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

1988 Faculty Handbook
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Information in this Handbook has been brought up to date as at 8 September 1987, but may be amended without notice by the University Council.

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# Session Dates

## Session 1

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<th>1988</th>
<th>1989</th>
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<tr>
<td>Session Begins</td>
<td>Monday 7 March</td>
<td>Monday 27 February</td>
</tr>
<tr>
<td>Mid-Session Recess</td>
<td>Friday 13 May</td>
<td>Thursday 23 March</td>
</tr>
<tr>
<td>Last Day of Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classes Resume</td>
<td>Monday 23 May</td>
<td>Monday 3 April</td>
</tr>
<tr>
<td>Last Day of Session</td>
<td>Friday 17 June</td>
<td>Thursday 8 June</td>
</tr>
<tr>
<td>Examinations Begin</td>
<td>Monday 27 June</td>
<td>Thursday 15 June</td>
</tr>
<tr>
<td>Examinations End</td>
<td>Wednesday 13 July</td>
<td>Friday 30 June</td>
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## Session 2

<table>
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<th>Event</th>
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<th>1989</th>
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<tr>
<td>Session Begins</td>
<td>Monday 1 August</td>
<td>Monday 24 July</td>
</tr>
<tr>
<td>Mid-Session Recess</td>
<td>Friday 26 August</td>
<td>Friday 22 September</td>
</tr>
<tr>
<td>Last Day of Classes</td>
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</tr>
<tr>
<td>Classes Resume</td>
<td>Monday 5 September</td>
<td>Tuesday 3 October</td>
</tr>
<tr>
<td>Last Day of Session</td>
<td>Friday 11 November</td>
<td>Wednesday 1 November</td>
</tr>
<tr>
<td>Examinations Begin</td>
<td>Monday 21 November</td>
<td>Wednesday 8 November</td>
</tr>
<tr>
<td>Examinations End</td>
<td>Friday 9 December</td>
<td>Friday 24 November</td>
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| Vacation Weeks             | 16-22 May             | 27 March — 2 April    |
| Common to Australian       | 11-17 July            | 3-9 July              |
| Universities               | 29 Aug — 4 September  | 25 September — 1 October |

### 1988

- **22 April**: Last day for students to discontinue without failure subjects which extend over Session 1 only
- **12 August**: Last day for students to discontinue without failure subjects which extend over the whole academic year
- **23 September**: Last day for students to discontinue without failure subjects which extend over Session 2 only
Faculty of Biological and Behavioural Sciences*

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Comprises First Year Biology Teaching Unit, Schools of Biochemistry, Botany, Microbiology, Psychology and Zoology, Department of Biotechnology.

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Associate Professor J. C. Kelly

Senior Administrative Officer
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Ruby Foon, MSc PhD Melb.
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Joan Pauline Ross, BSc Syd.
Ruth Martha Shaw, BA Hunter PhD C'nell.

Tutor
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School of Mathematics

Professor and Head of School
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Professor of Applied Mathematics
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Milan Pahor, BSc W'gong.

Tutors
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Ann Margaret Cowling, BSc Melb.
Lisa Veronica Maloney, BSc Hons Qld.
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Tony Peter Van Ravenstein, BMath PhD W'gong.
Derek Noel Ward, BSc DipEd N.S.W.

Senior Systems Analyst
Veronica Paul, BSc Wales, DipEd N.E.

Analyst Programmer
Michael Gerberg, Bsc(Hons) N.S.W.

Programming Staff
Stephen Braithwaite, BMath W'gong
Chong Seng Soon, BSc BEng(Hons) Syd.

