School of Optometry

Professor of Optometry and Head of School
Hermann Barry Collin, BSc MAppSc PhD Melb., LOSc V.C.O., FAAO

Associate Professor
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Senior Lecturers
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Philip James Anderton, BOptom BSc PhD N.S.W., MScOptom Melb.
David Philip Crewther, MSc Melb., PhD Cal. Tech.
Stephen John Dain, BSc PhD City Lond., FBCO, FAAO, FVCO
Daniel James O’Leary, BSc City Lond., MSc PhD Wales, FBOA, FSMC

Lecturers
Graham Leslie Dick, MSc N.S.W., ASTC, FIO
Angela Kathleen McCarthy, MSc N.S.W., ASTC, FIO
David Cecil Pye, MOptom N.S.W.

Senior Tutor
Barbara Maria Junghans, BOptom N.S.W.

Visiting Fellows
Jil Klein, BA City N.Y., OD Suny
Christine Ramsdale, MSc PhD Wis., FBOA, FSMC

Cornea and Contact Lens Research Unit
Director
Associate Professor Brien Anthony Holden

School of Physics

Professor of Physics and Head of School
John William Vanstan Storey, BSc LaT., PhD Monash

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

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

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

Professor
Dan Haneman, DSc Syd., PhD R’dg., FAIP, FRACI

Senior Lecturer and Executive Assistant to Head of School
Kenneth Reid Vost, BSc Glas., MSc PhD N.S.W., DipEd N’cle C.A.E.

Associate Professor and Director of First Year Studies
Graeme John Russell, BSc PhD N.S.W., MInstP., MAIP

Principal Tutor
Krystyna Wilk, MSc Cracow

Senior Tutors
Jaan Ferdinand Jouke Boersma, MSc Tas.
Gail Patricia Box, BSc PhD N’cle.(N.S.W.)
Gabriel Chirou, MSc Buch.
Ian Richard Dunn, BSc BA Melb., MIEEE
Edward Peter Eyland, BSc MPhysics N.S.W., BD Lond.
Philip George Spark, MSc DipEd Melb., GradAIP

Tutors
Paul Westley Brooks, BSc Adel.
Madan Mohan Kaila, BSc MSc Delhi, PhD N.S.W.
Joseph Khachan, BSc N.S.W.
Khin Sabai Lwin, BSc York(Can), MSc N.Y. State.
Victoria Suzanne Meadows, BSc N.S.W.
Darren John Pearce, BSc DipEd N.E., GradAIP
Kenneth George White, BSc PhD Tas.

Professional Officers
Terence Calvin Chilcott, BE Qld., MEngSc N.S.W.
Jack William Cochrane, BApplSc Canberra C.A.E., MPhysics N.S.W.
Patrick Thomas McMillan, BSc DipEd Syd.
Barry Perczuk, BSc PhD Monash
John McLaren Tann, BAppSc Melb.
Jeremy Karl Walter, BSc Lond.

Honorary Associates
John Stuart Dryden, MSc Melb., PhD DIC Lond., FAIP
Patrick Kelly, MA PhD ScD Camb., FAIP, MInstP

Honorary Visiting Fellows
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Zdenek Kviz, DipPhys Brno, CScRerNat
Dr Charles, PhD Prague
David Henry Morton, MA Oxf., FInstP, FAIP
Roderick Ian Sutherland, BSc LaT., DipEd PhD N.S.W.
Stephen George Szirmai, BSc PhD N.S.W.

Honorary Visiting Professor
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Department of Applied Physics

Senior Lecturer and Head of Department of Applied Physics
John Ian Dunlop, BSc PhD N.S.W., MAIP, MAAS

Department of Astrophysics and Optics

Senior Lecturer and Head of Department of Astrophysics and Optics
Betsy Louise Turtle, BSc Adel., PhD A.N.U.

Senior Lecturer
Peter Mitchell, BSc PhD Adel., MAIP

Lecturers
Michael Charles Brewster Ashley, MSc CalTech., BSc, PhD A.N.U.
Warrick Couch, PhD A.N.U.

Department of Biophysics

Associate Professor and Head of Department of Biophysics
James Martin Pope, MSc Brist., DPhil Sussex., AInstP

Associate Professor
Veronica Jean James, BA BSc Old., PhD N.S.W., MAIP

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
Senior Lecturer and Head of Department of Condensed Matter Physics
David John Miller, BSc PhD N.S.W., DipEd Syd., MAIP, MAmPS, MAAPT
Associate Professor
Graham James Bowden, BSc DipAdvStudSc PhD Manc., FAIP
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
George Lange Paul, MSc Syd., PhD Edin., FAIP
Lecturer
John Michael Cadogan, BSc Monash, PhD N.S.W., MAIP

Department of Theoretical Physics
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Jaan Oitmaa, BSc PhD DSc N.S.W., FAIP, MAmPS
Senior Lecturers
Michael Allister Box, BSc Monash, PhD Syd., MAIP
Christopher John Hamer, MSc Melb., PhD Calif. Inst. Tech., DipCompSc Canberra C.A.E., FAIP
Robert John Stening, MSc Syd., PhD Qld., DipTertEd N.E., MAIP, MAMOS
Lecturers
Gary Phillip Morriss BMath N’cle(N.S.W.), PhD Melb.
Marlene Noella Reed, BSc PhD N.S.W.
Introduction to the Sciences Handbook

This handbook has been designed to assist understanding of the academic activities of three interrelated 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 responsible for the undergraduate studies of students specialising 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 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.

It is University policy to promote equal opportunity in education (refer to EOE Policy Statement, University of New South Wales Calendar and Guide for Students 1990).

Enrolment Procedures

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

All students re-enrolling in 1990 should obtain a copy of the leaflet Re-Enrolling 1990: Procedures and Fees for Science Courses, available from Course Administration Offices and the Admissions Office. Students enrolling in graduate courses should contact the Postgraduate Section.

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 (SM90). The preliminary enrolment form is to be completed and returned to the Science and Mathematics Office by late December.

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.

General Education Requirement

The University requires that all 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 individuals, citizens and professionals.

The program requires students to undertake studies in three areas:

A. An introduction in non-specialist terms to an understanding of the environments in which humans function.

B. An introduction to, and a critical reflection upon, the cultural bases of knowledge, belief, language, identity and purpose.

C. An introduction to the development, design and responsible management of the systems over which human beings exercise some influence and control.

The exact form of category C is still being decided and should be clearly defined after 1989. 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 after 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.

2. Students who commenced their undergraduate program in or after 1988.

Students must complete a program of subjects selected from each of 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.

**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 undergraduate 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.

**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 undergraduate 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**

Rhonda Langford

**Undergraduate Services**

- 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
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.

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 ........................................ Professor D.C. Sandeman
School of Anatomy ....................................... Dr M.S.R. Smith
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 ......................... Dr. P.I. Dixon
Dr R.S. Vickery
School of Chemistry ...................................... Dr D. S. Alderdice
Dr T.J.V. Findlay Year 1
Dr D. N. Duffy Year 4
School of Community Medicine ....................... Dr L.Y.C. Lai
School of Electrical Engineering and Computer Science ................................. Ms V. Joubert
School of Geography .................................... Dr M. Melville
School of Information Systems ....................... Associate Professor R. Edmundson
School of Mathematics ................................... Dr D.C. Hunt (Year 1)
Miss J. Todd
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, Information Systems, (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 A.J. Wicken.

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 N. Fardouly.

*See Staff, listed earlier in this handbook.
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 prescribed 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 prerequisites 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 specialization is a program specifying only 4 Level III units in a discipline.

- A double specialization 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 10.011 Higher Mathematics, 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:

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 candidate 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.

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 degrees 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 upon 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 specialization are warned that due to timetabling difficulties it may take longer than three years to complete degree requirements, and any additional units above the minimum 23 required for the pass degree will attract an additional fee as voluntary subjects. 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
Biological Science see program 1700
Biochemistry see program 4100
Biotechnology see program 4200
Botany see program 1743
Business Information
Technology see course 3971
Chemistry see programs 0200, 0205
Community Medicine subjects available in some programs (the identifying number is 79)
Physics

The study programs offered by the School reflect the importance of Physics in science and technology at both the fundamental and 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:

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<th>Professional Training in Physics in other Courses</th>
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<td>Physics Program</td>
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<td>3820</td>
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</tbody>
</table>
Sciences

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 (e.g. 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 corequisites can be waived in certain cases, e.g. 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**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>1.001</th>
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<tbody>
<tr>
<td></td>
<td>10.001 or 10.011</td>
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<tr>
<td>Choose 4 Level I units from:* <strong>6</strong></td>
<td></td>
</tr>
<tr>
<td>1. Table 1 and/or</td>
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<tr>
<td>2. Table 2 for program 0100</td>
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</table>

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<tr>
<th>Year 2</th>
<th>1.002, 1.012, 1.022, 1.032</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1113*, 10.1114*, 10.2111*, 10.2112*</td>
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<tr>
<td>Choose 2 units from:** **</td>
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</tr>
<tr>
<td>1. Table 1 and/or</td>
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<td>2. Table 2 for program 0100</td>
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</table>

**1 General Education subject**

<table>
<thead>
<tr>
<th>Year 3</th>
<th>1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043</th>
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<tbody>
<tr>
<td>Choose at least 3 units from:** **</td>
<td></td>
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<tr>
<td>1. Table 1 and/or</td>
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<tr>
<td>2. Table 2 for program 0100</td>
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</tbody>
</table>

**1 General Education subject**

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

<table>
<thead>
<tr>
<th>Year 4 (Honours)</th>
<th>1.104, 1.304, 1.504</th>
</tr>
</thead>
</table>

**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.**

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### Geophysics

See program 2503

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### Recommended Elective Subjects

**Geology**

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### 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 (e.g., 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 requirements 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, (e.g., 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.

#### 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 I

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**

**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 units.**

#### Year 1

| 1.001 |
| 2.141 or both 2.121 and 2.131 |
| 10.001, 10.011 or both 10.021B and 10.021C |

Choose 2 Level I units from Table I

#### Year 2*

| 2.102A, 2.102B, 2.102C, 2.102D |

Choose 3 units from Table I

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

**Recommended Elective Subjects**

Biochemistry

Biotechnology

Computer Science

Geology

Mathematics

Physics

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. It is, however, noted that non-computing elements (such as human interface or psychological aspects) can often dictate the level of success of computing systems. 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 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 normally by direct selection at university entry. A small number of students are admitted 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, complete 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 permitted to enrol in further Computer Science units with the agreement of 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 was 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 computer 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*

<table>
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<tr>
<th>Year 1*</th>
<th>6.711, 6.712</th>
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<tr>
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<tr>
<td>Choose 3 Level I units from:**</td>
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<td>2. Table 2 for program 0600 and/or</td>
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<td>3. The BA course</td>
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<th>Year 2</th>
<th>6.721, 6.722, 6.723</th>
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<tbody>
<tr>
<td>Choose 5 units from:**</td>
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<td>2. Table 2 for program 0600 and/or</td>
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<td>3. The BA course</td>
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<td>1 General Education subject</td>
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<tr>
<th>Year 3</th>
<th>Choose 4 Level III Computer Science units</th>
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<tbody>
<tr>
<td>Choose 3 units from:**</td>
<td>1. Table 1 and/or</td>
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<td>2. Table 2 for program 0600 and/or</td>
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<td>3. The BA course</td>
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<td>1 General Education subject</td>
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<tr>
<th>Year 4 (Honours)</th>
<th>6.606</th>
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*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 15.203E, 15.204E (6 BA degree credit points at Level I or 4 credit points at Upper Level are equivalent to 1 science unit).
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, 10.1521 and 10.1524 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 and 10.1522 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 II
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.

Students considering an honours year in Pure Mathematics should consult Pure Mathematics Department staff to arrange courses to suit their interests.

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, 10.261A.

Year 3: At least three of 10.212A, 10.212B, 10.212D, 10.212L, 10.212M, 10.212N, 10.262A, 10.292A.

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, 15.101E, 15.102E. 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.

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

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***

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

Year 1

10.001 or 10.011

Choose 6 Level I units from:* Mathmatics
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:* Mathematics
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
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 15.203E, 15.204E. (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 Mathematics are advised to include at least three units of Level III Higher Pure Mathematics units (total value). However, students who have obtained a credit average in at least four Level III Mathematics units may also be considered for entry into Pure 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.

1061 Mathematics or Statistics/Computer Science

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

Year 1††
6.711
10.001 or 10.011, 10.081
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
4 Level III Statistics units
Choose further units from Mathematics and/or Computer Science to make a total of 8 for the year.
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.

1061 Mathematics or Statistics/Computer Science

Year 1††
6.711
10.001 or 10.011, 10.081
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
4 Level III Statistics units
Choose further units from Mathematics and/or Computer Science to make a total of 8 for the year.
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.

1061 Mathematics or Statistics/Computer Science

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

Year 1††
6.711
10.001 or 10.011, 10.081
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
4 Level III Statistics units
Choose further units from Mathematics and/or Computer Science to make a total of 8 for the year.
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 Elective Subjects

Computer Science
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.

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). In Year 3 students must take 8 Level III Psychology units including 12.300 12.341 and 12.342 for 12.404 in Year 4. Additionally, students intending to take 12.403 in Year 4 are required to also include 12.301.

Recommended Elective Subjects
Anatomy
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. See also Course 3971.

1400 Information Systems

Year 1*
6.711
10.001 or 10.011
Choose 5 Level I units from:
1 General Education subject
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).

1700

Biological Science

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
Choose 2 level 1 units from Table 1

*Students with an interest in molecular aspects of plant science should choose at least two of 41.132, 41.122 or 41.142.

1743

Botany

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

Year 2
17.050, 17.601
41.101
17.702, 17.712 and 2 units from 17.722, 17.732 and 44.121
1 General Education subject

Year 3
Choose 5 units from 17.703, 17.713, 17.723, 17.733, 17.743, 17.753, 17.763, 17.773, 17.783, 17.793, 17.803, 17.813, 17.8321 and 17.8232, 17.833, 44.172
Choose 2 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)
17.004

1745

Zoology

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

Year 2
17.050, 17.601
41.101
17.712, 17.702
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 17.703, 17.713, 17.723, 17.743, 17.833, 44.172
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)
17.434
of Studies in Science and Mathematics by the Department of the well-being of modern society. Thus geology has an applied, professional function as well as being a scientific discipline.

Geology

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

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. Students who have completed such studies may undertake an honours degree that includes geology with another science and 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, and the Combined Science/Law Course 4770.

2500
Geology

Year 1
1.001*  
2.141 or both 2.121 and 2.131  
10.001 or 10.011 or both 10.021B and 10.021C  
25.110, 25.120

Year 2
25.211, 25.212, 25.221  
Choose at least 4.5* units from:  
1. 25.223, 25.2261 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:  
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 subjects. Students following a combination of Applied Geology with Botany and/or Zoology are permitted in Year 1 to substitute the two Biology subjects, 17.031 17.041, for 1.001. In Year 2 they should take 17.702, 17.712, 17.722, 17.732 and 1 unit chosen from 17.012 and 17.703; in Year 3 25.324, either 25.321 or 25.325, 17.613 and 2 units chosen from 17.723, either 17.703, 17.743, 17.763, 17.773, 17.8231.

2503
Geophysics

Year 1
1.001  
2.141 or both 2.121 and 2.131  
10.001 or 10.011  
25.110, 25.120

Year 2
1.002, 1.012, 1.022, 1.032  
10.2111, 10.2112

25.5212, 25.223, 25.2261  
2 General Education subjects

Year 3
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 Elective Subjects

Biological Science  
Chemistry  
Geography  
Mathematics  
Physics

Earth and Environmental Science

This program is a combined course in Geology and Geography. It is designed to enable the graduate to understand and evaluate present geological processes and their relationships with the land surface. The effects on the natural processes of the various human activities, from industrial pressures to urban developments, are considered in detail and form an integral part of the course. The community's needs for future developments in a variety of environments and the vital role of environmental interdisciplinary safeguards have been among the main guide-lines in the selection of subjects within the course.

2527
Earth and Environmental Science

Year 1
2.141 or both 2.121 and 2.131  
10.001 or 10.011 or both 10.021B and 10.021C  
25.110, 25.120  
27.010, 27.030, 27.040

Year 2
17.031, 17.041  
25.211, 25.212, 25.511  
27.175, 27.183, 27.813  
1 General Education subject

Year 3
25.312, 25.622  
27.133, 27.143
Sciences

Choose at least 3 units from:
27.176, 27.223, 27.431, 27.652
17.702, 17.713, 17.722, 17.723, 17.732
1 General Education subject

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

Year 4 (Honours)
25.435 or 27.844

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 (e.g., 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 Biological Science, are encouraged. Geography may also be studied together with Geology in the Earth and Environmental Science Program 2527, or in conjunction with Biological Science in the Ecology Program 6851. Details of particular courses of study and subject combinations offered within these programs are available from the School Office.

2700 Geography

Year 1
10.001 or 10.011 or both 10.021B Mathematics
10.021C
Both 27.818 and 27.819
or both 27.010 and 27.030 Geography
Choose further Level I units from Table 1 to make a total of 8

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, chemistry, 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

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
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 Elective Subjects
Biological Science
Biotechnology
Chemistry

Microbiology
Physiology

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

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
Choose 2 Level 1 units from Table 1

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

Year 3
42.102A, 42.102B, 42.102C, 42.102H
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)**

44.103

*Students wishing to include 44.122 Immunology in their program are strongly advised to take 70.011A Histology I in Year 2. The subject 17.712 Biometry is recommended as a useful elective. In particular, students interested in 44.142 Environmental Microbiology or in a research career in any area are strongly advised to take this subject.*

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### Recommended Elective Subjects

- Biochemistry
- Chemistry
- Microbiology

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### 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 biodegradation of pollutants, 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.

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**4400 Microbiology***

**Year 1**

2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B
and 10.021C
17.031, 17.041

Choose 2 Level 1 units from Table 1

**Chemistry**

**Year 2**

17.050, 17.601
41.101
44.121

Choose 2 or 3 units from Table 1

1 *General Education subject*

**Mathematics**

**Biology**

**Year 3**

44.102, 44.152
Choose at least 2 units from 17.833, 44.122, 44.132, 44.142, 44.162, 44.172

Choose other 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.

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### 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**

Most Level II/III subjects in Philosophy have one unit value. The remainder are half units, of which three together can be counted as two science units.

**Specialization in Philosophy**

Students specializing in Philosophy must complete, in addition to 52.103 and 52.104 (Introductory Philosophy A and Introductory Philosophy B), the equivalent of six full-point Upper Level (II/III) units. Of these, at least four units must be chosen from List A, which includes subjects in Logic, Philosophy of Mind, Philosophy of Science, and areas of History of Philosophy relevant to those subject areas. Students normally take the equivalent of two Level II/III units in Year 2, and the equivalent of four Level II/III units in Year 3.

**List A**

- 52.220 Logic
- 52.231 Human Nature and Human Understanding: the Empiricist Approach
- 52.2001 The Nature of Mind
- 52.250 Contemporary Philosophy of Mind
52.251 Issues in the Philosophy of Psychology
52.210 Reasoning Skills
52.222 Body, Mind, Knowledge and Freedom
52.215 Reason and the Passions: Descartes, Spinoza and Hume
52.226 Philosophical Foundations of Artificial Intelligence
52.2140 Scientific Method
52.232 Personal Identity
52.304 Advanced Philosophy of Science
52.395 Pre-Honours Seminar

The remaining two units are to be chosen from other Upper-Level Philosophy subjects in Table 1 or 60.014 in Table 2.

**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.

**Honours Entry Requirements**

Students intending to proceed to an Honours degree in Philosophy, complete Years 1 - 3 of Programs 5200 or 5262 with an overall credit record — and some indications of Distinction ability — in the Philosophy units included in those programs; plus 52.395 Pre-Honours Seminar.

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### 5200

**Philosophy**

**Year 1**

10.001 or 10.011 or both 10.021B and 10.021C

52.103, 52.104

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

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units including 52.395.

**Year 4 (Honours)**

52.4000

*A combination of 3 half unit Philosophy subjects count as the equivalent of 2 Science units. Refer to List A for compulsory subjects on previous page.

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### 5262

**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 Philosophy or Science and Technology Studies. The regulations are set out below under the school headings. Intending students should consult the School of Science and Technology Studies at the earliest opportunity.

**Year 1**

10.001 or 10.011 or both 10.021B and 10.021C

Choose 1 unit from:

52.103, 52.104 or 62.1021, 62.1151, 62.1041

Choose 5 Level I units from Table 1

1 General Education subject

**Year 2**

52.220

52.2140 or 62.2202U

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:

52.251, 52.2140, 62.202U, 62.207U, 62.301U

Choose 3 units from Table 1

1 General Education subject

Students proposing to proceed to year 4 (Honours) must complete 7 Level III units including 52.395.

**Year 4 (Honours)**

52.4000 or 62.400H
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
   62.101I, 62.104I, 62.115I

2. Level II/III units
   62.201U, 62.202U, 62.207U,
   62.214U, 62.217U,
   62.218U, 62.219U, 62.224U

3. Level III units
   62.300U, 62.301U, 62.305U

Social Studies of Science and Technology

1. Level I units
   62.101I, 62.103I

2. Level II/III units

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

Year 1
10.001 or 10.011 or both 10.021B
and 10.021C
62.101I or 62.102I or 62.115I
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

*62.251, 62.443 and 26.2506 may not be included in this program.
Recommended Elective Subjects

Anatomy
Biological Science
Geology

Board of Studies in Science and Mathematics

6801
For Anatomy Programs

Year 1
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041

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 or Information Systems Programs

Year 1
10.001 or 10.011, 10.081
6.711

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*†

Year 1
10.001 or 10.011
14.501, 14.511
15.101E, 15.102E

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 corresponding 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
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041

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.