Administrative Assistant
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Department of Pure Mathematics

Associate Professor
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Senior Lecturers
Peter Windeyer Donovan, BA Syd., DPhil Oxf.
Anthony Haynes Dooley, BSC PhD A.N.U.
Mary Ruth Freischluch, BA Witw., MA MEd N.S.W.
Jack David Gray, BA Syd., PhD N.S.W.
Michael David Hirschhorn, BSc Syd., MSc Edin., PhD N.S.W.
David Christopher Hunt, BSc Syd., MSc PhD Warw.
Ezzat Sami Noussair, BE BSc Cairo, PhD Br. Col.
Iain Raeburn, BSc Edin., PhD Utah
John St Alban Sandiford, MSc Syd.
Colin Eric Sutherland, BSc Cant., PhD Calif.
David Graham Tacon, BSc N'cle.(N.S.W.), PhD A.N.U.
Dennis William Trenerly, BSC PhD Adel.

Lecturers
Charles Dixon Cox, BSc DipEd Qld.
Shaun Anthony Requa Disney, BA BSc Adel., DPhil Oxf.
Rodney Kelvin James, BSc PhD Syd.

Senior Tutor
James William Franklin, MA Syd., PhD Warw.

Emeritus Professor
George Szekeres, DiplChemEng Bud., Hon.DSc N.S.W., FAA, MHAS

Research Associate
David Charles Wilson, MA, PhD Syd.

Honorary Associates
John Harold Loxton, MSc Melb., PhD Camb.
Alf van der Poorten, BA BSc PhD MBA N.S.W.

Department of Applied Mathematics

Associate Professors
Michael Leslie Banner, BE MEngSc Synd., PhD Johns H.
William Eric Smith, MSc Synd., and Oxf., PhD N.S.W., MinstP, MAIP
Senior Lecturers
Peter James Blennerhassett, BE W.Aust., PhD Lond.
Brian James Burn, MSc Otago, PhD Camb.
William Dennis McKee, BSc Adel., MSc Flin., PhD Camb.
Jason Harry Falla Middleton, BSc PhD Monash
Elvin James Moore, MSc W.Aust., PhD Harv.
Richard Wyndham O'Brien, BE N.S.W., PhD Camb.
Alexander Hugh Opie, BSc DipEd Melb., PhD Monash, FAIP
Kok-Lay Teo, BSc Sing., MASc PhD Ott., MIEEE, AMIEE

Lecturers
David Charles Guiney, BSc PhD Adel.
Douglas Edward Mackenzie, BSc Tas., FIMA, MACE
John Francis Falla Middleton, BSc PhD Monash
John Michael Murray, MSc N.S.W., PhD, Wash.
David Alan Mustard, BSc Syd., MSc N.S.W.
Robert Spencer Womersley, BSc Adel., MSc PhD Dundee

Senior Tutor
Albert Tatar Daoud, BSc R'dg., PhD N.S.W., FinstP

Visiting Fellow
Andrew Michael Moore, BSc Lond., DPhil Oxf.

Research Associates
Linda Walsh, BSc PhD Manc.

Research Fellow
Dave Broutman, BA Calif., PhD Scripps

Professional Officers (Oceanography Group)
Gregory John Nippard, BSc Syd.
Drew Robert Whitehouse, BSc Qld.

Honorary Associates
Commodore Daniel James McKeegan, BSc Syd., MSc PhD N.S.W., RAN (Ret)
Simon Jacques Prokhovnik, BA MSc Melb.

Honorary Visiting Fellow
John Taylor, MSc PhD Lond.

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.
John Anthony Eccleston, BSc Syd., MSc Manc., PhD C'nell.
Manohar Khanderao Vagholkar, MSc Born., DIC PhD Lond.
Gillian Ziona Stein, BSc Cape T., MSc S.A., PhD Cape T.

Lecturers
Ronald Bruce Davis, BSc Syd., MSc N.S.W., DipEd N.E.
Marek Musiel, MMath Wroclaw, PhD Polish Acad. Sc., DSc Grenoble

Professional Officer
Rhonda Gock, BSc MStats N.S.W.

Honorary Associates
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Geoffrey Kennedy Eagleson, BSc PhD Syd.

School of Optometry

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

Associate Professor
Brien Anthony Holden, BAppSc Melb., PhD City, LOSc V.C.O., FAAO

Senior Lecturers
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David Philip Crewther, MSc Melb., PhD Cal. Tech.
Stephen John Dan, BSc PhD City, FBAC, FAAO, FVCO MIEAust
Daniel James O'Leary, BSc City, MSc PhD Wales, FBOA, FSMC

Lecturers
Philip James Anderton, BOptom BSc PhD N.S.W., MScOptom Melb.
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.

Tutors
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Colleen Marie Reilly, BOptom N.S.W.

Instructor
Ian William Robinson

Administrative Assistant
Yvonne Margaret Bartels, BA Monash

Cornea and Lens Research Unit

Director
Associate Professor Brien Anthony Holden
School of Physics

Associate Professor and Head of School
John Charles Kelly, BSc Syd., PhD R’dg., DSc N.S.W., CPhys, FinstP, FAIP, MAmpS

Professor of Experimental Physics
Hirosi Julian Goldsmid, BSc PhD DSc Lond., FAIP

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

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

Professor and Head of Department of Condensed Matter Physics
Dan Haneman, DSc Syd., PhD R’dg., FAIP, ARACI

Professor of Physics and Head of Department of Astrophysics and Optics
John William Vanstan Storey, BSc LaT., PhD Monash

Senior Lecturer and Executive Assistant to Head of School
John Robert Hanscomb, BSc Qld., MSc PhD N.S.W., MAIP GradInstP

Director of First Year Studies
Graeme John Russell

Principal Tutor
Paul Michael O’Halloran, BA Macq., MEd N.S.W.

Senior Tutors
Ian Richard Dunn, BSc BA Melb., MIEEE
Edward Peter Eyland, BSc MPhysics N.S.W., BD Lond.
Marlene Noella Read, BSc PhD N.S.W.

Tutors
Jaan Ferdinand Jouke Boersma, MSc Tas.
Gail Patricia Box, BSc PhD N’cle. (N.S.W.)
Paul Westley Brooks, BSc Adel.
Phillip John Clark, BSc N.S.W.
Michael Philip Goldsworthy, MSc N.S.W.
Joseph Khachan, BSc N.S.W.
Christopher John Russell, BSc N.S.W.
Sophia Sakellis, DipPhysics Patras, MSc N.S.W.
Perry Robert Wiles, BSc N.S.W.

Professional Officers
Peter Robert Bailer, BSc PhD Monash
Jack William Cochrane, BAAppSc Canberra C.A.E., MPhysics N.S.W.
Gordon Robert Keen, BSc BE Cant.
Patrick Thomas McMillan, BSc DipEd Syd.
Barry Perczuk, BSc PhD Monash
John McLaren Tann, BAAppSc Melb.
Jeremy Karl Walter, BSc Lond.

Honorary Associates
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Patrick Kelly, MA PhD ScD Camb., FAIP, MinstP

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

Department of Applied Physics

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

Department of Astrophysics and Optics

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

Department of Biophysics

Senior Lecturer and Head of Department of Biophysics
James Martin Pope, MSc Brst., DPhil Sus., AInstP

Associate Professor
Veronica Jean James, BA BSc Qld., 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., PhD A.N.U.
Department of Condensed Matter Physics

Associate Professor
Graham James Bowden, BSc DipAdvStudSc PhD Manc.
Graeme John Russell, BSc PhD N.S.W., MInstP, GradAIP

Senior Lecturers
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Peter Russell Elliston, BSc Melb., PhD Monash
Michael Gal, MSc PhD E.L. Bud.
Leslie Beven Harris, BSc Lond., BA DipEd Durh., PhD N.S.W., CEng, FIM, FinstP
David John Miller, BSc PhD N.S.W., DipEd Syd., MAIP, MAmPS, MAAFT

Department of Theoretical Physics

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

Senior Lecturer
Michael Allister Box, BSc Monash, PhD Syd., GradAlnstP
Christopher John Hamer, MSc Melb., PhD Calif. Inst. Tech., DipCompSc Canberra
Robert John Stening, MSc Syd., PhD Old., DipTertEd N.E., FRMetS