In 1989 the Faculty of Biological and Behavioural Sciences introduced a compulsory common core in Level II consisting of four units as follows: Principles of Biochemistry and Molecular 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 1700 Biological Science, 1743 Botany, 1745 Zoology, 4100 Biochemistry, 4200 Biotechnology, and 4400 Microbiology. 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.
Marine Science

The Marine Science programs are designed to provide opportunities 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 Science 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 Oceanography and 10.212B Fluid Mechanics. At Honours level, units in waves, turbulence and geophysical fluid mechanics are offered.

Biological Oceanography includes basic Mathematics, Chemistry and Biology as well as advanced courses in 17.702 Flowering Plants, 17.722 Biology of Invertebrates, 17.743 Phycology and Marine Botany, 17.763 Marine Ecology, 44.101 Introductory Microbiology and 44.152 Environmental Microbiology. Further options include 10.331 Statistics and 41.101 Biochemistry.


Environmental Chemistry includes basic Chemistry and Mathematics, and 2.102A Physical Chemistry, 2.102D Analytical Chemistry, 2.123E Environmental Chemistry and 2.103D Analytical 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)

Year 1
1.001
1.041 or 6.711
10.001 or 10.011
Choose 2 units from 1 of the strands:
1. 2.141 or both 2.121 and 2.131

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: 17.050, 17.733, 17.702 or
3. 25.621
Choose 2 additional units from Table 1 to give a total of 8
1 General Education subject

Year 3
10.212N
10.292A
10.212D or 10.222D
10.212B or 10.222B
10.0331
68.313
Choose 2.5 units from: 1.022, 1.032, 1.3533, 1.062, 1.133,
10.212A, 10.262A, 25.6342, 17.763 or 25.631 or 25.632 or
2.043A or 17.743 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)

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B
and 10.021C
17.031, 17.041
Choose 2 units from 1 of the strands:
1. 1.001 or 1.021 or
2. 25.110, 25.120

Year 2
2.102A
17.702
44.101
17.722
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: 17.050, 17.601, 17.712, 17.732, 41.101 to
given a total of 8 for the year
1 General Education subject
Year 3
17.743, 17.763
44.152

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 2 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

6834
Marine Science (Environmental Chemistry)

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011

Choose 4 units from 2 of the strands:
1. 1.001 and/or
2. 17.031, 17.041 and/or
3. 25.110, 25.120

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: 17.050, 17.702, 17.722 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. 17.743, 17.763 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.


**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 Botany, Zoology, and Geography; Program 6852 Mathematical Ecology provides for a concentration of subjects in Botany, Zoology 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 must be discussed with a program adviser. A fourth (Honours) year in Ecology is available in all programs.

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**6851 Geographical Ecology**

**Year 1**
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
Choose 1 of the strands:
1. 25.110, 25.120
2. 2.141 or both 2.121 and 2.131
3. 2 Level I units from Table 1

**Year 2**
17.072, 17.722 or 17.732, 17.712 or 27.175, 27.223
Choose at least 2 units from:
17.050, 17.601, 17.722, 17.732, 25.212, 25.622, 27.176, 27.183, 27.193, 44.101, 44.121
1 General Education subject

**Year 3**
Choose at least 2 units from:
17.703, 17.713, 17.763, 17.783, 17.793, 17.813, 17.8231 and 17.8232, 27.175, 27.176, 27.183, 27.193, 27.213, 44.142 and 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 6 Level III units

**Year 4 (Honours)**
68.504

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

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**6852 Mathematical Ecology**

**Year 1**
1.041, 6.711
10.001 or 10.011
17.031, 17.041
Choose 1 of the strands:
1. 1.001 or 1.021
2. 2.141 or both 2.121 and 2.131
3. 27.010, 27.030,

**Year 2**
10.311A, 10.311B, 10.111A, 10.1113
17.702 and 17.722 or 17.732
Choose at least 2 units from:
10.3111, 10.3112, 10.500, 17.601, 17.722, 17.732, 27.175, 27.176, 27.183, 27.193, 27.223, 44.101 or 44.121
1 General Education subject
Year 3
17.723, 17.733
27.143
Choose at least 3 units from:
10.311, 10.312, 10.312A, 10.312C, 10.312F, 10.312U, 10.3122, 10.3123, 10.3124
Choose at least 1 unit from:
17.703, 17.713, 17.753, 17.763, 17.773, 17.783, 17.793, 17.803, 17.813, 17.823, 27.050, 27.133, 27.213, 27.223, 44.142
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 6 Level III units.

Year 4 (Honours)
68.504

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

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. 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 elective subjects from Biochemistry (70.304 or 70.3041 recommended), Physiology or Psychology.

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

6853
Biological Ecology

Year 1
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
27.010, 27.030

Year 2
17.050, 17.601
41.101
17.702, 17.712
Choose at least 2 units from:
17.722, 17.732, 44.101 or 44.121
1 General Education subject

Year 3
17.723, 17.733
27.143
Choose 2 further units including at least 1 at Level III from:
17.703, 17.713, 17.753, 17.763, 17.773, 17.783, 17.793, 17.803, 17.813, 17.823, 27.050, 27.133, 27.213, 27.223, 44.142, 44.172
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 6 Level III units.

Year 4 (Honours)
68.504

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

7000
Anatomy

Year 1
10.001 or 10.011 or both 10.021B and 10.021C
17.031, 17.041
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.
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, Zoology, 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 an award of the 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.

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Recommended Elective Subjects

Anatomy
Biological Science
Biochemistry
Chemistry
Psychology
Course Outline 3971

3971
Business Information Technology

Bachelor of Science
BSc

This is an industry linked education course leading to the award of the qualification BSc. The course draws on three core disciplinary areas: Information Systems, Accounting, and Computer Science.

The course has been designed in conjunction with the Information Systems industry to provide for the needs of Australian Businesses. The course combines the normal requirements for the award of the degree with co-ordinated industrial experience in the sponsoring organisations. A scholarship is payable from a fund donated by the sponsoring organisations. Entry to the course is limited to students awarded a scholarship through the BIT selection Procedure.

Consideration for entry to the course may proceed only on the basis of an application directly to the Office of Industry Linked Education at the University of New South Wales and application through UCAC.

Objectives of the Course
This four year program teaches Information Systems (see Program 1400 in Course 3970 for a description) and provides industrial training linked to that teaching. 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.

Year 1
6.711,
10.001 or 10.011
14.501, 14.511
19.602
15.101E, 15.102E

Year 2
19.603, 19.609
19.691
6.712
Choose 2 units from:
1. Table 1 and/or
2. Table 2 for program 1400
1 General Education subject

Year 3
10.331
19.692
Choose 1 unit from:
1. Table 1 or
2. Table 2 for program 1400

Year 4
19.607, 19.611
19.693
Choose 2 units including at least one at Level III from:
1. Table 1 and/or
2. Table 2 for program 1400
1 General Education subject
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

3725
Combined Science/
Electrical Engineering Course

3730
Programs in the
Combined Science/
Civil Engineering Course

For details of the Combined Science/Aeronautical Engineering, Industrial Engineering, Mechanical Engineering, Electrical Engineering, Civil 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 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.

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

3995
Combined Science/Commerce Course
Finance and Mathematics

For details of the Combined Science/Commerce Course refer to the Faculty of Commerce and Economics Handbook.
4075
Combined Science/ Education Course

For details of the Combined Bsc BEd Course refer to the Faculty of Professional Studies Handbook.

4770
Combined Science/ Law Course

For details of the Combined Science/law course refer to the Faculty of Law Handbook.
### Units offered by the Board of Studies in Science and Mathematics

#### Table 1

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Level</th>
<th>Unit</th>
<th>When Offered</th>
<th>Hpw</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
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<td>1.001</td>
<td>Physics 1</td>
<td>I</td>
<td>2</td>
<td>F</td>
<td>6</td>
<td>See Subject Descriptions later in this Handbook</td>
<td>10.021C, or 10.001</td>
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<td>1.021</td>
<td>Introductory Physics†</td>
<td>I</td>
<td>2</td>
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<td>6</td>
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<td>10.021B and 10.021C or 10.011</td>
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<td></td>
<td>(For Health and Life Scientists)</td>
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<td>or 10.001 or 10.011</td>
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<td>1.041</td>
<td>Laboratory Computers in Physical Science</td>
<td>I</td>
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<td>10.021B and 10.021C or 10.001</td>
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<td>Programs</td>
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<td>1.021 or 10.001</td>
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<td>1.001</td>
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<td>1.061</td>
<td>Computer Applications in Experimental Science 1</td>
<td>I</td>
<td>1</td>
<td>S2</td>
<td>6</td>
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<td>1.001 or 10.021</td>
<td>1.041</td>
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**Physics Level II***

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<th>Level</th>
<th>Unit</th>
<th>When Offered</th>
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<th>Prerequisites</th>
<th>Co-requisites</th>
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<tr>
<td>1.002</td>
<td>Mechanics, Waves and Optics</td>
<td>II</td>
<td>1</td>
<td>S1</td>
<td>4</td>
<td>1.001, 10.001</td>
<td>10.2111</td>
<td>10.4111, 10.4211, 1.992</td>
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<td>No.</td>
<td>Name</td>
<td>Level</td>
<td>Unit</td>
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<td>Prerequisites</td>
<td>Co-requisites</td>
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<td>1.012</td>
<td>Electromagnetism and Thermal Physics</td>
<td>II</td>
<td>1</td>
<td>S2</td>
<td>4</td>
<td>1.001, 10.001</td>
<td>10.2111</td>
<td>6.825, 1.992</td>
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<td>1.022</td>
<td>Modern Physics</td>
<td>II</td>
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<td>1.001, 10.001</td>
<td>10.2112</td>
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<td>1.032</td>
<td>Laboratory</td>
<td>II</td>
<td>1</td>
<td>F</td>
<td>3</td>
<td>1.001, 10.001</td>
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<td>1.9222</td>
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<td>1.0522</td>
<td>Methods in Mathematical Physics</td>
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<td>.5</td>
<td>S1</td>
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<td>10.2111, 10.2112, 10.1113</td>
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<td>1.062</td>
<td>Computer Applications in Experimental Science 2</td>
<td>II</td>
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<td>S1</td>
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<td>1.9222</td>
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<td>II</td>
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<td>S1</td>
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<td>1.032</td>
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<td>1.9422</td>
<td>Introduction to Physics of Measurement</td>
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**Physics Level III**

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<th>Hpw</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
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<td>Quantum Mechanics</td>
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<td>.5</td>
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<td>2.023A, 10.222F</td>
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<td>Statistical Mechanics and Solid State Physics</td>
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<td>1.012, 1.022</td>
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<td>.5</td>
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<td>1.1833</td>
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<td>.5</td>
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†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 2640 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.

‡Offered in odd-numbered years only.

‡‡ Offered in even-numbered years only.

### Chemistry

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

### Mechanical and Industrial Engineering

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*These subjects must be studied in pairs as indicated by the parenthesis.*
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‡ 6.712 Computing 1B will count as a Level I subject for students in Program 0600

## Mathematics

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‡ Mathematics 10.031 is 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.
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**Pure Mathematics Level II**

- **10.111A** Linear Algebra  
  II  
  1  
  F  
  2.5  
  10.001 or 10.011  
  10.121A

- **10.1113** Real Analysis  
  II  
  .5  
  S1 or S2  
  2.5  
  10.001 or 10.011  
  10.1213

- **10.1114** Complex Analysis  
  II  
  .5  
  S1 or S2  
  2.5  
  10.001 or 10.011  
  10.1214

- **10.1115** Finite Mathematics  
  II  
  .5  
  S1  
  2  
  10.001 or 10.011**

- **10.1116** Automata and Algorithms  
  II  
  .5  
  S2  
  2  
  10.001 or 10.011**

**Higher Pure Mathematics Level II††**

- **10.121A** Algebra  
  II  
  1  
  S2  
  4.5  
  10.011 or 10.001 CR  
  10.111A

- **10.1213** Real Analysis  
  II  
  .5  
  S1  
  2.5  
  10.011 or 10.001 CR  
  10.1113

- **10.1214** Complex Analysis  
  II  
  .5  
  S1  
  2.5  
  10.1213  
  10.1114

**Pure Mathematics Level III***

- **10.1111** Group Theory  
  III  
  .5  
  S1  
  2  
  ***  
  10.121A

- **10.1112** Geometry  
  III  
  .5  
  S2  
  2  
  ***  
  10.14424

- **10.1121** Number Theory  
  III  
  .5  
  SS  
  2  
  ***  
  10.1421

- **10.1123** Logic and Computability  
  III  
  .5  
  SS  
  2  
  ***

- **10.1124** Combinatorial Topology  
  III  
  .5  
  SS  
  2  
  ***

- **10.1125** Ordinary Differential Equations  
  III  
  .5  
  S1  
  2  
  10.111A, 10.1114  
  10.1425

- **10.1126** Partial Differential Equations  
  III  
  .5  
  S2  
  2  
  10.1113, 10.1114  
  10.1125

- **10.1127** History of Mathematics  
  III  
  .5  
  SS  
  2  
  ***

- **10.1128** Foundations of Calculus  
  III  
  .5  
  SS  
  2  
  ***

- **10.11521** Combinatorial Structures and Applications  
  III  
  .5  
  SS  
  2  
  ***

- **10.1522** Differential Geometry  
  III  
  .5  
  SS  
  2  
  10.1113  
  10.1325

- **10.1524** Communication, Codes and Ciphers  
  III  
  .5  
  SS  
  2  
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**Higher Pure Mathematics Level III †††**

- **10.122B** Real Analysis and Functional Analysis  
  III  
  1  
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  2  
  10.121A or 10.111A CR  
  10.1213 or 10.1113 CR  
  10.1128

- **10.1321** Rings and Fields  
  III  
  .5  
  S1†  
  2  
  10.121A or 10.111A CR  
  †††

- **10.1322** Galois Theory  
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  .5  
  S2‡  
  2  
  †††  
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††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.

### Applied Mathematics Level III

- **10.0331 Transform Methods**
  - Level: III
  - Value: .5
  - Unit: S2
  - Prerequisites: 10.1114, 10.2111, 10.2921

- **10.212A Numerical Analysis**
  - Value: 1
  - Unit: S1
  - Prerequisites: 10.2112, 10.111A, 10.222A

- **10.212B Fluid Dynamics**
  - Value: 1
  - Unit: S1
  - Prerequisites: 10.2111, 10.2112, 10.222B, 10.422A

- **10.212D Mathematical Methods**
  - Value: 1
  - Unit: S1
  - Prerequisites: 10.2112, 10.111A, 10.222D, 10.412D

- **10.212L Optimization Methods**
  - Value: 1
  - Unit: S2
  - Prerequisites: 10.111A, and 10.2111 or 10.1113

- **10.212M Optimal Control**
  - Value: 1
  - Unit: S2
  - Prerequisites: A total of two level II Mathematics units which must include either 10.2111 or 10.1113

- **10.212N Dynamical Systems**
  - Value: 1
  - Unit: S2
  - Prerequisites: 10.111A, 10.2112, 10.1113

- **10.262A Mathematical Computing B**
  - Value: 1
  - Unit: S2
  - Prerequisites: 10.2112, 10.031, 1.001

- **10.292A Oceanography**
  - Value: 1
  - Unit: S2
  - Prerequisites: 10.2111, 10.2112 or 10.031, 1.001

### Theory of Statistics Level II

- **10.311A Probability and Random Variables**
  - Value: 1
  - Unit: S1
  - Prerequisites: 10.001 or 10.011 or 10.021C CR

- **10.311B Basic Inference**
  - Value: 1
  - Unit: S2
  - Prerequisites: 10.311A

- **10.311L Statistical Computing and Simulation**
  - Value: .5
  - Unit: S1
  - Prerequisites: 10.001 or 10.011 or 10.021C CR
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#### Higher Theory of Statistics Level II

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**For a student taking four of the higher units 10.322A, 10.322B, 10.322C, 10.322D, 10.3222, 10.3223, 10.3224, 10.312F is required to take 10.3225.**

**Psychology**

**Psychology Level I**

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

*At least four units from 10.322A, 10.322C, 10.322D, 10.3222, 10.3223, 10.3224, 10.322D, 10.312F.*
## Psychology Level III

See Notes

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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 either 12.200 Research Methods 2 or 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 student may not enrol in more than eight Level III Psychology units in course 3970.
5. Not all Level III Psychology units will necessarily be offered in each year.
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Sciences

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

*Students with percentile range 65-100 in HSC Examination 4 unit Science with Biology, or 2 unit Biology may apply to enrol in 17.722 or 17.732 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.

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; 10.312A; 10.331 may be substituted for 17.712 with special permission of the Head of the School.

Applied Geology

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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.
### Geography

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### Sciences

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*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.

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#### Biochemistry

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**Level II status in Philosophy consists of 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.

***Level III Status in Philosophy consists of having an overall standard of credit or higher in 8 Philosophy units.

#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.

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

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**Board of Studies in Science and Mathematics**

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### Pathology

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### Physiology and Pharmacology

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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 and/or Pharmacology should note Physiology 2 prerequisites.

### Community Medicine

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Note: 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**

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*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.

**Not available in Year 1 of programs 0600, 1000, 1400.

†††May be counted in Courses 3611, 3661, 3681 and 3701 in special circumstances only.

§§§0.304 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.
Table 3: Level IV units offered by the Board of Studies in Science and Mathematics

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.

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<td>10</td>
<td>F</td>
<td>Program 1000</td>
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</tr>
<tr>
<td>12.403</td>
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<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 1200</td>
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<tr>
<td>12.404</td>
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<td>10</td>
<td>F</td>
<td>Program 1200</td>
<td>8</td>
</tr>
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<td>17.004</td>
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<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 1700</td>
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<tr>
<td>17.434</td>
<td>Botany 4</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>4 Level III Botany units or a closely related discipline,</td>
<td>7</td>
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<tr>
<td>17.454</td>
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<td>IV</td>
<td>10</td>
<td>F</td>
<td>4 Level III Zoology units,</td>
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<td>19.794</td>
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<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 1400</td>
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<td>No.</td>
<td>Name</td>
<td>Level</td>
<td>Unit</td>
<td>When Offered</td>
<td>Prerequisites in Years 1, 2, 3 or 4</td>
<td>Number of Level III Units Required</td>
</tr>
<tr>
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<td>25.435</td>
<td>Geology 4 (Honours)</td>
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<td>10</td>
<td>F</td>
<td>Programs 2500, 2503, 2527</td>
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<tr>
<td>27.844</td>
<td>Geography 4 (Honours)</td>
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<td>10</td>
<td>F</td>
<td>Program 2700, 2527, 6851</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27.050 or 27.884</td>
<td></td>
</tr>
<tr>
<td>41.103</td>
<td>Biochemistry 4</td>
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<td>10</td>
<td>F</td>
<td>4 Level III Biochemistry units</td>
<td>8</td>
</tr>
<tr>
<td>42.103</td>
<td>Biotechnology 4</td>
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<td>10</td>
<td>F</td>
<td>4 Level III units in Biotechnology or related discipline.</td>
<td>8</td>
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<tr>
<td>44.103</td>
<td>Microbiology (Honours)</td>
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<td>10</td>
<td>F</td>
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</tr>
<tr>
<td>52.4000</td>
<td>Philosophy (Honours)</td>
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<td>10</td>
<td>F</td>
<td>Programs 5200, 5262, 52.395</td>
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</tr>
<tr>
<td>62.400H</td>
<td>Science and Technology Studies (Honours)</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 6200</td>
<td>7</td>
</tr>
<tr>
<td>68.304</td>
<td>Marine Science 4</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 6831, 6832, 6833 or 6834</td>
<td>6</td>
</tr>
<tr>
<td>68.404</td>
<td>Genetics 4</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 6840</td>
<td>6</td>
</tr>
<tr>
<td>68.430</td>
<td>Combined Geology Physics (Honours)</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 0100</td>
<td>8</td>
</tr>
<tr>
<td>68.504</td>
<td>Ecology 4</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>Programs 6851, 6852, 6853</td>
<td>6</td>
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<tr>
<td>70.013</td>
<td>Anatomy 4</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>4 Level III Anatomy units</td>
<td>6</td>
</tr>
<tr>
<td>72.304</td>
<td>Pathology (Honours)</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>72.301</td>
<td>6</td>
</tr>
<tr>
<td>73.013</td>
<td>Physiology 4</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>4 Level III Physiology units</td>
<td>7</td>
</tr>
<tr>
<td>73.023</td>
<td>Pharmacology</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>Program 7300 (Strand 2 - see Program 7300)</td>
<td>7</td>
</tr>
<tr>
<td>79.014</td>
<td>Human Genetics</td>
<td>IV</td>
<td>10</td>
<td>F</td>
<td>At least 3 of the following: 41.102, 42.102C, 44.122, 45.121, 79.201, 79.202, 79.302, 68.602</td>
<td>8</td>
</tr>
</tbody>
</table>

*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 Biotechnology (5015); to masters degrees in Biotechnology (8042) and in Psychology (8251 and 8252); 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.
Course Outline 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

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, 12.341, 12.342
Choose 5 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
17.031, 17.041
2.121, 2.131
Year 2
73.111
Zoology
Year 1
17.031, 17.041
Year 2
Choose 2 units from 17.050, 17.722, 17.732, 17.783
Genetics
Year 1
17.031, 17.041
2.121, 2.131 (for 17.601 only)
Year 2
Choose 2 units from 17.601, and 41.101, 17.773
68.601, 68.602
Arts
Year 1
12 level I credit points of Economics, Philosophy, Political Science, Sociology or other approved discipline.