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

Board of Studies in Science and Mathematics

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

Dean
Professor A. J. Wicken

Chairman
Professor H. J. Goldsmid

Co-ordinator of Studies in Science and Mathematics
Dr B. J. Burn

Administrative Assistant
Karenne May Irvine, BA 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 majoring in disciplines associated with the two faculties and several schools from other faculties. The regulations governing the award of the degree of Bachelor of Science form a substantial part of the handbook. Other parts include details of the Science component of the combined degrees, Science/Law, Science/Commerce, Science/Civil Engineering, Science/Electrical Engineering, Science/Aeronautical Engineering, Science/Industrial Engineering, Science/Mechanical Engineering, Science/Naval Architecture, Science/Medicine, Science/Optometry, and of the two concurrent courses in Mathematics Education 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 units prescribed in the various regulations.
Faculty Information

Some People Who Can Help You

If you require advice about enrolment, degree requirements, progression within courses or any other general matters related to the Board, contact one of the following:

Ms K. Irvine, Administrative Assistant

'Dr. B. J. Burn, Co-ordinator of Studies in Science and Mathematics
Room L-G06G, Biological Sciences Building

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

Enrolment Procedures

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

All students re-enrolling in 1988 or enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1988* available from Course Administration Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

The subject timetable for the Science and Mathematics Course (Course 3970) is available in late October/early November from the Science and Mathematics Course Office, Room L-G06G, Biological Sciences Building. All re-enrolling students should collect one of these timetables along with a preliminary enrolment form (SM88). The preliminary enrolment form is to be completed and returned to the Science and Mathematics Office by the end of the first week in January.

Sciences Library Facilities

Although any of the University Libraries may meet specific needs, staff and students of the Faculty of Biological and Behavioural Sciences are served mainly by the Biomedical Library and the 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.

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

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

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

Marian Bate

Undergraduate Services

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

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

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

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

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 $15 per annum with a $4 rebate if paid before 1 March.

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, N.S.W.I.T., P.O. Box 123, Broadway, NSW 2006.

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 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.
Undergraduate Study: Faculty of Science
Board of Studies in Science and Mathematics

Introduction

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

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

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

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

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

- First Year Biology Unit
  - Dr B. Fox

- School of Anatomy
  - Dr M.S. Smith

- Department of Applied Geology
  - Mr G. J. Baldwin
  - Dr G. R. Taylor

- School of Biochemistry
  - Associate Professor P.J. Schofield

- School of Biological Science
  - Botany
    - Dr R.S. Vickery
  - Zoology
    - Dr P.I. Dixon

- Department of Biotechnology
  - Associate Professor N. W. Dunn

- School of Chemistry
  - Dr D. S. Alderdice
  - Dr T.J.V. Findlay (Year 1)
  - Associate Professor M. A. Long (Year 2)
  - Dr. P. R. Haddad (Year 4)

- School of Community Medicine
  - Dr A. E. Stark

- School of Electrical Engineering and Computer Science
  - Dr P. W. Baker
**Board of Studies in Science and Mathematics**

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

The Dean is the Dean of the Faculty of Biological and Behavioural Sciences, Professor A. J. Wicken.

The Chairman is Professor H. J. Goldsmid.

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

*See test of Introduction, on previous page.

*See Staff, listed later 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:

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 degree.

The Structure of the Science and Mathematics Course

The Science and Mathematics Course consists of a number of individual programs, based on units 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 unit must be studied. Units 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 single 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 units. Where a choice of units 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 major is a program specifying only 4 Level III units in a discipline.

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

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

The three year program

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

1. at least 23 units at Level I, II, 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, 10.011 Higher Mathematics I or 10.021B and 10.021C;
   (3) not less than eight units from Level III or as specified in an individual program.

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

- In order to graduate a student must pass all the units 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. at least 23 units at Level I, II, 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, 10.011 Higher Mathematics I or 10.021B and 10.021C;
   (3) not less than eight units from Level III or as specified in an individual program.

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.

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

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

**General Studies Requirement**

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

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

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

The program requires students to undertake studies in three areas:

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

Subjects in categories 1 and 2 are in preparation. The exact form of category 3 is still begin decided and should be clearly defined by the end of 1988. This could involve, however, a slight subsequent change to the structure of the later years of degree programs.

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

Students who commenced their undergraduate program before 1988.

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

Students commencing their undergraduate program in 1988 and following.

Students must complete a program of subjects selected from each of the three categories of study in accordance with the rules defined in the General Studies 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 G56, Morven Brown Building, and the General Studies Handbook.

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**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.

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

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

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

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

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

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

Programs

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

Each program has a four-digit identifying number.

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

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

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

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

<table>
<thead>
<tr>
<th>Science and Mathematics Course (Course 3970)</th>
<th>see program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>7000</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>4100</td>
</tr>
<tr>
<td>Biology</td>
<td>see program 4200</td>
</tr>
<tr>
<td>Botany</td>
<td>see program 4300</td>
</tr>
<tr>
<td>Chemistry</td>
<td>see programs 0200, 0205</td>
</tr>
<tr>
<td>Community Medicine</td>
<td>units available in some programs (the identifying number is 79)</td>
</tr>
<tr>
<td>Computer Science</td>
<td>see program 0600</td>
</tr>
<tr>
<td>Genetics</td>
<td>see program 6840</td>
</tr>
<tr>
<td>Geography</td>
<td>see program 2700</td>
</tr>
<tr>
<td>Geology</td>
<td>see programs 2500, 2503</td>
</tr>
<tr>
<td>Information Systems</td>
<td>see program 1400</td>
</tr>
<tr>
<td>Marine Science</td>
<td>see programs 6831, 6832, 6833, 6834</td>
</tr>
<tr>
<td>Mathematics</td>
<td>see program 1000, 1006, 1061, 6810</td>
</tr>
<tr>
<td>Microbiology</td>
<td>see program 4400</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>see program 7300</td>
</tr>
<tr>
<td>Philosophy</td>
<td>see program 5200</td>
</tr>
<tr>
<td>Physics</td>
<td>see programs 0100, 0161, 2503</td>
</tr>
<tr>
<td>Physiology</td>
<td>see program 7300</td>
</tr>
<tr>
<td>Psychology</td>
<td>see program 1200</td>
</tr>
<tr>
<td>Science and Technology Studies</td>
<td>see program 6200</td>
</tr>
<tr>
<td>Zoology</td>
<td>see program 4500</td>
</tr>
</tbody>
</table>

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

Physics

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

The features are summarized in the following table:

<table>
<thead>
<tr>
<th>Program</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100 Physics</td>
<td>3170 Textile Physics</td>
</tr>
<tr>
<td>Including:</td>
<td>3611 Aeronautical Engineering</td>
</tr>
<tr>
<td>Theoretical Physics</td>
<td>with Physics</td>
</tr>
<tr>
<td>Applied Physics</td>
<td>3661 Industrial Engineering</td>
</tr>
<tr>
<td>Biophysics</td>
<td>with Physics</td>
</tr>
<tr>
<td>Physics/Geology</td>
<td>3681 Mechanical Engineering</td>
</tr>
<tr>
<td>with Physics</td>
<td></td>
</tr>
</tbody>
</table>
7. In addition to the above there are other areas of study of major interest. Thus an introduction to Astrophysics and Optics is available to students choosing the elective units 1.1633, 1.1713, 1.763, 1.773 and the study of Condensed Matter (Solid State) Physics may be furthered by the inclusion of elective units such as 1.3133 and 1.3143.

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

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

**Physics in other Courses**

The previous page lists those courses which have been arranged with other schools. Several of these can lead to honours in Physics (eg 3725, 5801) 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, eg when it is judged that an equivalent study has been undertaken in some other combinations of units. The possibility also exists of relaxing the requirements of programs to allow a student to select a unit in which he or she has a special interest but which is not a recommended one in the program.