Year 2
12 upper level credit points following on from the Year 1 choice

*For students in Course 3431 the additional prerequisite of either 10.001 or 10.021B and 10.021C for 73.111 has been waived by the School of Physiology and Pharmacology.

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.
3. The proposed course must be approved by the Head of the School of Psychology or her representative prior to or during enrolment. The courses must be chosen in such a way as to fit in with the timetable.
4. 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 corequisites for the subjects chosen.

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 available 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 .......................................................... Associate Professor H.A. Goodwin
School of Mathematics ........................................................ Associate Professor C.E. Sutherland
School of Optometry .......................................................... Professor H.B. Collin
School of Physics .............................................................. Dr D. Miller
Faculty of Science

Course Outlines

Optometry

3950
Optometry Course
The School provides a four year full-time course in Optometry leading 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

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.021</td>
<td>Introductory Physics 1 (For Health and Life Scientists) 6</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry 1A or 6</td>
</tr>
<tr>
<td>2.131</td>
<td>Chemistry 1B or 6</td>
</tr>
<tr>
<td>2.141</td>
<td>Chemistry 1M 6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics 1 or 6</td>
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<tr>
<td>10.011</td>
<td>Higher Mathematics 1 or 6</td>
</tr>
<tr>
<td>10.021B</td>
<td>General Mathematics 1B and 6</td>
</tr>
<tr>
<td>10.021C</td>
<td>General Mathematics 1C</td>
</tr>
<tr>
<td>17.031</td>
<td>Biology A and</td>
</tr>
<tr>
<td>17.041</td>
<td>Biology B 6</td>
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</table>

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 Session 2 and be permitted to carry 2.131 Chemistry 1B into Session 1 of Year 2.

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Full Year</th>
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<tbody>
<tr>
<td>31.851</td>
<td>Optics 8</td>
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<tr>
<td>31.852</td>
<td>Visual Optics 3</td>
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<tr>
<td>31.853</td>
<td>Measurement of Light and Colour 2</td>
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<tr>
<td>31.821</td>
<td>Anatomy and Physiology of the Eye and Visual System 7</td>
</tr>
<tr>
<td>73.011</td>
<td>Principles of Physiology 6</td>
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<td>General Education subject 2</td>
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<thead>
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<th>Year 3</th>
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<td>31.863</td>
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<tr>
<td>31.864</td>
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<tr>
<th>Year 4</th>
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<td>31.871</td>
</tr>
<tr>
<td>31.841</td>
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<tr>
<td>71.001</td>
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</table>
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 a subject other than the one intended.

Subject numbers are allocated by the 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 previously been used 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.

Appropriate subjects for each school appear at the end of each school section.

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. These subjects will be found at the back of this handbook.

The following pages contain descriptions for most of the subjects offered for the courses described in this book, the exception being General Education subjects. For General Education subjects see the General Education Handbook which is available free of charge.

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 the 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 or Credit units
- **CR** Credit level
- **DN** Distinction
- **HD** High Distinction
- **X** External
<table>
<thead>
<tr>
<th>School, Department etc</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 School of Physics*</td>
<td>Science</td>
</tr>
<tr>
<td>2 School of Chemistry*</td>
<td>Science</td>
</tr>
<tr>
<td>3 School of Chemical Engineering and Industrial Chemistry (New Course)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>4 School of Materials Science and Engineering</td>
<td>Applied Science</td>
</tr>
<tr>
<td>5 School of Mechanical and Industrial Engineering*</td>
<td>Engineering</td>
</tr>
<tr>
<td>6 School of Electrical Engineering and Computer Science*</td>
<td>Engineering</td>
</tr>
<tr>
<td>7 School of Mines (Mineral Processing and Extractive Metallurgy and Mining Engineering)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>8 School of Civil Engineering*</td>
<td>Engineering</td>
</tr>
<tr>
<td>9 School of Fibre Science and Technology (Wool and Animal Science)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>10 School of Mathematics*</td>
<td>Science</td>
</tr>
<tr>
<td>11 School of Architecture</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>12 School of Psychology</td>
<td>Applied Science</td>
</tr>
<tr>
<td>13 School of Fibre Science and Technology (Textile Technology)</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>14 School of Accounting*</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>15 School of Economics*</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>16 School of Health Services Management</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>17 Faculty of Biological and Behavioural Sciences*</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>18 School of Mechanical and Industrial Engineering (Industrial Engineering)</td>
<td>Engineering</td>
</tr>
<tr>
<td>19 School of Information Systems</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>20 Centre for Petroleum Engineering Studies</td>
<td>Applied Science</td>
</tr>
<tr>
<td>21 Department of Industrial Arts</td>
<td>Architecture</td>
</tr>
<tr>
<td>22 Faculty of Professional Studies</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>23 School of Primary and Computer Education</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>24 School of Mines (Applied Geology)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>25 Centre for Liberal and General Studies</td>
<td>Liberal and General Studies</td>
</tr>
<tr>
<td>26 School of Geography</td>
<td>Applied Science</td>
</tr>
<tr>
<td>27 School of Marketing*</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>28 School of Surveying*</td>
<td>Engineering</td>
</tr>
<tr>
<td>29 School of Industrial Relations and Organizational Behaviour</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>30 School of Psychology</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>31 School of Optometry</td>
<td>Science</td>
</tr>
<tr>
<td>32 Centre for Biomedical Engineering</td>
<td>Engineering</td>
</tr>
<tr>
<td>33 School of Sports and Leisure Studies</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>34 School of Building</td>
<td>Architecture</td>
</tr>
<tr>
<td>35 School of Town Planning*</td>
<td>Architecture</td>
</tr>
<tr>
<td>36 School of Landscape Architecture*</td>
<td>Architecture</td>
</tr>
<tr>
<td>37 Graduate School of the Built Environment</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>38 Centre for Petroleum Engineering Studies</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>39 School of Applied Bioscience (Biotechnology)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>40 Academic Board</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>41 School of Microbiology*</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>42 School of Biological Science</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>43 Faculty of Applied Science</td>
<td>Applied Science</td>
</tr>
<tr>
<td>44 Centre for Safety Science</td>
<td>Engineering</td>
</tr>
<tr>
<td>45 School of Chemical Engineering and Industrial Chemistry (Old course)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>46 School of Applied Bioscience (Food Science and Technology)</td>
<td>Applied Science</td>
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<td>47 Centre for Safety Science</td>
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<td>48 School of Chemical Engineering and Industrial Chemistry (Old course)</td>
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<td>49 School of Applied Bioscience (Food Science and Technology)</td>
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<td>50 School of English</td>
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<td>51 School of History</td>
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<td>52 School of Philosophy</td>
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<td>53 School of Sociology</td>
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<td>54 School of Political Science*</td>
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<td>55 School of Librarianship</td>
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<td>56 School of French</td>
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<td>57 School of Theatre Studies</td>
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<td>58 School of Education</td>
<td>Professional Studies</td>
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<td>59 Department of Russian Studies</td>
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<td>60 Faculty of Arts</td>
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<td>61 Department of Music</td>
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<td>62 School of Science and Technology Studies</td>
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<td>63 School of Social Work</td>
<td>Professional Studies</td>
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<td>64 School of German Studies</td>
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<td>Board of Studies in Science and Mathematics</td>
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<td>68 Board of Studies in Science and Mathematics</td>
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<td>73 School of Physiology and Pharmacology</td>
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<td>School, Department etc</td>
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<td>School of Surgery</td>
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<td>School of Psychiatry</td>
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<td>School of Medical Education</td>
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<td>School of Community Medicine</td>
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<td>Australian Graduate School of Management</td>
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<td>Faculty of Engineering</td>
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<td>Commerce and Economics</td>
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<td>Department of Legal Studies and Taxation</td>
<td>Commerce and Economics</td>
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Physics

Physics Level I Subjects

1.001 Physics 1
Prerequisites: HSC Exam
Score Range Required
2 unit Mathematics* or 67-100
3 unit Mathematics or 1-50
4 unit Mathematics or 1-100 or (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, inertia, 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 Kirchhoff’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)
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
Prerequisite: As for 1.001. Co-requisites: 10.001, and 1.021 or 1.001. Excluded Program 6806 and 6060.
Not offered in 1990.
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.

Physics Level II Subjects

1.002 Mechanics, Waves and Optics
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
Prerequisites: 1.001, 10.001. Co-requisite: 10.2111. Excluded 8.825, 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
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, fission and fusion, nuclear forces.

1.032 Laboratory
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 L1.5 T.5
Prerequisites: 1.001, and 10.001. Co-requisites: 10.2111 or 10.2211 and 10.2112 or 10.2212.


1.062 Computer Applications in S1 L2 T3
Experimental Science 2
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 L1 T2
Prerequisites: 1.001 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 S1 L1.5 T.5
Measurement
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

1.0143 Nuclear Physics S2 L1.5 T.5
Co-requisite: 1.033.

Nuclear shell model; theory of beta decay; the deuteron, nucleonnucleon 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 L3 T1
Prerequisites: 1.012, 10.2212.

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 L1.5 T.5
Prerequisites: 1.012. 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 L1.5 T.5
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 L1.5 T.5
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
Prerequisite: 1.9222 or 1.032.

1.1433 Biophysics
Prerequisites: 1.012, 1.022.

1.1633 Astrophysics
Prerequisite: 1.022.

1.1833 Atmospheric Physics
Prerequisites: 1.001, 1.012 or 2.102A, 10.2111. Excluded: 26.421
Atmospheric thermodynamics, radiation, dynamics; energy balance, greenhouse effect, climate models and climate change, upper atmosphere physics.

1.3033 Mechanical Properties of Materials
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
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
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
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 refraction and diffraction theory, scattering and diffraction effects.

1.5133 Classical Mechanics and Field Theory
Prerequisites: 1.002, 10.1113, 10.2111.
Lagrange’s equations and applications, variational principles, Hamiltonian formulation, canonical transformations, Poisson brackets, Hamilton-Jacobi equation, continuous systems and fields.

1.5233 Electrodynamics
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.

1.5433 Plasmas and Laser Fusion
Prerequisites: 1.012, 1.022.
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
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
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
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
Prerequisites: 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 L2 T2
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 subjects see the Faculty of Architecture Handbook.

1.931 Physics 1 (Building) S2 LT4
Prerequisites: Nil
Energy transfer: conduction, convection, radiation, emittance, absorptance; Joules equivalent; thermometry; heat transfer through materials; thermal storage; thermal resistance; insulation; water vapour, condensation and vapour barriers. Refrigeration theory, properties and characteristics of refrigerants. Electrostatics and electromagnetism: DC circuits; Coulomb's law; electric field; electric potential; capacitance; conductors; resistivity; Atomic view of conduction; EMF; Kirchoff's laws; magnetic induction; torque on a coil in a magnetic field; moving coil meter; Wheatstone bridge; potentiometer; Faraday's law; transient circuits. AC power and circuit theory. Sound: longitudinal waves; overtones; intensity levels; decibels; quality of sound; assessment of noise annoyance; airborne sound transmission; sound attenuation; transmission loss; adsorption coefficients; partitions; recommended acoustic criteria; introduction to auditorium acoustics.

For further information regarding the following subjects see the Faculty of Engineering Handbook.

1.911 Physics 1 (Mechanical Engineering) F L2 T2
Prerequisites: As for 1.001 Physics 1. Excluded 1.951.
For students in the School of Mechanical and Industrial Engineering.

1.921 Physics 1 (Surveying) F L2 T2
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

1.961 Physics 1 (Electrical Engineering) F L3 T3
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, polarisation.

1.962 Physics of Measurement S1 L1 T2
(For students in the School of Surveying)

1.972 Electromagnetism (Electrical Engineering) S1 or S2 L2 T2
Prerequisites: 1.961 or 1.001, 10.001. Co-requisites: 10.211. Excluded 1.022, 1.932.
Not offered in 1990.
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 L2 T2 and S2 L2 T1
Prerequisites: As for 1.001 Physics 1.
For students in the School of Civil Engineering.

1.982 Solid State Physics (Electrical Engineering) S1 L2.5 T2
Prerequisites: 1.961 or 1.001, 10.001. Co-requisites: 10.211. Excluded 1.022, 1.932.
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 F L1.5 T.5
(For students in the School of Surveying)
Prerequisites: 1.961, 10.001. Co-requisite: 10.211. 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 L2 T4
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 L2 T4
Prerequisites:
HSC Exam Score
2 unit Mathematics* or 67-100
3 unit Mathematics or 1-50
Undergraduate Study: Subject Descriptions

4 unit Mathematics and 1-100
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 in Society.


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 prerequisites 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 L2 T4
Prerequisites: 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, alkyne, 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 L2 T4
Prerequisites:
HSC Exam
Score Range
67-100
53-100
1-50
1-100
100

2 unit Mathematics
3 unit Mathematics
4 unit Mathematics
2 unit Science (Chemistry) or
4 unit Science or
3 unit Science 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 L3 T3
Prerequisites: 2.121 and 2.131, or 2.141, and 10.011 or 10.001 or 10.021B and 10.021C. Excluded 2.002A.

2.102B Organic Chemistry
F or S2 L3 T3
Prerequisites: 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 L3 T3
Prerequisites: 2.121 and 2.131, or 2.141. Excluded 2.042C

2.102D Chemical and Spectroscopic
S1 or S2 L3 T3
Analysis
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.

Chemistry Level III Core Subjects

2.103A Physical Chemistry
S1 L3 T3
Prerequisites: 1.001, 2.102A, 2.102D and 2.102C. Excluded 2.013A.

2.103B Organic Chemistry S1 L3 T3
Prerequisite: 2.102B. Excluded 2.003B.
Heterocyclic Chemistry: synthesis and reactions of the following heteroaromatic systems: pyridine, quinoline, isoquinoline, pyrimidine, pyrole, furan, thiophen, indole, imidazole; examples of naturally occurring alkaloids where relevant. Alkylcyclic Chemistry: stereochemistry of acyclic systems; classical and nonclassical strain in cyclic systems; stereochemistry and conformation of monocyclic and polycyclic compounds; synthesis, reactions and rearrangement of monocyclic compounds including stereochemical selectivity; transannular reactions in medium 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 L2 T4
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 L2 T4
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 L3 T3
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.

2.113B Synthetic Organic Chemistry S2 L2 T4
Prerequisite: 2.103B. Excluded 2.013B.

2.113C Advanced Inorganic Chemistry S2 L2 T4
Prerequisite: 2.103C. Excluded 2.013C.
Spectroscopy and magnetism of transition metal compounds; applications of infrared, electronic and Moessbauer spectra; magnetic 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 coordination 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 L2 T4
Prerequisite: 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 L2 T4
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, halflife 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 radioactivity, 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 L3 T3
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 L2 T4
Prerequisite: 2.103B. Excluded 2.023B.

2.123E Environmental Chemistry S2 L3 T3
Prerequisites: 2.102A and 2.102D. Excluded 2.043A.

2.133B Applied Organic Chemistry S2 L2 T4
Prerequisite: 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 L1 T1
Prerequisites: 2.102C, and 10.111A or 10.031. Excluded 2.023A.

2.1823 Computers in Chemistry S2 L1 T2
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 L1.5 T1.5
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 L1 T2
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
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.

2.002E Organic and Inorganic Chemistry for Chemical Engineers
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 ketones. Substitution reactions of acid derivatives. Chemistry of benzene and its derivatives with a brief extension to include naphthalene 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
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.

2.043B Food Chemistry
Prerequisite: 2.102B.
Treatment of the following aspects of food chemistry.
Water
The concept of free and bound water, mechanisms of water binding in foods, measurement of free, bound and total water.

Proteins
Chemical properties of different protein types in foods, rheological properties, chemical and thermal coagulation, chemical modification of proteins, methods of analysis: kjeldahl, chlorimetric, NIR.

Carbohydrates

Minerals in foods
Presence and chemical importance of minerals in foods. Effects of minerals on food properties (Ga2+, Fe2+, Mg2+ inter alia), electrochemistry.

Vitamins

Food flavour chemistry
Chemistry of essential oils and volatile food flavour components. Techniques of food flavour research.

Pigments
Chemical structure of natural and synthetic pigments in plant and animal foods. Mechanisms of pigment breakdown, effects of oxidation and pH.

2.043S Instrumental Methods of Food Analysis
Prerequisite: 2.030.
Treatment of theory and practice of modern instrumental methods of analysis, with strong emphasis on the analysis of food constituents. Methods studied include the following:


2.911 Chemistry 1EE
Prerequisite: 2 unit Mathematics or 2 unit Science (Physics) or 2 unit Science (Chemistry).

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* 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).

2.951 Chemistry 1ME S1 L3 T3
Prerequisite: As for 2.9111.
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 L3 T3
Prerequisites: As for 2.9111.

Materials Science and Engineering

4.412A Physical Metallurgy 1A S1 L3
Unit 1: Phase Equilibria I
Co-requisite: 2.102A, 4.732 or 5.4221.

Unit 2: Phase Equilibria Laboratory S1 T3

4.413 Physical Metallurgy 2A S1 L1 T1
Prerequisite: 4.412A.

4.412B Physical Metallurgy 1B S2 L1 T1

4.432 Physical Metallurgy 1C S2 L1 T3
Prerequisite: 4.412A

4.433C Physical Metallurgy 2C S1 L2.5 T1.5
Prerequisite: 4.412A.

4.443 Physical Metallurgy 2D S2 L2 T2
Prerequisite: 4.432.

4.453 Physical Metallurgy 2E S2 L1 T1
Prerequisite: 4.432.

4.643 Metallurgical Engineering 2D S2 L2 T1
Prerequisites: 4.412A, 4.732 or 5.4221.

4.713 X-Ray Diffraction and Electron Microscopy S1 L2 T2
Prerequisite: 4.412A or 4.212
4.742 Physics of Materials S2 L2 T1
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; intrinsic, extrinsic. Exchange energy; ferromagnetism, antiferromagnetism. Elementary perturbation theory, covalent bond; crystal structures, properties. Ionic bond, crystal structures, force models, properties.

Mechanical and Industrial Engineering

5.3005 Manufacturing Technology S2 L T3
Prerequisite: 5.0011 or 5.3600. Co-requisites: 5.0300, 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 manufacturing processes. Elementary functional analysis of product designs, including linear loop equations, limits and fits, dimensional accuracy of processes and alternate design and manufacturing strategies.

5.3021 Engineering Mechanics 2A S1 or S2 L2 T1
Prerequisites: 1.001 or 1.951, 5.0011 or 5.0201, 10.001 or 10.011. Excluded: 5.303.

Kinetics of systems of particles; plane steady mass flow. Plane kinematics and kinetics of rigid bodies: moment of inertia; motion relative to translating and rotating frames of reference, equations of motion; work and energy, impulse and momentum. Virtual work for static and dynamic systems. Kinematics and kinetics of simple mechanisms.

5.421 Mechanics of Solids 1 S1 or S2 L2 T1
Co-requisite: 5.010 or 5.0011.

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. Pumps and turbines.

5.526 Thermodynamics 1  F L1 T1
Prerequisites: 1.001 or 1.951, 5.0011, 10.001 or 10.011. Excluded 5.622.

6.010 Electrical Engineering 1  S2 L3 T3
Co-requisite: 1.961 or equivalent

6.066 Computing Science (Honours)

6.633 Data Bases and Networks  SS L3 T2
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.

6.642 Design and Analysis of Algorithms  SS L3 T2
Prerequisite: 6.641
The course consists of 2 strands: Algorithms and Software Engineering. The first strand covers techniques for the design and performance analysis of algorithms for a number of classes of problems. Analysis: order notation, recurrence equations, worst case and average case statistics. Design: recursion, divide and conquer, balancing, backtracking, dynamic programming, approximate algorithms, NP-complete problems. Software engineering covers the specification, analysis, design and testing of software systems. The methodology used produces a naturally concurrent, hierarchal network of intercommunicating processes as a model of the system being specified. A significant group project is undertaken.

6.643 Compiling Techniques and Programming Languages  SS L3 T2
Prerequisite: 6.641. Excluded 6.672.

6.646 Computer Applications  SS L3 T2
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 L3 T2
Prerequisites: 6.411, 14.001.

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 L3 T3
Prerequisite: as for 10.001. Corequisite: 10.001. Excluded: 6.611


6.712 Computing 1B S1 or S2 L3 T3
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 iteration. 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.

6.718 Computing 1 (Procedural) S1 L3 T3
Prerequisite: As for 10.001. Co-requisite: 10.001. Excluded: 6.600, 6.611, 6.620, 6.021D, 10.061


6.721 Data Organisation S1 or S2 L3 T2


6.722 Computer Organisation S2 L3 T2

The multilevel approach to the structure of computers. The Machine Code Level: data representation; registers; instructions sets; the fetch/execute cycle; the programmer's model of the computer; 68000 assembly-language programming. The Component Level: the classification of digital logic components: processing, storage and communication devices; the concept of hierarchical logic description; the separation of control and data paths; Register Transfer Language; other description tools for digital systems. Programmable Controllers: the design of controllers using state machines and microcode. The System Level: the main characteristics of storage and I/O devices; communication between processors, memory, and I/O devices; networking. Virtual machines. Tradeoffs and constraints in computer systems and techniques for performance enhancement. The history and technology of computer systems. An introduction to advanced architectures.