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**0100**

**Physics**

**General Studies: see Contents**

**Year 1**

1.001

10.001 or 10.011

Choose 4 Level I units from:**

1. Table 1 and/or

2. Table 2 for program 0100

**Year 2**

1.002†, 1.012, 1.022, 1.032

10.1113*, 10.1114*, 10.2111*, 10.2112*

Choose 2 units from:**

1. Table 1 and/or

2. Table 2 for program 0100

1 General Studies elective

**Year 3**

1.0133, 1.0143†, 1.023, 1.0333, 1.0343†, 1.043

Choose at least 3 units from:**

1. Table 1 and/or

2. Table 2 for program 0100

1 General Studies elective

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

**Year 4 (Honours)**

Choose one of 1.104, 1.304, 1.504, 1.604, 68.430

*Students are encouraged to select Higher Level Mathematics units where applicable.

** Students should read carefully the above description relating to program 0100 and seek advice from the School of Physics regarding the choice of units. An incorrect choice of units could exclude a student from the study of certain areas of Physics and/or prevent the combination of Physics with other disciplines.

† Students with a special interest in Biophysics may replace unit 1.002 with unit 2.102B and units 1.0143 and 1.0343 with the Biophysics units 1.1433 and 1.1533 provided 2.121, 2.131, 17.031 and 17.041 are completed in Year 1 and 41.101 is taken in Year 2.
**0161**

**Physics/Computer Science**

General Studies: see contents

**Year 1††**

1.001, 1.061  
6.611  
10.001 or 10.011*  
Choose 2 Level I units from Table 1**

**Year 2**

1.012, 1.022, 1.032  
6.621, 6.641  
10.1113*, 10.1114*, 10.2111*, 10.2113*  
Choose 1 unit from 1.062, 6.631†, 10.111A*  
1 General Studies elective

**Year 3**

1.002, 1.0133, 1.0333  
Choose 2 further Level III Physics units  
Choose 1 Level III Computer Science unit  
Choose 2 unit from:**  
1. 1.062, 6.631†, 10.212A*, 10.212D*, 10.262A  
2. Level III Physics units  
3. Level III Computer Science units  
1 General Studies elective

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

**Year 4 (Honours)**

Choose one of 1.104, 1.304, 1.504

*See footnote to program 0100.  
**Students intending to proceed to Year 4 are required to choose appropriate units.  
This choice is determined by the requirements of program 0100. Students are required to consult the School of Physics.

†The unit 6.631 must be taken in Year 2 or Year 3, but students should bear in mind that his unit is a prerequisite for 6.632 and 6.613.

††Quota restrictions apply to most Level III Computer Science units. Students wishing to take these units should in Year 1 apply for entry to the Computing quota. Advice should be obtained from the office of the Board of Studies in Science and Mathematics.

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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 units.

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

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

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

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

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**Geophysics**

See program 2503

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**Recommended Double Majors**

Physics/Geology
**0200**

**Chemistry**

General Studies: see Contents

**Year 1**

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

Choose 2 Level units from Table 1

**Year 2**

2.102A, 2.102B, 2.102C, 2.102D
Choose 3 units from Table 1

2 General Studies electives

**Year 3**

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

Choose 4 units from Table 1

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

**Year 4 (Honours)**

2.004

*Students wishing to do a co-major of Chemistry with Geology or Biotechnology may apply for a variation of the specified units to the Programs Committee of the Board of Studies in Science and Mathematics.

**Recommended Double Majors**

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

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**0205**

**Pure and Applied Chemistry**

General Studies: see Contents

**Year 1**

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

Choose 2 Level I units from Table 1

**Year 2**

2.102A, 2.102B, 2.102C, 2.102D
Choose 3 units from Table 1

2 General Studies Electives

**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

**Computer Science**

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

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

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

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

Science/Law students may enrol directly into Year 1 of the Course 4770 Computer Science program. To progress into Year 2 of this program, these students must, at the end of Year 1, compete with students in Course 3970.
Students majoring in other disciplines may undertake all Level I and Level II and one of the Level III Computer Science units and thus undertake a substantial amount of Computing. Programs available are Physics/Computer Science (0161) and Mathematics with Computer Science (1061). Students with very good academic records may be able to enrol in further Computer Science units by special permission from the Head of the Department of Computer Science.