6.723 Concurrent Computing S2 L3 T2
Prerequisite: 6.712.


6.821 Circuit Theory S1 L2 T.5
Prerequisites: 6.010, 10.001. Corequisite: 10.1214 or 10.1114.

Dynamic response of linear circuits: 1st and 2nd order circuits with DC sources, introduction to higher order circuits. Sinusoidal steady state operation: phasors, impedance and admittance; dynamic response of circuits driven by sinusoidal sources, concepts of power electronics; linearity, network theorems; resonance, bandwidth, and quality factor. Two-port networks: parameters, circuits as filters. Power in steady-state circuits; average and reactive power, power factor, power factor correction. Three-phase circuits: balanced and unbalanced steady-state operation; real and reactive power in balanced circuits, transient analysis.

6.823 Analog Electronics S2 L5 T.5
Prerequisites: 6.821, 1.982.

Operating principles and terminal characteristics of PN diodes, bipolar and field effect transistors, and thyristors. Small signal models of devices, including h-parameter model. Analysis and design of low-frequency Class-A amplifiers, including choice of biasing method.

Wool and Animal Science

9.801 Genetics 1 S2 L3 T3
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 crossbreeding. Genetics applied to animal and plant improvement. Applications of genetics in sheep and wool production.

9.802 Genetics 2

Prerequisite: 9.801.


9.811 Biostatistics 1

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 Distinction are only awarded in the ordinary level in exceptional circumstances.

Students should note that some of the Mathematics honours programs require them to take some 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

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10.011 Higher Mathematics 1

Prerequisite:

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10.021B General Mathematics 1B

Prerequisite:

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10.021C Applied Mathematics and Computation

Prerequisite:

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10.022A Real Analysis A

Prerequisite:

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10.022B Modern Algebra and Topology

Prerequisite:

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10.022C Geometry A

Prerequisite:

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10.023A Linear Algebra and Its Applications

Prerequisite:

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10.023B Discrete Mathematics

Prerequisite:

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10.023C Probability and Stochastic Processes

Prerequisite:

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10.024A Complex Variables

Prerequisite:

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10.024B Partial Differential Equations

Prerequisite:

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10.024C Numerical Analysis

Prerequisite:

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10.012C General Mathematics 1C  S2 L4 T2
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 L1 T1
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 L1 T1
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 II Mathematics unit. If other Level II 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 2 Unit Mathematics (Mathematics in Society).

10.061 Introductory Applied Computing  S2 L3 T3
Prerequisite: As for 10.021B. Co-requisite: 10.021C or 10.001. Excluded: 6.711, 6.718.
The major components of a computer, software vs hardware. The role of computers, history, range of available hardware and software, computing issues and standards. The operating systems DOS and UNIX, files and text editors, networks and communications. An overview of spreadsheets, databases, graphics and other software packages Structured programming in the high level language C, covering a variety of data types, efficiency, language standards, and libraries of functions and subprograms. Mathematical applications from a wide variety of areas.

10.081 Discrete Mathematics  S1 L4 T2
Co-requisite: 10.001 or 10.011.

10.623 Mathematics and Computer Science Honours

Pure Mathematics

Level II Subjects

10.111A Pure Mathematics 2 – Linear Algebra  F L1.5 T1
Prerequisite: 10.001 or 10.011. Excluded 10.121A.

10.1113 Pure Mathematics 2 – Real Analysis  S1 or S2 L1.5 T1
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 L1.5 T1
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  S1 L1.5 T5
Prerequisite: 10.001 or 10.011.**
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 – Automata and Algorithms  S2 L1.5 T5
Prerequisite: 10.001 or 10.011.**
Finite automata, regular languages and Kleene's theorem. Analysis of fast algorithms for matrix, integer and polynomial manipulation, sorting, etc. Discrete and Fast Fourier Transform and applications.
10.121A Higher Pure Mathematics 2 - Algebra
Prerequisite: 10.011 or 10.001 CR. Excluded 10.111A, 10.1111.

10.1213 Higher Pure Mathematics 2 - Real Analysis
Prerequisite: 10.011 or 10.001 CR. Excluded 10.1113.
As for 10.1113 Pure Mathematics 2 Multivariable Calculus but in greater depth.

10.1214 Higher Pure Mathematics 2 - Complex Analysis
As for 10.1114 Pure Mathematics 2 Complex Analysis, but in greater depth.

Level III Subjects

10.1111 Pure Mathematics 3 - Group Theory
Prerequisites: **. Excluded 10.121A.
Mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups.

10.1112 Pure Mathematics 3 Geometry
Prerequisites: **. Excluded 10.1424.
Elementary concepts of Euclidean, affine and projective geometries.

10.1121 Pure Mathematics 3 - Number Theory
Prerequisites: **. Excluded 10.1421.
Introduction to algebraic structures. Euclidean domains, prime and irreducibles, factorization. Diophantine equations, polynomial congruences, arithmetic functions, Primitive roots, quadratic residues, quadratic reciprocity, sums of squares.

10.1123 Pure Mathematics 3 - Logic and Computability
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
Prerequisites: **.
Elementary combinatorial topology of surfaces.

10.1125 Pure Mathematics 3 - Ordinary Differential Equations
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

10.1127 Pure Mathematics 3 - History of Mathematics
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
Prerequisites: **. Excluded 10.122B.

10.122B Higher Pure Mathematics 3 - Real Analysis and Functional Analysis
Prerequisites: 10.121A or 10.111A CR, 10.1213 or 10.1113 CR, 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
Prerequisite: 10.121A or 10.111A CR, **.
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
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
Prerequisites: 10.1214 or 10.1114 CR, **. Co-requisite: 10.122B strongly recommended.
Topics in advanced complex function theory chosen from the following: Conformal mapping. Analytic continuation. Entire

10.1324 **Higher Pure Mathematics 3** – S2‡ L1.5 T.5
Integration and Fourier Analysis
Prerequisites: †† †Co-requisite: 10.122B.
Lebesgue integration; measure theory. Fourier transforms.

10.1325 **Higher Pure Mathematics 3** – S1† L1.5 T.5
Differential Geometry
Prerequisites: 10.121A or 10.111A CR, 10.1213 or 10.1113 CR, †† †Excluded: 10.1522.
Curves and surfaces in space; classification of surfaces. Curvature; geodesics.

10.1326 **Higher Pure Mathematics 3** – S2‡ L1.5 T.5
Calculus on Manifolds
Prerequisites: †† †Co-requisite: 10.1325.
Manifolds; vector fields; flows. Introduction to Morse theory. Differential forms; Stokes' theorem; the Gauss-Bonnet theorem.

10.1421 **Higher Pure Mathematics 3** – S1‡ L1.5 T.5
Number Theory
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** – S2‡‡ L1.5 T.5
Groups and Representations
Prerequisites: 10.121A or 10.111A CR and 10.111 CR, †† †
Abelian groups, composition series; nilpotent groups; soluble groups. Representations and characters of finite groups; induced representations.

10.1423 **Higher Pure Mathematics 3** – S1‡‡ L1.5 T.5
Topology
Prerequisite: 10.1213 or 10.1113 CR, †† †
Naive set theory, the axiom of choice. Metric and topological spaces, compactness.

10.1424 **Higher Pure Mathematics 3** – S2‡‡ L1.5 T.5
Geometry
Prerequisites: 10.121A or both 10.111A CR and 10.1111 CR, †† †Excluded: 10.1112.
Axioms for a geometry; affine geometry, Desargues' theorem; projective geometry.

10.1425 **Higher Pure Mathematics 3** – S1‡‡ L1.5 T.5
Ordinary Differential Equations
Existence and uniqueness theorems. Linearization. Qualitative theory of autonomous systems.

10.1426 **Higher Pure Mathematics 3** – S2‡‡ L1.5 T.5
Partial Differential Equations
Prerequisites: †† †Co-requisite: 10.1425. Excluded: 10.1126.

Classification, characteristics. Cauchy problem; Dirichlet and Neumann problems. Distributions.

** 10.1521 **Pure Mathematics 3** – SS L1.5 T.5
Combinatorial Structures and Applications
Prerequisites: †† †
Theory of combinatorial designs (including Bruck-Ryser-Chowla theorem), Latin squares, projective and affine planes, application to the design of experiments.

10.1522 **Pure Mathematics 3** – SS L1.5 T.5
Differential Geometry
Prerequisites: 10.1113, †† †Excluded: 10.1325.
Curves and surfaces in space. Gaussian curvature, Gauss Bonnet theorem.

10.1524 **Pure Mathematics 3** – S1 L1.5 T.5
Communication, Codes and Cipher
Prerequisites: †† †
Introduction to discrete information theory (including Shannon's theorems), error-correcting codes and cryptography.

**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.

** 10.081 is strongly recommended
+ 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 students 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 enroling. 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**

10.2111 **Applied Mathematics 2** – S1 or S2 L1.5 T.5
Vector Calculus
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 — S1 or S2 L1.5 T.5 Mathematical Methods for Differential Equations
Prerequisite: 10.001. Excluded: 10.2212.

10.2113 Applied Mathematics 2 — S1 L1.5 T.5 Linear Programming
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 — S2 L1.5 T.5 Discrete-Time Systems
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 — S2 L1.5 T.5 Continuous-Time Systems
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 — S1 L2 T.5 Vector Analysis
Prerequisite: 10.011 or 10.001 CR. Excluded: 10.2111. As for 10.2111 but in greater depth.

10.2212 Higher Applied Mathematics 2 — S2 L2 T.5 Mathematical Methods for Differential Equations
Prerequisite: 10.011 or 10.001 CR. Excluded: 10.2112. As for 10.2112 but in greater depth.

10.2213 Higher Applied Mathematics 2 — S1 L1.5 T.5 Linear Programming

10.2215 Higher Applied Mathematics 2 — S2 L1.5 T.5 Discrete-Time Systems

10.2216 Higher Applied Mathematics 2 — S2 L1.5 T.5 Continuous-Time Systems
Prerequisite: 10.011 or 10.001 CR. Excluded: 10.2116. Not offered in 1990.

10.261A Applied Mathematics 2 — S1 L3 T1 Mathematical Computing A
Prerequisite: 10.011. Topics covered are: structured programming in FORTRAN, errors in representing real numbers and their effect on calculations, and mathematical algorithms based on polynomial approximations.

Level III Subjects

10.212A Applied Mathematics 3 — S1 L3 T1 Numerical Analysis

10.212B Higher Applied Mathematics 3 — S1 L3 T1 Fluid Dynamics

10.212D Applied Mathematics 3 — S1 L3 T1 Mathematical Methods

Surface and internal waves, tides. Thermohaline processes: height from layers and gravity currents.

Elementary hydrodynamics. An elementary discussion of Review of basic physical features and mathematical

Level IV Subjects

10.223 Applied Mathematics 4
An honors 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 10.233. 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
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
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
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
Prerequisite: 10.001 or 10.011 or 10.021(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
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.

10.3211 Higher Theory of Statistics 2 – Statistical Computing and Simulation
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
Prerequisite: 10.321A. Co-requisite: 10.321B.
As for 10.3112 but in greater depth.

10.331 Statistics SS
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


10.312C Theory of Statistics 3 – Linear Models

Prerequisites: 10.311B or 10.321B, 10.3111 or 10.3211.

10.312F Theory of Statistics 3 – Sample Survey Theory
Prerequisite: 10.311B. Excluded: 10.322F.
Finite population sampling theory illustrated by mean estimation; simple random, stratified, cluster, systematic, multistage and ratio sampling, sampling proportional to size.

10.312G Theory of Statistics 3 – Design and Analysis of Experiments
Prerequisites: 10.311B, 10.311C. Excluded: 10.322G, 10.332G.

10.312H Theory of Statistics 3 – Statistical Inference
Prerequisite: 10.311B. Excluded: 10.322H.
10.3124 Theory of Statistics 3 – Nonparametric Methods  
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.

As for 10.312A but in greater depth.

10.322C Higher Theory of Statistics 3 – Linear Models  
As for 10.312C but in greater depth.

Prerequisites: 10.321A, 10.111A, 10.1113. 
Not offered in 1990. 

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  
Prerequisites: 10.321B, 10.322C. Excluded: 10.3122, 10.3221. 
As for 10.3122 but in greater depth.

Prerequisite: 10.321B. Excluded: 10.3123. 
As for 10.3123 but in greater depth.

10.3224 Higher Theory of Statistics 3 – Nonparametric Methods  
As for 10.3124 but in greater depth.

10.3225 Higher Theory of Statistics 3 – Statistic Project  
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  
Prerequisite: 10.331 or 10.311B or approved equivalent. Excluded: 10.3222, 10.3222, 10.312C, 10.3222C. 

10.3322 Applied Stochastic Processes  
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

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  
Prerequisite: 10.001. 
Differential equations, use of Laplace transforms, solutions by series; partial differential equations and their solution for selected physical problems, use of Fourier series; introduction to numerical methods; matrices and their application to theory of linear equations, eigenvalues and their numerical evaluation; vector algebra and solid geometry; multiple integrals; introduction to vector field theory.

10.033A Electrical Engineering – Mathematics 3  
Prerequisites: 10.111A, 10.1114, 10.2111. Excluded: 10.2112, 10.2212, 10.212A, 10.222A. 
methods, generalized Fourier series, Bessel functions, Legendre polynomials.

10.0331 Electrical Engineering S2 L1.5 T.5
Mathematics 3 — Transform Methods
Prerequisites: 10.1114, 10.2111. Excluded: 10.033, 10.2921

10.341 Statistics SU S1 L2.5 T.5
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, chi^2 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 L1.5 T.5
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, chi^2 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 L1.5 T.5
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 chi^2 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.

10.381 Statistics SC S1 or S2 L1.5 T.5
For students in the School of Civil Engineering.

Psychology Level I Subject

12.100 Psychology 1 F L3 T2
Prerequisite: 12.100.
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 1990.
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 1990.
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 1990.
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 L2 T2
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
Prerequisite: 12.100.
Not offered in 1990.
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 1990.
Measurement and significance of individual differences in intellectual, motivational and personality functioning. Statistics, to cover the fundamentals of hypothesis testing.

12.206 Research Methods 2  
**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  
**Prerequisite:** 12.206. Excluded: 12.200.  
Principles and techniques 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  
**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  
**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.

12.210 Human Development  
**Prerequisites:** 12.100, 12.204, 12.321 and 12.340.  
The physical, perceptual, cognitive, and psychosocial development of the human from genetic and pre-natal influences through to old age.

Psychology Level III Subjects

12.300 Research Methods 3A  
**Prerequisite:** 12.200 or 12.206.  
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.

12.301 Research Methods 3B  
**Prerequisites:** 12.200 or 12.206 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  
**Prerequisites:** 2 Psychology Level II subjects.  
Not offered in 1990.  
Personality dynamics and structure and differences in ability and intelligence.

12.305 Learning and Behaviour 3  
**Prerequisites:** 12.200 and 12.201.  
Not offered in 1990.  
The establishment and elimination of extended sequences of behaviour in complex environments. Implications of the theories and research for applied work.

12.310 Physiological Psychology 3  
**Prerequisites:** 12.200 and 12.201.  
Not offered in 1990.  

12.311 Perception 3  
**Prerequisites:** 12.200 and 12.201.  
Not offered in 1990.  
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  
**Prerequisites:** 12.200 and 12.202.  
Not offered in 1990.  
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  
**Prerequisites:** 12.200 and 12.201.  
Not offered in 1990.  
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 Associative Learning 3  
**Prerequisite:** 12.305.  
Not offered in 1990.  
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 1990.
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
Not offered in 1990.
Human sociability, affiliation and attraction, the development of interpersonal relationships, social influence processes, conformity, obedience, leadership, interaction in groups, affective influences on social cognition and behaviour.

12.321 Development Psychology S2 L2 T2
Issues, methods, and theories in developmental psychology; the development of infants, toddlers, school children, and adolescents with reference to significant cognitive and social events in each of these periods.

12.322 Abnormal Psychology S1 L2 T2
Prerequisites: 12.200 and 12.201 or 12.206 and 12.207.
Descriptive psychopathology; symptomatology and diagnostic features of schizophrenia, organic brain syndromes, affective disorders, neurotic disorders, psychopathy, sexual aberrations, and addictions.

12.324 Experimental Psychopathology S2 L2 T2
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, addictive behaviours and amnesia.

12.325 Social Behaviour 3
Not offered in 1990.
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 1990.
Principles and techniques of psychological assessment. Types of tests and their application in selection and allocation procedures.

12.331 Counselling Psychology 3
Prerequisites: 2 Psychology Level II subjects.
Not offered in 1990.
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 1990.

12.333 Ergonomics 3
Prerequisite: 12.200.
Not offered in 1990.
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 S2 L2 T2
Industrial and organisational psychology, job analysis, selection, motivation, management strategies, job design and a systems analytic approach to organisations, training, selection, work satisfaction and organisational climate.

12.335 Behavioural Evaluation and Assessment 3
Prerequisite: 12.200.
Not offered in 1990.
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
Not offered in 1990.
An occasional elective dealing with a special field of psychology.

12.341 Perception S2 L2 T2
Prerequisites: 12.206 and either 12.208 or 12.209. Excluded: 12.201 and 12.311.
The study of the sensory basis of perception; the study of perception as an adaptive process by which individuals are able to correctly apprehend the external environment and localise themselves within it; the study of perceptual development in infants and young children.
12.342 Behavioural Neuroscience S1 or S2 L2 T2
Prerequisites: 12.206 and either 12.208 or 12.209. Excluded: 12.201 and 12.305.
An examination of brain-behaviour relationships with emphasis on contemporary models of the neural bases of learning, memory and motivation. Topics may include classical and operant conditioning, neurotransmission, the neural basis of feeding and its disorders, invertebrate and vertebrate models of learning, amnesias and theories of normal memory.

12.343 Counselling and Evaluation S1 L2 T2
Theory and practice of counselling in a variety of contexts. Emphasis will be placed on major theoretical orientations, counselling skills development and the evaluation of counselling effectiveness through behavioural and other assessments.

12.344 Individual Differences
Not offered in 1990.
Measurement and assessment of intelligence, psychometric assessment of personality, cognitive and affective aspects of personality, the authoritarian personality, achievement motivation, socio-biological models and critique.

12.345 Cognition and Skill S2 L2 T2
An examination of the cognitive processes underlying skilled behaviour. Topics include detection and discrimination, the representation of knowledge, artificial intelligence, and the basis of expertise in skilled performance.

12.346 Language and Its Development S1 L2 T2
How language is acquired and used in reading, writing, speech comprehension and speech production. Language dysfunction and bilingualism will also be considered.

12.347 Artificial Intelligence and Cognitive Psychology
Not offered in 1990.
A course designed to investigate the burgeoning relationships between cognitive psychology and artificial intelligence. Topics to be covered include parallel distributed processing models of memory and perception; processes of reasoning, logic and decision making; human expertise and expert systems; and imagery.

12.348 Learning S2 L2 T2
Prerequisite: 12.342. Excluded: 12.315
The conditions which promote learning, the contents of learning and the mechanisms by which learning is deployed in action. The course emphasises the distinction between specialised and general-purpose learning abilities.

12.349 Physiological Psychology S1 L2 T2
Prerequisite: 12.342. Excluded: 12.310 and 12.316.
An examination of the neural control of behaviour with special emphasis on cerebral localisation of function in humans. Clinical conditions will be considered to the extent that they illuminate mechanisms of brain control or they relate to theorising about brain function.

12.350 Perceptual Theory
Prerequisite: 12.341. Excluded: 12.311.
Not offered in 1990.
Some of the major theoretical influences in perception, beginning with a historical view and then considering the different perspectives represented by Helmholtz, Gestalt psychology, and Gibson, and finally the influence of computer vision (especially Marr) and the modern revolution in knowledge of the physiology of the visual system.

12.351 Recent Developments in Experimental Psychology
Prerequisites: 12.206 and 12.208.
Not offered in 1990.
An occasional elective dealing with recent developments in experimental psychology.

12.352 Issues in Applied Psychology
Prerequisites: 12.206 and 12.207.
Not offered in 1990.
An occasional elective dealing with issues in applied psychology. Topics may include psychology and the law, career choice and development, stress, forensic psychology and field versus laboratory research.

12.353 Cross-Cultural Social Behaviour S1 L2 T2
The social psychology of intergroup relations or contact between culturally diverse individuals and groups. Particular aspects to be covered will include intercultural communication, inter-group conflict and its resolution, culture learning and orientation program, and cross-cultural social skills training. These processes will be illustrated with studies of overseas students, migrants, international business persons, and other individuals exposed to second-culture influences.

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 supervised 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 supervised 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, 12.301 and 12.305, 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 supervised 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, 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 supervised 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)  F
Prerequisite: Nil.
Not offered in 1990.
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 L2 T2.5
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 L2 T2.5
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 L2 T2.5
Prerequisites: 14.511 plus
HSC minimum mark required
2 unit Mathematics or 60
3 unit Mathematics or 1
4 unit Mathematics or 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 L2 T2.5
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 L2 T2.5
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 L2 T2.5  
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.

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Economics

15.101E Microeconomics 1  
S1 or S2 L2 T1.5 or T2  
Commerce/Arts/Applied Science/Sciences prerequisite:  
HSC minimum mark required

- 2 unit English (General) or  
- 2 unit English or  
- 3 unit English

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 L2 T2  
Commerce and Economics prerequisite: 15.011 or 15.102E.  
Arts/Applied Science/Sciences prerequisites: 15.101E or 15.102E, 15.103M. Excluded: 15.042, 15.052, 15.062, 15.204E, 15.222E.

Choice theory, including intertemporal choice, labour supply. Extensions of price theory. The theory of production, costs and supply. Market structures including oligopoly models. Introduction to general equilibrium and welfare analysis. Externalities.

15.301E Microeconomics 3  
S1 L2 T2  

Extensions of microeconomic theory; general equilibrium approaches to economic analysis; international trade including analysis of trade restrictions and distortions. Limitations of the general competitive model; uncertainty and risk with applications to modern theories of corporate behaviour.

15.102E Macroeconomics 1  
S1 or S2 L2 T1.5  
Commerce and Economics prerequisite: 15.011 or 15.102E.  
Arts/Applied Science/Sciences prerequisites: 15.102E, 15.103M. Excluded: 15.042, 15.052, 15.062, 15.204E, 15.222E.


15.202E Macroeconomics 2  
S2 L2 T2  
Commerce and Economics prerequisite: 15.011 or 15.102E.  
Arts/Applied Science/Sciences prerequisites: 15.102E, 15.103M. Excluded: 15.042, 15.052, 15.062, 15.204E, 15.222E.


15.203E Applied Microeconomics  
S1 or S2 L2 T1.5  
Commerce and Economics prerequisite: 15.011 or 15.102E.  
Arts/Applied Science/Sciences prerequisites: 15.101E or 15.102E, 15.103M or 15.100M. Excluded: 15.201E, 15.202E, 15.052, 15.062, 15.222E and 15.042.

Choice theory, including intertemporal choice, labour supply. Extensions of price theory. The theory of production, costs and supply. Market structures including oligopoly models. Introduction to general equilibrium and welfare analysis. Externalities.

15.203E Applied Microeconomics  
S1 or S2 L2 T1.5  
Commerce and Economics prerequisite: 15.011 or 15.102E.

Arts/Applied Science/Sciences prerequisites: 15.101E or 15.102E and 15.103M or 15.100M. Excluded: 15.201E, 15.221E, 15.072, 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 market 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.
15.302E Macroeconomics 3  S2 L2 T2
Prerequisite: 15.201E, 15.202E and 15.203M. Excluded 15.322E, 15.003, 15.013.


15.101H Australia in the International Economy in the 20th Century  S1 or S2 L2 T1.5
Commerce Applied Science Arts Sciences prerequisite:

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<tr>
<th>English (General)</th>
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<td>2 unit</td>
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<td>2 unit</td>
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The international economy at the end of the 19th century: trade, factor flows, and payments arrangements. 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.

Information Systems

19.602 Computer Information Systems  S1 or S2 L2 T1
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  S2 L2 T1
System analysis and design: requirements analysis and specification, logical and physical design of business systems, specification and updating of files, man-machine dialogue procedures. Comparison of design methodologies - top-down and evolutionary.

19.605 Computer Systems Implementation  S1 L2 T1
Prerequisite: 19.609.
For students who first enrolled before 1989 – 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 L2 T1
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 involving the design of a telecommunications based commercial system.

19.608 Database Systems  S1 L2 T1
Prerequisite: 19.603 or 19.606 or 19.609.
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 database management system. Information retrieval concepts, relational query-systems, security, control and audit considerations.

19.609 Computer Information Systems Technology  S1 L2 T1
Prerequisite: 19.602 or 6.711.
Programming in the commercial environment; COBOL; Hardware and operating systems concepts and their impact on the commercial computing environment. Introduction to computer networks and distributed systems.

19.611 Information Systems Development  S2 L2 T1
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 L2 T1
Prerequisite: 19.605 Co-requisite: 19.692
Available only to students enrolled in Course 3971.
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 students enrolled in Course 3971.
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
Available only to students enrolled in Course 3971.
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 students enrolled in Course 3971.
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 IS 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 19.986G. See Graduate Study: Subject Descriptions.

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 L2 T1
Prerequisite:
HSC minimum
mark required
2 unit English (General) or
2 unit English or
3 unit English
60
53
1

Legal Regulation of Commerce  S1 or S2 L2 T1
Prerequisite: 99.774.
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.

99.783 Taxation Law  S1 L3 T1
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 Science

17.031 Biology A  
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  
Prerequisite: 17.031 (however, students without this prerequisite may seek the permission of the Co-ordinator 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.

17.050 Functional Adaptation in Biology  
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.

17.434 (Botany Honours)

17.501 Introductory Genetics  
Prerequisite: 2.131 or 2.141, 17.031, 17.041,
Co-requisite: 41.101. Excluded 9.80, 45.601

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.

17.722 Biology of Invertebrates S2 L2 T4
Prerequisite: 17.031, 17.041. Excluded: 45.201.
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.

17.723 Plant Community Ecology S2 L2 T4
Prerequisites: 43.111 or 45.111 or 17.702 and 17.012 or 27.010 and 27.030 or 27.111 or 17.050. Excluded 43.152, 45.152.
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.

17.732 Vertebrate Zoology S1 L3 T3
Prerequisite: 17.031, 17.041. Excluded: 45.301.
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.

17.733 Population and Community Ecology S1 L2 T4
Prerequisite: 17.041 and 10.001 or both 10.021B and 10.021C. Excluded 45.152.
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.

17.743 Physiology and Marine Botany S2 L2 T4
Prerequisite: 45.111 or 43.111 or 17.702. Excluded 43.172, 45.172.
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.

17.753 Ultrastructure and Function of Cells S1 L2 T4
Prerequisite: At least 1 core level II Biological Science subject. Excluded 43.192, 45.192.
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.

17.454 Zoology 4

17.763 Marine Ecology S1 L2 T4
Prerequisites: 45.201 or 68.302 or 17.722. Excluded: 45.112.
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.

17.773 Evolution and Population Genetics S1 L3 T3
Prerequisites: 17.031, 17.041. Excluded: 45.121.
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.

17.783 Animal Behaviour S2 L2 T4
Prerequisites: 45.101, and 45.201 or 45.301, or 17.712 and 17.722 or 17.732. Excluded: 45.122.
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.

17.793 Ecological Physiology S2 L2 T4
Prerequisites: 45.201 or 45.301 or 17.722 or 17.732. Excluded: 45.132.
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 attention is given to Australian fauna and conditions.

17.803 Comparative Animal Physiology S1 L2 T4
Prerequisite: 45.201 or 45.301 or 17.722 or 17.732. Excluded: 45.142.
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.
17.813 Vertebrate Zoogeography and Evolution
Prerequisite: 45.301 or 17.732. Excluded: 45.302.
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.

17.8231 Entomology
Prerequisites: 17.031, 17.041, 45.201 or 17.722. Excluded: 45.402.
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.

17.8232 Economic Zoology
Prerequisite: 45.201 or 45.402 or 17.722 or 17.8231. Excluded: 45.422.
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, diseases caused or spread by animals, chemicals, biological and physical control, and side effects.

17.833 Plant-Microbe Interactions
Prerequisites: 17.050 and 17.702 or 44.101.
The relationship between microbes and plant surfaces particularly in the soil environment, rhizosphere organisms, role of microorganisms in mineral acquisition by plants, mutualistic symbioses between roots and microorganisms, dynamics of infection and host invasion, plant pathogen interactions. Examination of fungi in culture and basic fungal taxonomy. Inoculation of plant material to produce symbioses and examination of infection processes, histochemistry and light microscopy.

Applied Geology

Field tutorials are an essential part of these subjects, and are held during weekends and/or recesses. Dates and costs are available during the first week of the subject. Attendance is compulsory.

25.110 Geological Processes
Stream 1

OR
Stream 2
Available only with permission of the Head of School.
A program of projects and independent study of selected aspects of geology. Assessment includes practical and theory examinations.

25.120 Geological Environments
Prerequisites:
HSC Exam Score
Range Required
2 unit Mathematics* or 55-100
3 unit Mathematics or 1-50
4 unit Mathematics and 1-100
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 1-50
4 unit Science 90-150
3 unit Science
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).


25.211 Earth Materials 1
Prerequisite: 25.120.

25.212 Earth Environments 1
Prerequisite: 25.120.
Sedimentology: Flow regimes and bedforming, 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. 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 L3 T3  
Prerequisite: 25.211.


25.223 Earth Physics  
S2 L2 T4  
Prerequisite: 25.110.


25.2261 Mathematical Geology 1  
S2 L2 T1  
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 L2 T4  
Prerequisite: 25.221.


25.312 Earth Environments 2  
S1 L3 T3  
Prerequisite: 25.212 note: it is desirable that students taking this unit have also taken 25.223.


25.314 Mineral and Energy Resources 1  
S1 L3 T3  
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 L2 T1  
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 L3 T3  
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.

25.324 Mineral and Energy Resources 2
Prerequisite: 25.212 or 25.5212.


25.325 Engineering and Environmental Geology

25.3271 Structural Geology
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.

25.3281 Exploration Geochemistry
Prerequisites: 25.311 and 25.314

Principles and techniques of soil, drainage and rock geochemistry as applied to mineral exploration.

25.333 Exploration Geophysics
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.

25.511 Surficial Materials and Processes
Prerequisite: 25.211.

25.5212 Sedimentology  
Prerequisite: 25.120. Excluded 25.212. 
As for Sedimentology in 25.212 Earth Environments 1.

25.5313 Stratigraphy  
Prerequisite: 25.5212. Excluded 25.312. 
As for Stratigraphy, in 25.312 Earth Environments 2.

25.621 Marine Geology 1  
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  
Prerequisite: Nil. 
*Field work of five days is a compulsory part of the subject.*

25.631 Marine Geology 2  
Prerequisite: 25.621. 
*Field work of four days is a compulsory part of the subject.*

25.632 Estuarine Geology  
Prerequisite: Nil. 
*Field work of four days is a compulsory part of the subject.*

25.6341 Marine Mineral Deposits and Oceanic Minerals  

25.9311 Gravity and Magnetic Methods  
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  
Prerequisites: 1.001 and 10.001. It is desirable that students taking this subject have a background in geology. 

25.9313 Electrical Methods  
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 L1 T1
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 L1 T2
Prerequisite: 25.120. Excluded 25.6342.
Geological Interpretation of Geophysical data: Seismic stratigraphy. Coal-seam geometry from high resolution seismic and inseam 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 L2 T2
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 L2 T2
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, alterations 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 L2 T2
Prerequisites: Both 27.010 and 27.030 or both 27.818 and 27.819. Excluded: 27.813, 27.854.
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.

27.133 Pedology S1 L2 T3
Prerequisites: 25.030 or 27.818 or both 17.031 and 17.041.
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 L2 T3
Prerequisites: 27.030 or 27.818 or both 17.031 and 17.041.

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 airphoto 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 L2 T2
Prerequisites: 27.175 or 29.8710.
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 L2 T3
Prerequisites: 27.030 or 27.810 or 25.120. Excluded 27.860.

27.193 Environmental Impact Assessment  S2 L2 T2
Prerequisites: 27.030 or 27.818.
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 L2 T2
Prerequisite: 27.133 or 27.183 or 27.828 or by permission of Head of School.

27.223 Environmental Change  S2 L2 T2
Prerequisite: Successful completion of a Year 2 Programme in Applied Science, Science, or Arts or equivalent as approved by the Head of School.

27.300 Field Project 3  S2 T3
Prerequisites: One of 27.133, 27.143, 27.183, 27.828. This prerequisite does not apply to students in Course 3010.
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 L1 T3
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 L2 T2
Prerequisite: 27.432 or by permission of Head of School. This prerequisite does not apply to students in Course 3010.
An introduction to information systems of particular relevance for geographers with special reference to computer-based systems for resource evaluation. Case study evaluation, application of the MAP and other GIS software.

27.753 Social Welfare and Urban Development  S1 L2 T3
Prerequisite: 27.010 or 27.829. 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 L2 T2
Prerequisites: both 27.010 and 27.030, or both 27.818 and 27.819. Excluded 27.050.
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 L2 T2
Excluded 27.030 and 27.424.
Characteristics of the Australian environment viewed in global context. Topics include: the structure, function and origin of the lithosphere, hydrosphere and biosphere; the plate tectonic model and major landforms; atmospheric circulation, energy and radiation balances; the hydrological cycle; floods and droughts; characteristics and distribution of soils and vegetation; analysis of ecosystems. A one day field trip is compulsory. Students will incur some personal expenses in connection with this subject.
27.819 Technology and Regional Change

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 and growth, resource utilization, and settlement patterns are examined at different scales emphasizing the social consequences at the community and regional level. International and intra-national spatial variations in the context of development and modernization theories. Examples are taken from Third World and modernized countries, with particular reference to Australian case studies.

Prerequisite: 27.829 or 27.010.

27.824 Spatial Population Analysis

Population growth and structure in an international urban and regional context. The components and processes of population change; fertility, mortality and migration set within the framework of demographic transition and development theory. Theories of migration and morbidity and of optimal populations. Demographic and social indicators for urban and regional analysis and their implications for disparities in living conditions at local, regional, and international scales. The adjustment of immigrant and migrant populations to the urban environment.

Prerequisite: 27.829 or 27.010.

27.825 Urban Activity Systems

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.

Prerequisite: 27.829 or 27.010.

27.826 Urban and Regional Development

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. Examples are taken principally from the fields of recreation and tourism.

Prerequisite: 27.829 or 27.010. Excluded 27.836.

27.828 Australian Natural Environments

Characteristics, origin and development of environments in Australia in terms of their tectonic history, lithology, landforms, climate, vegetation and soils. Analysis of natural physiographic regions and their modification by humans. A two day field trip is compulsory. Students will incur some expenses in connection with this subject.

Prerequisite: 27.030 or 27.818. Excluded 26.425.

27.829 Australian Social Environments

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.

Prerequisite: 27.010 or 27.819.

27.844 Honours Geography

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

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.

Prerequisites: 27.183 or 27.828.

27.883 Special Topic

Admission by permission to suitable students with good Passes in at least four subjects at Level III. Course of individually supervised reading and assignments as an approved topic in Geography not otherwise offered.

Prerequisite: Nil.

27.884 Advanced Geographic Methods

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


31.841 Clinical Optometry F L1 T1.5

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 L4 T4 S2 L1 T3
Prerequisites: 1.001 or 1.021, 10.001 or 10.021B and 10.021C or 10.011.1


31.852 Visual Optics S1 L1 T1 S2 L2 T1
Prerequisites: 1.001 or 1.021, 10.001 or 10.021B and 10.021C or 10.011.


31.853 Measurement of Light and Colour S2 L1 T1
Prerequisite: Nil.


31.861 Optometry A F L5.5 T0.5

Refraction: theory and practice of keratometry, measurement of vision and visual acuity, aetiology and treatment of ametropia, objective and subjective refraction, prescribing special visual aids. Binocular vision; sensory and motor fusion; retinal correspondence; the horopter; stereopsis. Orthoptics: convergence/accommodation anomalies, strabismus, amblyopia. Contact lenses: corneal anatomy and physiology, contact lens design and manufacture, fitting techniques, care and maintenance. Low vision: examination of the low vision patient, selection of aids.

31.862 Diagnosis and Management of Ocular Disease F L5 T
Prerequisite: 31.821.


Social Science

34.3001 Social Science Research Laboratory

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 solve problems and write reports.

Biochemistry

41.101 Principles of Biochemistry and Molecular Biology

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

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

Prerequisite: 41.101.

Aspects of metabolism that are of particular relevance to the human: nutrition, exercise, neurochemistry, xenobiotics and genetic diseases.

41.122 Cellular Biochemistry and Control

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

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

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 cultures, 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 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

Prerequisites: 41.101 and 44.121.

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

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 agroindustry 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

Prerequisite: 17.050, 17.601, 41.101 and 44.121. Excluded: 44.152, 43.102.

This unit is suitable for students majoring in Microbiology, Biochemistry, Biotechnology or Genetics. It deals with major aspects of the genetics of bacteriophage, bacteria and yeast. Topics include plasmids and transposable genetic elements, gene transfer, mutagenesis and DNA repair, mutants, bacteriophage genetics, gene cloning (vectors, recombinant DNA techniques) and genetics of nitrogen fixation.

42.102H Modern Techniques in Biotechnology

Prerequisite: 41.101.

Recent developments in biotechnology have resulted in techniques which are widely applied in industrial, clinical, veterinary, agricultural and research laboratories. Many of these techniques have resulted from the development of monoclonal antibodies and the development of gene probes. The course includes: antibody structure; production of monoclonal antibodies, cell fusion, hybridoma selection, culture techniques, purification; analytical techniques employing monoclonal antibodies (RIA, ELISA); therapeutic applications of antibodies, immunotoxins, gene probes; restriction fragment length polymorphisms (RFLP); gene probes for disease detection, identification of bacteria and viruses; forensic application of DNA fingerprinting. Tutorial and practical work to complement the lectures.

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.
Microbiology

Level II Subjects

44.101 Introductory Microbiology S1 L2 T4
Prerequisites: Nil.

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 microorganisms; a systematic review of the eukaryotic protista (microalgae, protozoa and fungi), prokaryotic protista (bacteria) and viruses. Relationships between microorganisms 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 L2 T4

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 prerequisite 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 micro-organisms with their environments.

44.122 Immunology I S1 L2 T4
Prerequisites: 17.050, 17.601, 41.101.

This course covers basic immunology and immunological techniques. The interdisciplinary nature of the subject makes this unit suitable for students taking any major program in biological science and also for higher degree students who require a background training in immunology. The course includes innate and adaptive immunity, development of the immune system, induction and expression of the immune response, structure and function of antibodies, in vitro and in vivo antigen-antibody reactions, the major histocompatibility complex and aspects of clinical immunology.

44.132 Animal Virology S2 L2 T4
Prerequisites: 44.121.

This unit concerns viruses which are important to man and other animals. It is suitable for students with special interests in Medical Microbiology who require a grounding in human virology. It is also of value to students wishing to broaden their knowledge of the important role which viruses play in human society.

The course covers virus structure and classification and provides some experience of the biological and physical techniques employed in virology laboratories. The methods used by viruses for replication are discussed, with particular emphasis on their behaviour at the cellular level. A number of human diseases caused by viruses are discussed in the contexts of the mechanisms used to produce diseases and the associated virus-host interactions of various types, the persistence, transfer and control of virus infections in communities and aspects of laboratory diagnosis of virus diseases. The course also discusses new trends in virology with emphasis on research aspects.

44.142 Environmental Microbiology S2 L2 T4
Prerequisites: 44.101 or 44.121.

This unit is suitable for students majoring in Microbiology, Ecology and Marine Science (Biological Oceanography) together with other students wishing to broaden their knowledge of the important role played by micro-organisms in environmental processes.

The course covers the complexity of natural habitats and recognition of organisms in these habitats, interactions of micro-organisms with their environment at the level of individuals and populations along with evolution and adaptation. Methods for environmental monitoring in aquatic and soil habitats are discussed. Manipulation of microbial populations in natural habitats, including problems associated with the release of genetically engineered micro-organisms are considered in some detail.

44.152 Microbial Genetics S1 L2 T4
Prerequisites: 17.050, 17.601, 41.101 and 44.121. Excluded: 42.102C.

This unit is suitable for students majoring in Microbiology, Biochemistry, Biotechnology or Genetics. It is presented...
conjointly by the School of Microbiology and the Department of Biotechnology and covers a wide range of topics in microbial genetics including plasmids and transposable genetic elements, gene transfer, mutagenesis and DNA repair, bacterial mutants, bacteriophage genetics, gene cloning, recombinant DNA techniques (genetic engineering) and genetics of nitrogen fixation. It also includes an introduction to the genetics of eucaryotic micro-organisms.

**44.162 Medical Bacteriology**  
**Prerequisites:** 44.121, 44.102.

The aim of this course is to provide an appreciation of the mechanisms whereby bacteria cause disease. Selected groups of bacteria will be studied in detail emphasising strategies which the micro-organisms have adopted to overcome host defence mechanisms. Special emphasis will be given to the processes of research that have led to the understanding of microbial pathogenesis and the means of intervention, i.e. immunisation, treatment and epidemiology. The focus of the practical classes will be to further develop the student's skills in handling bacteria and in identification methods used in a routine diagnostic laboratory.

**44.172 Applied Mycology**  
**Prerequisites:** 44.101 or 44.121 or 44.141.

The balanced structure of this unit makes it suitable for students majoring in Microbiology, Plant Science or Biotechnology. It is also suitable for students who wish to broaden their knowledge and skills in mycology beyond those obtained in second level introductory Microbiology courses or equivalent units at other institutions. The course is also appropriate as an elective for Food Technology students in third level.

The course is essentially an introduction to the applications and economic importance of fungi to man and his environment. It includes details of the growth and ecology of fungi, the use of fungi as food and fodder, in food and beverage fermentations and in the production of useful chemical products. The medical uses of fungal products including drugs, antibiotics and hallucinogens are discussed. Some aspects of the poisonous and mycotoxigenic fungi, fungi as superficial and systemic animal pathogens, fungal biodeterioration and biodegradation of organic matter and interaction of fungi with other organisms are covered. Means of controlling fungal growth by chemicals are also included in the discussions.

**Level IV Subjects**

**44.103 Microbiology Honours**  
**Prerequisites:** 44.121, 44.102.  
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 subjects see the Faculty of Medicine and Faculty of Applied Science Handbooks.

**44.141 Microbiology**

This course is solely for students enrolled in the Food Technology BSc courses 3060 and 3070 in the Faculty of Applied Sciences.

**44.211 Microbiology for Medical Students**

**Chemical Engineering and Industrial Chemistry**

**48.403 Polymer Science**  
**Prerequisites:** 2.102A, 2.102B, 10.301, 10.301.  
**Co- or prerequisites:** 48.001, 48.113.


**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**

Most upper level subjects are full units. The remainder are part units, of which three together have the value of two full units; otherwise, each one counts as a half-unit.

**Specialization in Philosophy**

Students majoring in Philosophy must complete, in addition to 52.103 and 52.104 (Introductory Philosophy A and Introductory Philosophy B), the equivalent of six full-point Upper Level (II/III) units. Of these, at least four units must be chosen from List A, which includes subjects in Logic, Philosophy of Mind, Philosophy of Science, and areas of History of Philosophy relevant to those subject areas. Students normally take the equivalent of two Level II/III units in Year 2, and the equivalent of four Level II/III units in Year 3.

**List A**

- 52.220 Logic
- 52.231 Human Nature and Human Understanding: the Empiricist Approach
- 52.2201 The Nature of Mind
- 52.250 Contemporary Philosophy of Mind
- 52.241 Issues in the Philosophy of Psychology
- 52.2010 Reasoning Skills
- 52.2022 Body, Mind, Knowledge and Freedom
- 52.215 Reason and the Passions: Descartes, Spinoza and Hume
- 52.2026 Philosophical Foundations of Artificial Intelligence
- 52.2140 Scientific Method
- 52.232 Personal Identity
- 52.304 Advanced Philosophy of Science
- 52.395 Pre-Honours Seminar

The remaining two units are to be chosen from other Upper Level Philosophy subjects in Table 1 or 60.014 in Table 2.

**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.

**Honours Entry Requirements**

Students intending to proceed to an Honours degree in Philosophy complete years 1-3 of Programs 5200 or 5262 with an overall credit record - and some indication of Distinction ability - in the philosophy units included in those programs; plus 52.395 (Pre-Honours Seminar).

**Socratic Society**

The Socratic Society is a student-run society associated with the School of Philosophy which meets regularly to promote discussion on topics of philosophical interest.

**Undergraduate Study: Subject Descriptions**

52.103 **Introductory Philosophy A**

Stephen Cohen, Phillip Staines, Genevieve Lloyd.

*Prerequisite: Nil.*

An introduction to philosophical thought and issues. Topic areas: the nature of argument; love and friendship in Greek Philosophy; ethics and political philosophy.

52.104 **Introductory Philosophy B**

Lisabeth During, Neil Harpley, Philip Cam.

*Prerequisites: Nil.*

A further introduction to philosophy through a study of traditional and contemporary discussions of three topic areas: words, signs and images; science and religion; ideas of utopia.

52.2001 **The Nature of Mind**

Philip Cam

*Prerequisite: Upper Level status in Philosophy.*

Not offered in 1990.

52.250 **Contemporary Philosophy of Mind**

Philip Cam

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.002.*

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.

May not be offered in 1990.

52.251 **Issues In the Philosophy of Psychology**

Philip Cam

*Prerequisite: Either 52.2001 or 52.250 or 12.100 (Psychology). Excluded: 52.203.*

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**

*Prerequisite: Any Level 1 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.*

May not be offered in 1990.

52.2022 **Body, Mind, Knowledge and Freedom**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.2020.*

Not offered in 1990.

The philosophical theories, mainly of Descartes and Leibniz, about (a) the natures of mind and body; (b) the mind-body
52.210 Scientific Method
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.

52.241 Philosophy of Law
Stephen Cohen
Prerequisite: Upper Level status in Philosophy. Excluded: 52.2150, 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, vicarious and collective liability), and punishment.
Assessment: Essays, possibly an examination.

52.242 The Ethics of Plato and Aristotle
Stephen Cohen
Prerequisite: Upper Level status in Philosophy. Excluded: 52.2220.
Not offered in 1990.

52.243 Theories in Moral Philosophy
Stephen Cohen
Prerequisite: Upper Level status in Philosophy. Excluded: 52.2230, 52.523, 52.522.
Examination of three moral theories central in the history and development of moral philosophy. Hume, Kant, and Mill offer different 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 is investigated in itself and in comparison with the other two.
Assessment: Essays and an examination.

52.2260 Aesthetics
Prerequisite: Upper Level status in Philosophy. Excluded: 52.273.
An examination of the central concepts, types of judgement and theories occurring in the field of aesthetics or theory of art.
52.2270 Social and Political Philosophy L2 C4
Stephen Cohen
Prerequisite: Upper Level status in Philosophy.
Not offered in 1990.

52.2330 Psychoanalysis – Freud and Lacan S1 L2 C4
Prerequisite: Upper Level status in Philosophy. Excluded: 52.573.
A discussion of psychoanalytic theory, particularly for what it shows about the relation between the individual and the social.
Assessment: Essays.

52.231 Human Nature and Human Understanding: The Empiricist Approach S1 3CCH C6
Neil Harpley
The traditional empiricists – Locke, Berkeley, and Hume – developed a substantial framework for theories concerning human nature and particularly for the consideration of issues arising in the attempt to explain our perception and knowledge of the world. The empiricist approach to these matters was revivified and became dominant in the first half of this century. Notable figures in recent empiricism include Russell and Quine and the leaders of the Logical Positivist movement. The course will involve a study of the major concerns of traditional and modern empiricists.
Assessment: Exercises and essays or examination.

52.2980 Seminar A S2 T2 C4
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 or S2 T2 C4
As for 52.2980 Seminar A.

52.601 Seminar C S2 3CCH C6
Excluded: 52.443, 52.3020.
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 or 62.202U.
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 theory generation; the revival of realism; problems of classification; theories of measurement; order and entropy; current issues in the philosophy of the physical sciences.

52.395 Pre-Honours Seminar S2 3CCH C6
Prerequisites: Level III status in Philosophy.
A subject for students intending to take Honours in Philosophy; designed to form skills in philosophical research and writing through seminar discussion of readings illustrating a range of philosophical approaches, styles and techniques.

52.4000 Philosophy Honours (Research) F T4
The Honours Year consists of writing a research thesis under supervision and seminar courses.

Sociology

53.001 Introduction to Sociology F 3CCH C12
Not offered in 1990.
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 cultures 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 a 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: F 3CCH C12
New Perspectives on Australian Society
Excluded: 53.001, 53.002, 53.003, 53.005.
Not offered in 1990.
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 S2 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.

54.1010 State and Society: An Introduction to Political Sociology S1 3CCH C6
For details contact the School of Political Science.

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.

European Studies

60.014 Culture and Critique: Trends in Contemporary European Philosophy S1 3CCH C6
Excluded: 52.3025.
A study of influential texts of 20th century European philosophy, which finds its rationale in a project which is common to contemporary French and German theory: rethinking philosophy as Cultural Criticism. Authors to be discussed include Freud, Nietzsche, Benjamin, Adorno, Horkheimer, Marcuse, Bloch, Mauss, Bataille, Artaud, Faucault, Deleuze, Kristeva and Derrida.
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 L2 T1 C6
Prerequisite: Nil. Excluded: 62.110.
Only Level I units may be counted towards Course 3970.

Relations between Science, Technology and Society as they have evolved in the 20th Century. Theories and the nature of technological design and change. An examination of controversies in areas including: pollution and environmental protection; nuclear energy and alternative energy sources; information/communications technologies; genetic engineering. The control of technology, technology assessment and the nature of public involvement in decisions about scientific and technological development.

Assessment: Essay (40 percent); tutorials (30 percent); class tests (30 percent).

62.102I Man, Megalith and Cosmos
S1 L2 T1 C6
Prerequisite: Nil. Excluded: 62.111
Only 2 level I units may be counted towards course 3970.

The first of a two part study of Humanity and the Cosmos constituting a general introduction to the history and philosophy of science. Provides a background to 62.104I From the Closed World to the Infinite Universe but is a self-contained subject in its own right presupposing no prior knowledge of science or mathematics. Examines the evidence for scientific knowledge in prehistoric cultures (with special reference to the Western European megalithic cultures), the astronomy and cosmology of the ancient Near Eastern civilizations, and the development in earlier Greek geometry, astronomy, cosmology and method which provided the foundations for medieval and modern Western science. Topics: naked-eye astronomy; archaeoastronomy; ley lines and "fringe" archaeology; dating and the development of archaeological theory; Pacific Islands' navigation; Australian Aboriginal cosmology and astronomy; the interpretation of mythology; the astronomy and cosmology of Mesopotamia and Egypt; an assessment of astrology; Aristotle's cosmology; the origins and development of geometry to Euclid; patterns of reasoning and the foundations of scientific method; and the mystery of the Dogons and the Von Daniken phenomenon.

Assessment: 2 short essays, 2 tests, tutorials.

62.103I Understanding Technological Controversy
S2 L1 T2 C6
Prerequisite: 62.101I.
Only 2 Level I units may be counted towards Course 3970.

The lecture series examines themes relevant to the analysis of scientific and technical controversies in general; how they arise, how they are conducted, the nature of evidence, the uses of expert authority, how and why disputes are resolved or remain unresolved. The tutorials are devoted to intensive supervised group work on particular issues of concern to students in the general areas of environment; energy resources and technologies; reproductive technologies and genetic engineering; information and communication technologies.

Assessment: Essay (20 percent); test (20 percent); tutorials (60 percent).

62.104I From the Closed World to the Infinite Universe
S2 L2 T1 C6
Prerequisite: Nil. Excluded: 62.211.

Only 2 level I units may be counted towards course 3970.

The second of a two part study of Humanity and the Cosmos which aims to provide a general introduction to the history and philosophy of science. Follows on from Man, Megalith and Cosmos, but constitutes a self-contained subject in its own right without prerequisites. Examines the momentous transition from the ancient/medieval model of a closed world to modern cosmological theory. Topics: the ancient tradition and the medieval conception of the cosmos; the labyrinth and the mappa mundi: the Ptolemaic system; cultural and cognitive change during the Renaissance; Terra Australis and the expansion of the known world; Copernicus and the Copernican Revolution; the development of scientific methodology; the astronomy and cosmology of Kepler, Galileo and Descartes; Newton and the clockwork universe; the Scientific Revolution and the Church; humanity as microcosm; the telescope and the microscope; the plurality of worlds; galaxies and nebulae; Relativity theory, big bangs and black holes; "fringe" and "New Age" cosmologies; science fiction and little green men.

Assessment: 2 short essays (33½ percent); 2 tests (33½ percent); tutorials (33½ percent).

62.115I Science: Good, Bad and Bogus.
S2 L2 T1 C6
An Introduction to the Philosophy of Science
Prerequisite: Nil.

Only 2 Level I units may be counted towards Course 3970.

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. Central 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 L2 T1 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
Sciences

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 (40 percent); performance in class (30 percent); examination (30 percent).

62.202U The Scientific Theory

Prerequisite: As for 62.201U. Excluded: 62.032, 62.505.

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 laws 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 (33\(\frac{1}{3}\) percent); tests (33\(\frac{1}{3}\) percent); tutorials (33\(\frac{1}{3}\) percent).

62.203U Scientific Knowledge and Political Power

Prerequisite: As for 62.201U. Excluded: 62.052, 62.252.

Not offered in 1990.

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 Sociology of Science and Technology

Prerequisite: As for 62.201U. Excluded: 62.062.

An examination of the communal nature of scientific and technological activities which will include: an historical survey of the development of scientific and engineering sub-cultures and professions; theories on the internal workings of scientific communities – scientific communication, norms, the reward system, fraud, disciplines and specialties in science and engineering; a critical examination of the notion of 'communities' and their relation with the wider social order; the 'constructivist' re-unification of social systems and knowledge systems and consequences for the sociology of expertise.

Assessment: Essays (60 percent); tutorials (40 percent).

62.206U Science, Technology and Developing Countries


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

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 (33\(\frac{1}{3}\) percent); tutorials (33\(\frac{1}{3}\) percent); 2 class tests (33\(\frac{1}{3}\) percent).

62.208U The Darwinian Revolution

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

Prerequisite: As for 62.201U. Excluded: 62.106.

Not offered in 1990.
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 (33\% percent); tutorial assessment (33\% percent); tests (33\% percent).

62.210U History of Medicine  

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  

The relationships between science, technology and the visual arts 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 and the discovery of the principles of perspective. Optical theories of Newton, Goethe, Young, Helmholtz, etc., and their influence on painting. Photography and art. Impressionism, neo-impressionism, cubism, futurism, etc., and the emergence of abstract art in relation to science, technology and art. Psychology and art. Magritte's philosophizing. New visual experiences as material for artistic expression. Nature of the relationship between science and art.

Assessment: Tutorial exercises (40 percent); essay (30 percent); examination (30 percent).

62.212U The New Biotechnologies and Their Social Context  
Prerequisite: 62.101U 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  

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  

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: archaeological 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 (33\% percent); 2 tests (33\% percent); tutorials (33\% percent).

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 L2 T1 C6

Prerequisite: As for 62.201U. Excluded: 62.570.

Not offered in 1990.

Chomsky's theories of language and mind which have revolutionised linguistics, psychology, and philosophy, especially the Behaviourist approach of Skinner. Chomsky's impact on traditional philosophical debate between Rationalists and Empiricists concerning innate ideas.

62.219U Knowledge and Belief in the Sciences S1 L2 T1 C6

Prerequisite: As for 62.210U.

Not offered in 1990.

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, Environment and Risk S1 L2 T1 C6

Prerequisite: 62.101U 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 Technology, Politics and Policies S1 L2 T1 C6

Prerequisite: As for 62.220U.

Key issues for an 'info-tech' society including: social policies and the future of work and education; mass media and telecommunications in the electronic age; commercialisation and shifting patterns of trade in the world economy; de-regulation and the role of 'info-tech' in global restructuring.

Assessment: Essay and tutorial participation.

62.222U The Politics of Energy S2 L2 T1 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 S1 L2 T1 C6


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.

Science prerequisite: completion of S & T with an average of Credit or better, or by permission of the Head of School.

Excluded: 62.105.

A weekly seminar designed to prepare students to carry out Honours level research. The historiography of science, is 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.

Not offered in 1990.

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.

62.303U Technology, Globalisation and the Role of the State S2 L2 T1

An analysis of the interaction between technology, economic growth and the internationalism of industry; the growing pressure on the State to adopt an increasingly interventionist role — from Japan to Dodge City.

62.305U Issues In the Philosophy of Science

Prerequisite: 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.

Anatomy

70.011A Histology 1

Prerequisites: 17.031, 17.041. Co-requisite: 70.011C.

Elementary theory of light and electron microscopy. Mammalian cell morphology and 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

Co-requisites: 70.011A, 70.011C.


70.011C Introductory Anatomy

Prerequisites: 17.031, 17.041.

Introduction to gross anatomy, based on a study of preserved specimens. Musculoskeletal, cardiovascular, respiratory, gastrointestinal, genitourinary and nervous systems. General topographical and surface anatomy.
70.012B Visceral Anatomy S2 L2 T4
**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 L2 T4
**Prerequisites:** 70.011A, 70.011C.
Nerve cells and glial cells, cytarchitecture of brain and spinal cord. 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 F L1 T2
**Prerequisite:** 70.011A. Excluded 70.3041. (If 70.304 is taken after 70.3041, total counts only 1 unit).

70.3041 Histological and Histochemical Techniques S1 L1 T2
**Prerequisites:** 17.031, 17.041 and either 41.101 or 45.301 or 70.011A. Excluded: 70.304.
May not be offered in 1990.

70.305 Neuroanatomy 2 S2 L1 T2
**Prerequisite:** 70.012C.
Topics of contemporary neuroanatomy and neuroscience. Includes: sensory, motor and associational areas of the cerebral cortex, cerebellar asymmetry, hippocampus, regulatory centres of the brainstem, organization of cerebellum, sensory organs. Recent advances in chemical neuroanatomy and neuroendocrinology. Neuroanatomy of major neurological diseases, scientific basis of novel approaches to treatment. Recent work on the development of the brain. The course is organized in seminar format, and is based primarily on original publications. Students are required to undertake a substantial amount of private study.

70.306 Functional Anatomy 1 S1 L2 T4
**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 L2 T4
**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 F L1
**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 L2 T1
**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 processes 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 L2.5 T3.5

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 Optom degree course.

73.012 Physiology 2  
F L4 T8

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 L2 T4

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 L2 T4

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 L4 T8

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.

73.013 Physiology 4 (Honours)  
F L2 T4

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  
F L2 T4

Prerequisite: 73.111 or 73.121.

For entry consult Head of School of Physiology and Pharmacology.

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
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
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
Prerequisite: 41.101, 17.601 or 68.601.
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. Inherited DNA variation or restriction fragment length polymorphism, its application to studies of genetic diseases and of human populations. Application of statistical techniques to analyzing population data. Laboratory techniques to illustrate principles and uses of selected polymorphic systems.

Faculty of Medicine

80.014 Human Behaviour
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
Graduate Study: Faculty of Biological and Behavioural Sciences
Faculty of Science

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
- 17.004 Biological Science Honours
- 42.103 Biotechnology Honours
- 17.434 Botany Honours
- 44.103 Microbiology Honours
- 12.403 Psychology 4 (Thesis)
- 12.404 Psychology 4
- 17.435 Zoology Honours

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 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.
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
- 17.999G Biological Science
- 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.

---

**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 students who achieve an appropriate standard may be admitted 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 fulfill the needs and objectives of individual students, building on that student's competence and experience.

---

**Biotechnology**

**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 18 hours per week, or two years part-time study, consisting of an average of 9 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.
Graduate Study: Faculty of Biological and Behavioural Sciences

### Master of Applied Science (Biotechnology)

The Department also offers a formal graduate course at the master's level (Master of Applied 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 supervised 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.

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### 8042

**Master of Applied Science (Biotechnology)**

**Graduate Course**

**Master of Applied Science (Biotechnology)**

MAppSc(Biotech)


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### 8252

**Applied Psychology Graduate Course**

**Full-time**

**Master of Psychology (Applied)**

MPsychol (Applied)

<table>
<thead>
<tr>
<th>Core Program Year 1</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>12.239G Research and Evaluation Methods</td>
<td>2</td>
</tr>
<tr>
<td>12.241G Graduate Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>12.244G Psychological Assessment 2</td>
<td>2</td>
</tr>
<tr>
<td>12.250G Psychological Assessment 1</td>
<td>3</td>
</tr>
</tbody>
</table>

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**Psychology**

Head of School
Professor B.J. Gillam

Administrative Officer
Mr. T.J. Clulow
## Core Program Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.351G Industrial and Organizational Psychology</td>
<td>S1: 2</td>
</tr>
<tr>
<td>12.353G Applied Experimental Psychology</td>
<td>S1: 2</td>
</tr>
<tr>
<td>12.354G Principles of Ergonomics</td>
<td>S2: 3</td>
</tr>
<tr>
<td>12.356G Professional Practice (Applied): 340 hours</td>
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</tbody>
</table>

## Core Program Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>12.241G Graduate Colloquium</td>
<td>S1: 1</td>
</tr>
<tr>
<td>12.356G Professional Practice Applied: 340 hours</td>
<td>S2: 1</td>
</tr>
<tr>
<td>12.357G Seminars in Applied Psychology</td>
<td>S1: 2</td>
</tr>
<tr>
<td>12.358G Research Thesis</td>
<td>S2: 6</td>
</tr>
</tbody>
</table>

## Elective Program Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>12.230G Developmental Disabilities and Disorders</td>
<td>S1: 3</td>
</tr>
<tr>
<td>12.245G Behavioural Health Management</td>
<td>S1: 2</td>
</tr>
<tr>
<td>12.251G Human Neuropsychology</td>
<td>S2: 3</td>
</tr>
<tr>
<td>12.352G Psychological Principles of Training</td>
<td></td>
</tr>
<tr>
<td>12.355G Advanced Ergonomics</td>
<td>S2: 3</td>
</tr>
<tr>
<td>12.359G Cross-Cultural Perspectives in Applied Psychology</td>
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</tr>
<tr>
<td>12.360G Vocational Psychology</td>
<td>S2: 3</td>
</tr>
<tr>
<td>12.361G Special Topic</td>
<td></td>
</tr>
<tr>
<td>47.062G Applied Ergonomics</td>
<td>S2: 3</td>
</tr>
<tr>
<td>47.090G Introduction to Occupational Health and Safety Law</td>
<td></td>
</tr>
<tr>
<td>70.201G Introductory Functional Anatomy</td>
<td>S2: 3</td>
</tr>
<tr>
<td>80.701G Occupational Disease</td>
<td></td>
</tr>
</tbody>
</table>

### Note:
- Part-time students normally are expected to take half the full-time program in any one session.

## Master of Psychology (Clinical)

### Year 1

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>12.230G Developmental Disabilities and Disorders</td>
<td>S1: 3</td>
</tr>
<tr>
<td>12.231G Professional Practice: 340 hours</td>
<td>S2: 3</td>
</tr>
<tr>
<td>12.237G Biological and Environmental Bases of Behavioural Disturbance</td>
<td>S1: 2</td>
</tr>
<tr>
<td>12.239G Research and Evaluation Methods</td>
<td>S2: 2</td>
</tr>
<tr>
<td>12.241G Graduate Colloquium</td>
<td>S1: 1</td>
</tr>
<tr>
<td>12.244G Psychological Assessment 2</td>
<td>S2: 2</td>
</tr>
<tr>
<td>12.245G Behavioural Health Management</td>
<td>S2: 2</td>
</tr>
<tr>
<td>12.249G Child Clinical Psychology</td>
<td>S2: 2</td>
</tr>
<tr>
<td>12.250G Psychological Assessment 1</td>
<td>S2: 1</td>
</tr>
<tr>
<td>12.251G Human Neuropsychology</td>
<td>S2: 3</td>
</tr>
<tr>
<td>12.252G Experimental Clinical Psychology 1</td>
<td>S2: 4</td>
</tr>
</tbody>
</table>

### Year 2

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>12.231G Professional Practice: 340 hours</td>
<td>S1: 3</td>
</tr>
<tr>
<td>12.235G Community Psychology</td>
<td>S2: 3</td>
</tr>
<tr>
<td>12.240G Graduate and Clinical Seminars 2</td>
<td>S1: 2</td>
</tr>
<tr>
<td>12.241G Graduate Colloquium</td>
<td>S2: 1</td>
</tr>
<tr>
<td>12.242G Research Thesis*</td>
<td>S2: 4</td>
</tr>
<tr>
<td>12.253G Experimental Clinical Psychology 2</td>
<td>S2: 2</td>
</tr>
</tbody>
</table>

### Notes:
- Part-time students normally are expected to take half the full-time program in any one session.

### Core Program Year 1

1. **Industrial and Organizational Psychology** (12.351G)
2. **Applied Experimental Psychology** (12.353G)
3. **Principles of Ergonomics** (12.354G)

### Core Program Year 2

1. **Graduate Colloquium** (12.241G)
3. **Seminars in Applied Psychology** (12.357G)
4. **Research Thesis** (12.358G)

### Elective Program Year 2

1. **Developmental Disabilities and Disorders** (12.230G)
2. **Behavioural Health Management** (12.245G)
3. **Human Neuropsychology** (12.251G)
4. **Psychological Principles of Training** (12.352G)
5. **Advanced Ergonomics** (12.355G)
6. **Cross-Cultural Perspectives in Applied Psychology** (12.359G)
7. **Vocational Psychology** (12.360G)
8. **Special Topic** (12.361G)
9. **Applied Ergonomics** (47.062G)
10. **Introduction to Occupational Health and Safety Law** (47.090G)
11. **Introductory Functional Anatomy** (70.201G)
12. **Occupational Disease** (80.701G)

### 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 1 or Class 2 in Psychology;
2. Completion of a research thesis or research project in the Honours fourth year;
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 i.e. 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.

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, supervised 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 680 hours of supervised clinical practice must be completed.

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.

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### 8251 Clinical Psychology Graduate Course – Full-time

#### Master of Psychology (Clinical) (MPsychol (Clinical))

##### Year 1

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<tr>
<td>12.239G Research and Evaluation Methods</td>
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</tr>
<tr>
<td>12.241G Graduate Colloquium</td>
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<tr>
<td>12.250G Psychological Assessment 1</td>
<td>S2: 1</td>
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<tr>
<td>12.251G Human Neuropsychology</td>
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##### Year 2

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<td>12.253G Experimental Clinical Psychology 2</td>
<td>S2: 2</td>
</tr>
</tbody>
</table>

*Contributes approximately 25 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.
Facility 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
- Master of Optometry
- Master of Chemistry
- Graduate Diploma in Food and Drug Analysis

School of Mathematics
- Master of Mathematics
- Master of Statistics
- Master of Physics

School 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
- 97.580G Image Analysis Remote Sensing 3 credits
- 97.581G Microwave Remote Sensing 3 credits
- 8.663G 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 D. St C. Black

Chairman of Graduate Studies
Associate Professor H. A. Goodwin
(contactable via Chemistry Academic Office)

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 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

<table>
<thead>
<tr>
<th>Part-time**</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>2.231G Food and Drugs 1</td>
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<tr>
<td>2.371G Treatment of Analytical Data</td>
<td>1</td>
</tr>
<tr>
<td>2.281G Instrumental Techniques in Food and Drug Analysis</td>
<td>4</td>
</tr>
<tr>
<td>44.101 Introductory Microbiology</td>
<td>9</td>
</tr>
</tbody>
</table>

Year 2

<table>
<thead>
<tr>
<th>Part-time**</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.242G Food and Drugs 2</td>
<td>4</td>
</tr>
<tr>
<td>2.251G Toxicology, Occupational and Public Health</td>
<td>4</td>
</tr>
<tr>
<td>44.101 Introductory Microbiology</td>
<td>11</td>
</tr>
</tbody>
</table>

*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 supervised 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 supervised 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.381G</td>
<td>Experimental Design 1</td>
<td>2</td>
</tr>
<tr>
<td>10.383G</td>
<td>Stochastic Processes</td>
<td>2</td>
</tr>
<tr>
<td>10.385G</td>
<td>Multivariate Analysis 1</td>
<td>2</td>
</tr>
<tr>
<td>10.390G</td>
<td>Statistical Inference</td>
<td>2</td>
</tr>
<tr>
<td>10.392G</td>
<td>Project</td>
<td>2</td>
</tr>
</tbody>
</table>

Elective Subjects

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.382G</td>
<td>Experimental Design 2</td>
<td>2</td>
</tr>
<tr>
<td>10.384G</td>
<td>Time Series</td>
<td>2</td>
</tr>
<tr>
<td>10.386G</td>
<td>Multivariate Analysis 2</td>
<td>2</td>
</tr>
<tr>
<td>10.387G</td>
<td>Sample Survey Design</td>
<td>2</td>
</tr>
<tr>
<td>10.388G</td>
<td>Sequential Analysis</td>
<td>2</td>
</tr>
<tr>
<td>10.391G</td>
<td>Non-Parametric Methods</td>
<td>2</td>
</tr>
<tr>
<td>10.393G</td>
<td>Special Topic* A</td>
<td>2</td>
</tr>
<tr>
<td>10.394G</td>
<td>Special Topic* B</td>
<td>2</td>
</tr>
<tr>
<td>10.394G</td>
<td>Discrete Distributions</td>
<td>2</td>
</tr>
<tr>
<td>10.212M</td>
<td>Optimal Control Theory or</td>
<td>3</td>
</tr>
<tr>
<td>10.222M</td>
<td>Higher Optimal Control Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.403G</td>
<td>Theory of Land Use/Transport</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Interaction</td>
<td></td>
</tr>
<tr>
<td>8.405G</td>
<td>Urban Transport Planning Practice</td>
<td>2</td>
</tr>
<tr>
<td>8.417G</td>
<td>Transport and Traffic Flow Theory</td>
<td>4</td>
</tr>
<tr>
<td>10.212L</td>
<td>Optimization Methods</td>
<td>3</td>
</tr>
<tr>
<td>10.222L</td>
<td>Higher Optimization Methods</td>
<td>3</td>
</tr>
<tr>
<td>15.304M</td>
<td>Econometrics B</td>
<td>2</td>
</tr>
<tr>
<td>18.711G</td>
<td>Simulation in Operations Research</td>
<td>2</td>
</tr>
</tbody>
</table>

*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 fulltime 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.
### 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).

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### 8760

#### Master of Optometry Graduate Course

**Master of Optometry**

MOptom

Not offered in 1990.

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.701G Advanced Clinical Optometry</td>
</tr>
<tr>
<td>Three elective graduate subjects chosen from the list below</td>
</tr>
<tr>
<td>(each 4 hours)</td>
</tr>
<tr>
<td>31.799G Project</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Elective Graduate Subjects**

| 31.702G Advanced Physiological Optics | 4 |
| 31.703G Pleuroptics 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:

<table>
<thead>
<tr>
<th>Specialization</th>
<th>Graduate Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Lenses</td>
<td>1. Advanced Contact Lens Studies</td>
</tr>
<tr>
<td></td>
<td>2. Advanced Contact Lens Practice</td>
</tr>
<tr>
<td></td>
<td>3. Clinical Photography</td>
</tr>
<tr>
<td>Occupational Optometry</td>
<td>1. Occupational Optometry</td>
</tr>
<tr>
<td></td>
<td>2. Pleuroptics and Binocular Vision</td>
</tr>
<tr>
<td></td>
<td>3. Advanced Physiological Optics</td>
</tr>
<tr>
<td>Orthoptics</td>
<td>1. Pleuroptics and Binocular Vision</td>
</tr>
<tr>
<td></td>
<td>2. Clinical Photography</td>
</tr>
</tbody>
</table>

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### Physics

**Head of School**

Professor J. W. V. Storey

**Executive Assistant to Head of School**

Dr K. R. Vost

**Administrative Officer**

Mr S. Lo

---

**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).
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 a subject other than the one intended.

Subject numbers are allocated by the 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 previously been used 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.

Appropriate subjects for each school appear at the end of each school section.

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. These subjects will be found at the back of this handbook.

The following pages contain descriptions for most of the subjects offered for the courses described in this book, the exception being General Education subjects. For General Education subjects see the General Education Handbook which is available free of charge.

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 the 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 or Credit units
- CR Credit level
- DN Distinction
- HD High Distinction
- X External
<table>
<thead>
<tr>
<th>School, Department etc</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Physics*</td>
<td>Science</td>
</tr>
<tr>
<td>School of Chemistry*</td>
<td>Science</td>
</tr>
<tr>
<td>School of Chemical</td>
<td>Applied Science</td>
</tr>
<tr>
<td>Engineering and</td>
<td></td>
</tr>
<tr>
<td>Industrial Chemistry</td>
<td>(New Course)</td>
</tr>
<tr>
<td>School of Materials</td>
<td>Applied Science</td>
</tr>
<tr>
<td>Science and Engineering</td>
<td></td>
</tr>
<tr>
<td>School of Mechanical and</td>
<td>Engineering</td>
</tr>
<tr>
<td>Industrial Engineering*</td>
<td></td>
</tr>
<tr>
<td>School of Electrical</td>
<td>Engineering</td>
</tr>
<tr>
<td>Engineering and</td>
<td></td>
</tr>
<tr>
<td>Computer Science*</td>
<td></td>
</tr>
<tr>
<td>School of Mines (Mineral</td>
<td>Applied Science</td>
</tr>
<tr>
<td>Processing and Extractive</td>
<td></td>
</tr>
<tr>
<td>Metallurgy and Mining Engineering)</td>
<td></td>
</tr>
<tr>
<td>School of Civil</td>
<td>Engineering</td>
</tr>
<tr>
<td>Engineering*</td>
<td></td>
</tr>
<tr>
<td>School of Fibre Science</td>
<td>Applied Science</td>
</tr>
<tr>
<td>and Technology</td>
<td>(Wool and Animal Science)</td>
</tr>
<tr>
<td>School of Mathematics*</td>
<td>Architecture</td>
</tr>
<tr>
<td>School of Architecture</td>
<td>Biological and Behavioural</td>
</tr>
<tr>
<td>Sciences</td>
<td>Sciences</td>
</tr>
<tr>
<td>School of Psychology</td>
<td>Applied Science</td>
</tr>
<tr>
<td>School of Fibre Science</td>
<td>and Technology</td>
</tr>
<tr>
<td>(Textile Technology)</td>
<td>(New Course)</td>
</tr>
<tr>
<td>School of Accounting*</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>School of Economics*</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>School of Health</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Services Management</td>
<td></td>
</tr>
<tr>
<td>17 Faculty of Biological</td>
<td>Biological and Behavioural</td>
</tr>
<tr>
<td>and Behavioural Sciences*</td>
<td>Sciences</td>
</tr>
<tr>
<td>School of Mechanical</td>
<td>Engineering</td>
</tr>
<tr>
<td>and Industrial Engineering</td>
<td>(Industrial Engineering)</td>
</tr>
<tr>
<td>19 School of Information</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>Systems</td>
<td>Applied Science</td>
</tr>
<tr>
<td>20 Centre for Petroleum</td>
<td>Architecture</td>
</tr>
<tr>
<td>Engineering Studies</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>21 Department of Industrial Arts</td>
<td></td>
</tr>
<tr>
<td>22 Faculty of Professional</td>
<td>Studies</td>
</tr>
<tr>
<td>23 School of Primary</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>and Computer Education</td>
<td>Applied Science</td>
</tr>
<tr>
<td>25 School of Mines</td>
<td></td>
</tr>
<tr>
<td>(Applied Geology)</td>
<td></td>
</tr>
<tr>
<td>26 Centre for Liberal and</td>
<td>Liberal and General</td>
</tr>
<tr>
<td>General Studies</td>
<td>Studies</td>
</tr>
<tr>
<td>27 School of Geography</td>
<td>Applied Science</td>
</tr>
<tr>
<td>28 School of Marketing*</td>
<td>Commerce and Economics</td>
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<tr>
<td>29 School of Surveying*</td>
<td>Engineering</td>
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<td>30 School of Industrial</td>
<td>Commerce and Economics</td>
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<td>Relations and</td>
<td></td>
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<td>Organizational Behaviour</td>
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</tr>
<tr>
<td>School of Optometry</td>
<td>Science</td>
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<tr>
<td>32 Centre for Biomedical</td>
<td>Engineering</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
</tr>
<tr>
<td>33 School of Sports and</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Leisure Studies</td>
<td></td>
</tr>
<tr>
<td>35 School of Building</td>
<td>Architecture</td>
</tr>
<tr>
<td>36 School of Town Planning*</td>
<td>Architecture</td>
</tr>
<tr>
<td>37 School of Landscape</td>
<td>Architecture</td>
</tr>
<tr>
<td>39 Graduate School of the Built Environment</td>
<td></td>
</tr>
<tr>
<td>40 Academic Board</td>
<td></td>
</tr>
<tr>
<td>41 School of Biochemistry*</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>42 School of Applied Bioscience (Biotechnology)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>44 School of Microbiology*</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>45 School of Biological Science</td>
<td>Biological and Behavioural Sciences</td>
</tr>
<tr>
<td>46 Faculty of Applied Science</td>
<td>Applied Science</td>
</tr>
<tr>
<td>47 Centre for Safety Science</td>
<td>Engineering</td>
</tr>
<tr>
<td>48 School of Chemical Engineering and Industrial Chemistry (Old course)</td>
<td></td>
</tr>
<tr>
<td>49 School of Applied Bioscience (Food Science and Technology)</td>
<td>Applied Science</td>
</tr>
<tr>
<td>50 School of English</td>
<td>Arts</td>
</tr>
<tr>
<td>51 School of History</td>
<td>Arts</td>
</tr>
<tr>
<td>52 School of Philosophy</td>
<td>Arts</td>
</tr>
<tr>
<td>53 School of Sociology</td>
<td>Arts</td>
</tr>
<tr>
<td>54 School of Political Science*</td>
<td>Arts</td>
</tr>
<tr>
<td>55 School of Librarianship</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>56 School of French</td>
<td>Arts</td>
</tr>
<tr>
<td>57 School of Theatre Studies</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>58 School of Education</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>59 Department of Russian Studies</td>
<td>Arts</td>
</tr>
<tr>
<td>60 Faculty of Arts</td>
<td>Arts</td>
</tr>
<tr>
<td>61 Department of Music</td>
<td>Arts</td>
</tr>
<tr>
<td>62 School of Science and Technology Studies</td>
<td>Arts</td>
</tr>
<tr>
<td>63 School of Social Work</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>64 School of German Studies</td>
<td>Arts</td>
</tr>
<tr>
<td>65 School of Spanish and Latin American Studies</td>
<td></td>
</tr>
<tr>
<td>66 Subjects Available from Other Universities</td>
<td></td>
</tr>
<tr>
<td>67 Faculty of Science</td>
<td>Science</td>
</tr>
<tr>
<td>68 Board of Studies in Science and Mathematics</td>
<td>Board of Studies in Science and Mathematics</td>
</tr>
<tr>
<td>69 School of Arts Education</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>70 School of Anatomy</td>
<td>Medicine</td>
</tr>
<tr>
<td>71 School of Medicine</td>
<td>Medicine</td>
</tr>
<tr>
<td>72 School of Pathology</td>
<td>Medicine</td>
</tr>
<tr>
<td>73 School of Physiology and Pharmacology</td>
<td></td>
</tr>
<tr>
<td>School, Department etc</td>
<td>Faculty</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>School of Surgery</td>
<td>Medicine</td>
</tr>
<tr>
<td>School of Obstetrics and Gynaecology</td>
<td>Medicine</td>
</tr>
<tr>
<td>School of Paediatrics</td>
<td>Medicine</td>
</tr>
<tr>
<td>School of Psychiatry</td>
<td>Medicine</td>
</tr>
<tr>
<td>School of Medical Education</td>
<td>Medicine</td>
</tr>
<tr>
<td>School of Community Medicine</td>
<td>Medicine</td>
</tr>
<tr>
<td>Faculty of Medicine</td>
<td>Medicine</td>
</tr>
<tr>
<td>Medicine/Science/Biological Sciences</td>
<td>Medicine</td>
</tr>
<tr>
<td>Australian Graduate School of Management</td>
<td>AGSM</td>
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<tr>
<td>Faculty of Law</td>
<td>Law</td>
</tr>
<tr>
<td>Faculty of Engineering</td>
<td>Engineering</td>
</tr>
<tr>
<td>School of Banking and Finance</td>
<td>Commerce and Economics</td>
</tr>
<tr>
<td>Department of Legal Studies and Taxation</td>
<td>Commerce and Economics</td>
</tr>
</tbody>
</table>
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.

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
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
and
2.242G Food and Drugs 2
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, antibacterials, etc. Antibiotics, penicillin, streptomycin, aureomycin, sulphonamides. Activity of enzyme preparations; antiseptics and disinfectants; soaps and detergents.

2.251G Toxicology, Occupational and Public Health
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.

2.281G Instrumental Techniques in Food and Drug Analysis
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 chromatographic 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.

2.371G Treatment of Analytical Data F L1

Errors of measurement, the treatment, interpretation and comparison of sets of measurements, associated data and problems involving analysis of variance. Topics: Description 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


2.582G Food and Drug Chemistry

2.583G Analytical Science (Chemistry)

Civil Engineering

8.403G Theory of Land Use Transport SS C3

Theoretical aspects of land use transport planning. Basic concepts, data collection methods, systems models and equation of state function behaviour, 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


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 L1.5 T.5

Prerequisite: First course in Statistics or equivalent.


10.303G Applied Stochastic Processes S2 L1.5 T.5

Prerequisite: First course in Statistics or equivalent.


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+ 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

10.384G Time Series

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

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

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
Boundary value problems in partial differential equations. Selected topics from complex variable analysis, integral transforms, and orthogonal functions and polynomials.

10.361G Statistics
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
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
Probability and distributions. Estimation and hypothesis testing. Associations between disease and risk factors. Linear
models; analysis of variance, simple and multiple regression, discriminant analysis. Experiment design.

32.101G Mathematical Modelling for Biomedical Engineers
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.

12.244G Psychological Assessment 2
Prerequisite: 12.250G.
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 supervised 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

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 Ill-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.
12.252G Experimental Clinical Psychology 1  
*Excluded: 12.243G.*

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.

12.253G Experimental Clinical Psychology 2  
*Excluded: 12.243G*  
As for 12.252G

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.*

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.

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; geriatric and pediatric optometry; the clinical application of electrophysiological techniques. The assessment of new instruments, methods and treatment.

31.702G Advanced Physiological Optics F L2 T2


31.703G Pleothoptics and Binocular Vision F L2

An integrated subject, in which binocular vision and pleothoptics 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 L1

Contact lens materials: polymer chemistry, physical and chemical properties of soft and hard lens materials. Contact lens design: the relationship of the theoretical contact lens design and corneal topography. Clinical evaluation of current and new soft and hard lens designs. Contact lens care and...

31.705G Advanced Contact Lens Practice  F  L1  T3
The examination, evaluation and aftercare of contact lens patients.

31.706G Occupational Optometry  F  L2  T2

31.707G Clinical Photography  F  L2  T2

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)

42.214G Biotechnology  SS  L2  T1
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 fermenter 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  T6
Illustration, demonstration and operation of laboratory-scale and pilot-scale equipment. Visits to appropriate industries. Experimental project or critical review.

42.407G Biological Principles  S1  L3

42.408G Bioprocessing 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**

17.999G Alternative Higher Degree Qualifying Program
Similar in content and standard to 17.004 Biological Science Honours but designed specifically for students who cannot regularly attend the University.

43.999G Alternative Higher Degree Qualifying Program
Similar in content and standard to 17.434 Botany Honours but designed specifically for students who cannot regularly attend the University.

45.900G Ecological Studies in Arid Lands Management
Prerequisites: 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 17.454 Zoology Honours but designed specifically for students who cannot regularly attend the University.

**Faculty of Science**

67.001G Experimental Project in Physical Oceanography
A report of an experimental project, including recording, preparation, analysis and interpretation of field or laboratory data.

67.002G Geophysical Fluid Dynamics
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
Laboratory, moored, shipborne, airborne and space instrumentation commonly used in oceanographic experiments; their applications and limitations.

67.004G Applied Time Series Analysis
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**

70.012G Neuroanatomy
This subject is identical in content as 70.012C Neuroanatomy 1 and is offered jointly with that subject.

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...
sciences, 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.

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## Faculty of Medicine

### 80.701G Occupational Disease

**Prerequisite:** 70.201G or equivalent.

Physical environment and disease; Musculoskeletal system, physical trauma; heat and cold, burns, electric shock; radiation, 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.

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## Faculty of Engineering

### 97.580G Image Analysis In Remote Sensing

**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

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.
## Conditions for the Award of Higher 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.

The following is the list of higher degrees and graduate diplomas of the University, together with Higher Degrees 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 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 later in this section.

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* = includes Honours
§ = includes Specialised Science

Note: The abbreviations and titles listed are based on the institutions' offerings and may vary.
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<th>Title</th>
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<th>Calender/Handbook</th>
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<tr>
<td>Master of Science without supervision</td>
<td>MSc</td>
<td>Engineering</td>
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<td>Medicine</td>
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<td>Sciences*§</td>
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<td>University College</td>
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<tr>
<td>Master of Science (Acoustics)</td>
<td>MSc(Acoustics)</td>
<td>Architecture</td>
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<tr>
<td>Master of Science (Industrial Design)</td>
<td>MSc(IndDes)</td>
<td>Architecture</td>
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<tr>
<td>Master of Science and Society</td>
<td>MScSoc</td>
<td>Arts</td>
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<tr>
<td>Master of Social Work</td>
<td>MSW</td>
<td>Professional Studies</td>
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<tr>
<td>Master of Statistics</td>
<td>MStats</td>
<td>Sciences*</td>
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<td>Master of Surgery</td>
<td>MS</td>
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<tr>
<td>Master of Surveying</td>
<td>MSurv</td>
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<td>MSurv</td>
<td>Engineering</td>
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<tr>
<td>Master of Surveying Science</td>
<td>MSurvSc</td>
<td>Engineering</td>
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<tr>
<td>Master of Town Planning</td>
<td>MTP</td>
<td>Architecture</td>
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<tr>
<td>Master of Welfare Policy</td>
<td>MWP</td>
<td>Professional Studies</td>
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<td>Graduate Diploma</td>
<td>GradDip</td>
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<td>Sciences*</td>
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<td>DipM-Lib</td>
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*Faculty of Science, §Faculty of Biological and Behavioural Sciences.

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.

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.

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.

   (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.

* 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.
(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 eighteen months 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.

** Thesis **

4. (1) On completing the program of study a candidate shall submit a thesis embodying the results of the investigation.

(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;

(e) it must consist of an account of the candidate's own research but in special cases work done jointly 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.

* 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.
(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.

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 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.

(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.

6. A candidate shall pay such fees as may be determined from time to time by the Council.

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 or 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.

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.

(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.

*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.
(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 candidate 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 this time 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 Engineering (ME) and Master of Science (MSc)

Qualifications

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.

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.

(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.

(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.

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.

*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.
Graduate Study: Conditions for the Award of Higher Degrees

(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.

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.

6. A candidate shall pay such fees as may be determined from time to time by the Council.

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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.

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.

4. (1) A candidate shall submit a thesis embodying the results of the investigation.

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*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) 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.

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) 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.

Fees

6. A candidate shall pay such fees as may be determined from time to time by the Council.

Master of Mathematics (MMath)

See Master of Chemistry above.

Master of Optometry (MOptom)

See Master of Chemistry above.

Master of Physics (MPhysics)

See Master of Chemistry above.

Master of Psychology (Applied) (MPsychol(Applied)) and Master of Psychology (Clinical) (MPsychol(Clinical))

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).

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

*Or department where a department is not within a school.
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.

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 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.

See Master of Engineering above

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 advanced study.

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).

(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.

(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.
1. A Graduate Diploma may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

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 qualification 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).

   (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 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.

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.

   (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 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 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.

4. A candidate shall pay such fees as may be determined from time to time by the Council.
Scholarship 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 Academic Registrar by 14 January each year. Please note that not all of these awards are available every year.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td><strong>General</strong></td>
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<tr>
<td>Bursary Endowment Board*</td>
<td>$200 pa</td>
<td>Minimum period of approved degree/combined degree course</td>
<td>Merit in HSC and total family income not exceeding $6000</td>
</tr>
<tr>
<td>Sam Cracknell Memorial</td>
<td>Up to $3000 pa payable in fortnightly instalments</td>
<td>1 year</td>
<td>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.</td>
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<tr>
<td>Girls Realm Guild</td>
<td>Up to $1500 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress and continued demonstration of need</td>
<td>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.</td>
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*Apply to The Secretary, Bursary Endowment Board, PO Box 460, North Sydney 2060, immediately after sitting for HSC.
Undergraduate Scholarships (continued)

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<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tr>
<td>General (continued)</td>
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<tr>
<td>W.S. and L.B. Robinson**</td>
<td>Up to $4200 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td>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.</td>
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<tr>
<td>Universities Credit Union</td>
<td>$500 pa</td>
<td>1 year with the possibility of renewal</td>
<td>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.</td>
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<tr>
<td>Alumni Association</td>
<td>Up to $1500 pa</td>
<td>1 year with the possibility of renewal</td>
<td>Available to students enrolled in any year of a full-time course. Candidates must be the children of Alumni of the University of NSW and may be either permanent residents of Australia or overseas students.</td>
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<tr>
<td><strong>Applications close 30 September each year.</strong></td>
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</tr>
</tbody>
</table>

Science

Chemistry

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

Esther Louise Buchwald Memorial Scholarship

- $500 pa
- 1 year
- Available only to a physically handicapped student enrolled in any year of a course in the Board of Studies in Science and Mathematics

Mathematics

George Szekeres Award

- $200 pa
- 1 year
- Open to students entering the final year of the honours degree course in Pure Mathematics

Optometry

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 Division
Graduate Scholarships

Application forms and further information are available from the Student Centre, 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.

*Available for reference in the University Library.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University Postgraduate Research Scholarships</td>
<td>Living allowance of $9000 pa. Other allowances may also be paid.</td>
<td>1-2 years for a Masters and 3-4 years for a PhD degree</td>
<td>Applicants must be honours graduates or equivalent. Applications to Dean of relevant Faculty.</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Research Awards</td>
<td>$12,734 to $16,433</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commonwealth Postgraduate Course Awards</td>
<td>Living allowance of $10,415 pa. Other allowances may also be paid.</td>
<td>1-2 years; minimum duration of course</td>
<td>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.</td>
</tr>
<tr>
<td>Australian American Educational Foundation Fulbright Award</td>
<td>Travel expenses and $2000 as establishment allowance.</td>
<td>1 year, renewable</td>
<td>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.</td>
</tr>
<tr>
<td>Australian Federation of University Women</td>
<td>Amount varies, depending on award</td>
<td>Up to 1 year</td>
<td>Applicants must be female graduates who are members of the Australian Federation of University Women.</td>
</tr>
<tr>
<td>Commonwealth Scholarship and Fellowship Plan</td>
<td>Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable.</td>
<td>Usually 2 years, sometimes 3</td>
<td>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.</td>
</tr>
<tr>
<td>The English-Speaking Union (NSW Branch)</td>
<td>$5000</td>
<td>1 year</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General (continued)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frank Knox Memorial Fellowship</td>
<td>Stipend of $US7000 pa</td>
<td>1, sometimes 2</td>
<td>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.</td>
</tr>
<tr>
<td>tenable at Harvard University</td>
<td>plus tuition fees</td>
<td>years</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Robert Gordon Menzies Scholarship</td>
<td>Up to $US 15,000</td>
<td>1 year</td>
<td></td>
</tr>
<tr>
<td>to Harvard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gowrie Scholarship Trust Fund</td>
<td>$4000 pa. Under special circumstances this may be increased</td>
<td>2 years</td>
<td>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 the Academic Registrar by 31 October.</td>
</tr>
<tr>
<td>Harkness Fellowships of the</td>
<td>Living and travel</td>
<td>12 to 21 months</td>
<td>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.</td>
</tr>
<tr>
<td>Commonwealth Fund of New York</td>
<td>allowances, tuition</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>and research expenses,</td>
<td></td>
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<td></td>
<td>health insurance, book</td>
<td></td>
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<tr>
<td></td>
<td>and equipment and other allowances for travel and study in the USA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Packer, Shell and Barclays</td>
<td>Living and travel</td>
<td>1-3 years</td>
<td>Applicants must be Australian citizens who are honours graduates or equivalent, and under 26 years of age. Applications close 15 October with The Secretary, Cambridge Commonwealth Trust, PO Box 252, Cambridge CB2 1TZ, England.</td>
</tr>
<tr>
<td>Scholarships to Cambridge University</td>
<td>allowances, tuition</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>expenses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Rhodes Scholarship to Oxford</td>
<td>Approximately 4200 stg</td>
<td>2 years, may be</td>
<td>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.</td>
</tr>
<tr>
<td>University</td>
<td>pa</td>
<td>extended for a</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>third year.</td>
<td></td>
</tr>
</tbody>
</table>

### Biological and Behavioural Sciences

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Clark Memorial Award in</td>
<td>$1000</td>
<td>1 year</td>
<td>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.</td>
</tr>
<tr>
<td>Psychology</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Biological and Behavioural Sciences (continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Research Scholarship of the Royal Commission of the Exhibition of 1851</td>
</tr>
<tr>
<td>National Heart Foundation</td>
</tr>
<tr>
<td>The National Health and Medical Research Council</td>
</tr>
</tbody>
</table>

### Science

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Telecommunications</td>
<td>$9000 intended as a supplement to other awards</td>
<td>1 year for a Masters and up to 3 years for a PhD degree</td>
<td>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 November 2 with ATERB, PO Box 76, Epping NSW.</td>
</tr>
<tr>
<td>Australian Institute of Nuclear Science and Engineering Student Scholarships</td>
<td>See under Engineering.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Lens Society of Australia</td>
<td>$2000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gordon Godfrey Scholarship in Theoretical Physics</td>
<td>$1500 pa</td>
<td>1-3 years</td>
<td>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.</td>
</tr>
<tr>
<td>Lionel Murphy Australian Postgraduate Bicentennial Scholarship</td>
<td>See under Law</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shell Scholarship in Science or Engineering</td>
<td>Adequate funds for living allowance, tuition and travel expenses</td>
<td>2 years, sometimes 3</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 or the Chancellery.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Sydney Technical College Union Award</td>
<td>$400.00 and Bronze Medal</td>
<td>Leadership in student affairs combined with marked academic proficiency by a graduand.</td>
</tr>
<tr>
<td>The University of New South Wales Alumni Association Prize</td>
<td>Statuette</td>
<td>Achievement for community benefit by a student in the final or graduating year.</td>
</tr>
<tr>
<td><strong>School of Chemistry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Inglis Hudson Bequest</td>
<td>$15.00</td>
<td>The best performance in 2.102B Organic Chemistry 1</td>
</tr>
<tr>
<td>The Jeffery Bequest</td>
<td>$100.00</td>
<td>The best performance in 2.034L Chemistry and Enzymology of Foods</td>
</tr>
<tr>
<td>The June Griffith Memorial Prize</td>
<td>$60.00</td>
<td>The best performance in 2.121 Chemistry 1A and 2.131 Chemistry 1B in the Bachelor of Science course</td>
</tr>
<tr>
<td>The Merck Sharp &amp; Dohme (Aust) Pty Ltd Prize</td>
<td>$52.50</td>
<td>The best performance in Level 2 Chemistry subjects in the Board of Studies in Science and Mathematics</td>
</tr>
<tr>
<td>The Merck Sharp &amp; Dohme (Aust) Pty Ltd Prize</td>
<td>$52.50</td>
<td>The best performance in Level 3 Chemistry subjects in the Board of Studies in Science and Mathematics</td>
</tr>
<tr>
<td>The Raci Analytical Chemistry Group Prize</td>
<td>$150.00</td>
<td>The best performance in 2.103D Advanced Analytical Chemistry</td>
</tr>
<tr>
<td>The University of New South Wales Chemical Society Parke-Pope Prize</td>
<td>$100.00</td>
<td>The best performance in a subject selected by the Head of School</td>
</tr>
<tr>
<td>The University of New South Wales Chemical Society George Wright Prize</td>
<td>$100.00</td>
<td>The best performance in a subject selected by the Head of School</td>
</tr>
<tr>
<td><strong>School of Mathematics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Amatil Limited Prize</td>
<td>$200.00</td>
<td>The best performance in Theory of Statistics or Higher Theory of Statistics 3 subjects in a Bachelor degree</td>
</tr>
<tr>
<td>The Applied Mathematics Prize</td>
<td>$50.00</td>
<td>Excellence in level 3 Applied Mathematics subjects in a Bachelor degree or Diploma course</td>
</tr>
<tr>
<td>The C.H. Peck Prize</td>
<td>$50.00</td>
<td>The best performance in Year 2 Mathematics by a student proceeding to Year 3 in the School of Mathematics</td>
</tr>
<tr>
<td>The Head of School's Prize</td>
<td>$50.00</td>
<td>Excellence in four or more mathematics units in Year 2 in a Bachelor degree or Diploma course.</td>
</tr>
<tr>
<td>The IBM Prize</td>
<td>$200.00</td>
<td>The best performance in the final year of an honours degree in the School of Mathematics</td>
</tr>
<tr>
<td>The ICI Theory of Statistics 4 Prize</td>
<td>$100.00</td>
<td>The best performance in 10.323 Theory of Statistics 4 in a Bachelor degree</td>
</tr>
<tr>
<td>The I.P. Sharp Associates Pty Limited Prize</td>
<td>$100.00</td>
<td>Excellence in Higher Theory of Statistics 2 subjects in a Bachelor degree</td>
</tr>
</tbody>
</table>
## Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Mathematics (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Michael Mihailavitch Erhman Award</td>
<td>$750.00</td>
<td>The best performance by a student enrolled in a Mathematics Program, in examinations conducted by School of Mathematics in any one year.</td>
</tr>
<tr>
<td>The Pure Mathematics Prize</td>
<td>$50.00</td>
<td>The best performance in Level 3 Pure Mathematics subjects by a student in a bachelor degree or diploma course.</td>
</tr>
<tr>
<td>The School of Mathematics Prize</td>
<td>$50.00</td>
<td>The best performance in 10.001 Mathematics 1 by a student in a Bachelor degree or Diploma course.</td>
</tr>
<tr>
<td>The School of Mathematics Prize</td>
<td>$50.00</td>
<td>The best performance in basic Year 2 Higher Mathematics units by a student in a bachelor shared degree or diploma course.</td>
</tr>
<tr>
<td>The School of Mathematics Prize</td>
<td>$50.00</td>
<td>Excellence in four or more Mathematics units by a student in Year 2 of a bachelor degree or diploma course.</td>
</tr>
<tr>
<td>The Statistical Society of Australia (NSW Branch) Prize</td>
<td>$100.00</td>
<td>The best performance in Theory of Statistics subjects.</td>
</tr>
<tr>
<td>The T,P,F &amp; C Fourth Year Prize</td>
<td>$200.00</td>
<td>The best performance in the fourth year project by a student proceeding to the degree of Bachelor of Science (Honours) within the School of Mathematics.</td>
</tr>
<tr>
<td>The T,P,F &amp; C Third Year Prize</td>
<td>$200.00</td>
<td>The best performance in either 10.122B Real and Functional Analysis or 10.212M Optimal Control Theory.</td>
</tr>
<tr>
<td><strong>School of Optometry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Australian Optometrical Association Prize</td>
<td>$200.00</td>
<td>The best performance in a subject selected by the Head of School.</td>
</tr>
<tr>
<td>The Bausch &amp; Lomb Soflens Prize</td>
<td>Contact Lenses valued at $700.00</td>
<td>The best performance in the contact lens section of 31.841 Clinical Optometry in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Contavue Prize</td>
<td>Trial fitting set of contact lenses</td>
<td>The best essay or project on contact lenses in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The G Nissell &amp; Company Australia Pty Ltd Prize</td>
<td>Trial fitting set of contact lenses</td>
<td>The best performance in the Contact Lens sections of 31.871 Optometry B and 31.841 Clinical Optometry in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Hoya Lens Australia Pty Ltd Prize</td>
<td>$250.00</td>
<td>The best academic record in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Hydron (Australia) Pty Ltd Prize</td>
<td>$100.00</td>
<td>The best performance in Year 4 of the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Hydron (Australia) Pty Ltd Prize</td>
<td>$100.00</td>
<td>The best performance in 31.871 Optometry B in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Keith Woodland Memorial Prize</td>
<td>$100.00</td>
<td>The best performance in the Binocular Vision component of 31.871 Optometry B and 31.841 Clinical Optometry in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Martin Wells Pty Ltd Prize</td>
<td>$200.00</td>
<td>The best performance in 31.821 Anatomy and Physiology of the Eye and Visual System in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Martin Wells Pty Ltd Prize</td>
<td>$200.00</td>
<td>The best performance in 31.862 Diagnosis and Management of Ocular Disease in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Martin Wells Pty Ltd Prize</td>
<td>$200.00</td>
<td>The best Final Year Essay in the Bachelor of Optometry course.</td>
</tr>
</tbody>
</table>
### Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>School of Optometry (continued)</th>
<th></th>
<th></th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Optical Products Ltd Prize</td>
<td>$100.00</td>
<td></td>
<td>The best performance in a subject selected by the Head of School</td>
</tr>
<tr>
<td>The Optometric Vision Research Foundation</td>
<td>$200.00</td>
<td></td>
<td>The best research project in the final year of the Prize Bachelor of Optometry course</td>
</tr>
<tr>
<td>The Optometrists Association of NSW Prize</td>
<td>$100.00</td>
<td></td>
<td>The best performance in a subject selected by the Head of School</td>
</tr>
<tr>
<td>The Optyl (Australia) Pty Ltd Prize</td>
<td>$100.00</td>
<td></td>
<td>The best performance in the practical work of 31.864 Clinical Methods in the Bachelor of Optometry course.</td>
</tr>
<tr>
<td>The Safilo Australia Prize</td>
<td>$150.00</td>
<td></td>
<td>The best performance in a subject selected by the Head of School</td>
</tr>
<tr>
<td>The Theo Kannis Prize for Clinical Optometry</td>
<td>$250.00</td>
<td></td>
<td>The best performance in 31.841 Clinical Optometry by a student in the Bachelor of Optometry course.</td>
</tr>
</tbody>
</table>

### School of Physics

| The Australian Institute of Physics Prize | $100.00 and one year's membership of the Institute | The highest aggregate in any 3 units from: 1.0133 Quantum Mechanics, 1.0143 Nuclear Physics, 1.023 Statistical Mechanics & Solid State Physics, 1.0333 Electromagnetism, 1.0343 Advanced Optics, 1.043 Experimental Physics A by a student in the Bachelor of Science course |
| The Bodal Prize                         | $100.00       |                | The best performance in a competition based on the use of microcomputers in 1.061 Computer Applications |
| The ETP-Oxford Prize                    | $200.00       |                | The best design study of an optical system in 1.713 Advanced Laser and Optical Applications |
| The Gordon and Mabel Godfrey Award In Theoretical Physics 4 | $200.00 |                | Excellence in the subject 1.504 Theoretical Physics 4 (Honours) in the Bachelor of Science with Honours course. |
| The Gordon and Mabel Godfrey Prize In Theoretical Physics 3 | $200.00 |                | The best performance in a selection of Year 3 Theoretical Physics subjects chosen from: 1.5133, 1.5233, 1.5333, 1.5433 and 1.5533 |
| The Head of School's Prize in Physics   | $50.00        |                | The best Year 4 Honours Thesis in Physics in the Bachelor of Science course. |
| The Laser Dynamics Prize                | $200.00       |                | Excellence in the subject 1.713 Advanced Laser and Optical Applications |
| The Parameters Prize in Electronics     | $200.00       |                | Excellence in 1.133 Electronics or 1.043 Experimental Physics A and 1.7163 Laser and Optoelectronics Technology Laboratory 1. |
| The Physics Staff Prize for Physics 1   | $100.00       |                | The best performance in 1.001 Physics 1 |
| The Physics Staff Prize for Physics 2   | $150.00       |                | The highest aggregate in 1.002 Mechanics, Waves and Optics, 1.012 Electromagnetism and Thermal Physics, 1.022 Modern Physics, 1.032 Laboratory by a student in the Bachelor of Science course |
| The Physics Staff Prize for Physics Honours | $200.00  |                | The best performance in the Physics Honours Year by a student in the Bachelor of Science course |
## Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Psychology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Australian Psychological Society Prize</td>
<td>$100.00</td>
<td>The best performance in a subject selected by the Head of School</td>
</tr>
<tr>
<td>The Milon Buneta Prize</td>
<td>$80.00</td>
<td>The best performance in Year 2 of the Bachelor of Science course in Psychology</td>
</tr>
<tr>
<td>The Psychology Staff Prize</td>
<td>$80.00</td>
<td>The best performance in Year 2 Psychology by a student in the Bachelor of Science course in Psychology</td>
</tr>
</tbody>
</table>

## Graduate University Prizes

The following table summarizes the graduate prizes awarded by the University.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Chemistry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Smith Kline &amp; French Prize</td>
<td>$100.00</td>
<td>The best performance by a student in the Food and Drug Analysis Graduate Diploma</td>
</tr>
<tr>
<td><strong>School of Mathematics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The J.R. Holmes Prize</td>
<td>$75.00</td>
<td>Excellence in at least 4 pass-level pure mathematics level 3 units, taken over no more than two consecutive years by a student in the Science, Arts or Education courses</td>
</tr>
<tr>
<td><strong>School of Optometry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Hydron Contact Lens Prize</td>
<td>Trial fitting set of contact lenses</td>
<td>The best performance in 31.705G Advanced Contact Lens Theory and Practice in the Master of Optometry course</td>
</tr>
<tr>
<td>The Theo Kannis Prize for Advanced Clinical Optometry</td>
<td>$250.00</td>
<td>The best performance in 31.701G Advanced Clinical Optometry by a student in the Master of Optometry course</td>
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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) L8
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 C26
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
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.