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

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

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### Year 4 (Honours)
6.606

*In Year 1 students who have not gained direct entry to this program must enrol in program 6806. 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, History, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre Studies. Science and Technology Studies subjects are available in Table 1. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273. (6 BA degree credit points at Level 1 or 4 credit points at Upper Level are equivalent to 1 unit).*

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### Computer Science/Physics
See program 0161 Physics/Computer Science

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### Computer Science/Mathematics/Statistics
See program 1061 Mathematics or Statistics/Computer Science

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### See also
1400 Information Systems

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### Mathematics

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

Pure Mathematics is concerned with the whole structure of mathematics. Research focuses on the creation of new mathematical systems and the finer analysis of partially understood fields. Problems of mathematics come from many sources of science and industry but the pure mathematician is more concerned with the problems themselves than with the sources from which they arise. Courses in the Department of Pure Mathematics are designed to provide the necessary equipment for those
who intend to use mathematics in any way, to give basic familiarity with the fundamental language of modern science and technology and to develop appreciation for and insight into one of our major cultural achievements.

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

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

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

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

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

**Programs of study**

**Program 1000 (Mathematics)**

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

**Pure Mathematics major**

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

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

1. Pure Mathematics units relevant to the mathematical aspects of Computer Science are 10.1115 and 10.1116 in Year 2, and 10.1123 and 10.1521 in Year 3.
2. Pure Mathematics units 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 units relevant to the applications of mathematics in physics or engineering are 10.1125, 10.1126, 10.1128, 10.1522 and 10.1523 in Year 3.

Pure Mathematics Department staff will be happy to advise students on choices of units 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 units (total value) at the Higher Level. However, students with a credit average in at least four Level III Mathematics units may also be considered for entry into Pure Mathematics.

4. Usually, students doing Honours in Pure Mathematics do Higher level courses from Year 1 onwards.

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

**Applied Mathematics major**

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

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

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

In addition, Applied Mathematics students are expected to select relevant units 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 units.

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

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

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

**Applied Mathematics Honours**

A student interested in taking an Honours degree in Applied Mathematics is advised to enrol in 10.011 in first year and complete at least one Level II and three Level III Higher Applied Mathematics units (total value). However, students who have obtained a credit average in at least four Level III Mathematics units (total value) may also be considered for entry into 10.223 Applied Mathematics 4.

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

**Program 1006 (Statistics)**

**Statistics Major**

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

**Statistics Honours**

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

**Program 1061 (Mathematics or Statistics/Computer Science)**

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

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

**Mathematics/Computer Science**

See Computer Science/Mathematics

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**1000 Mathematics***

**General Studies:** see Contents

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:*

1. Table 1 and/or
2. The BA course and/or
3. Table 2 for program 1000

**Year 2**

10.111A, 10.1113, 10.1114, 10.2111, 10.2112

Choose 1 further Level II or III Mathematics unit

Choose 4 units from:*

1. Table 1 and/or
2. The BA course and/or
3. Table 2 for program 1000
1 General Studies elective

**Year 3**

Choose 4 Level III Mathematics units (not 10.312F or 10.262A)

Choose 3 units from:*

1. Table 1 and/or
2. The BA course and/or
3. Table 2 for program 1000
1 General Studies elective

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

**Year 4 (Honours)**

10.123 or 10.223*

*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, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre Studies. Science and Technology Studies and Philosophy subjects are available in Table 1. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273. (6 BA credit points at Level I or 4 credit points at Upper Level are equivalent to 1 unit.)

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

***Students should read carefully the above description relating to program 1000 and seek advice from the School of Mathematics regarding the choice of units.
1006

Statistics

General Studies: see contents

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

Year 1

10.001 or 10.011

Choose 6 units from:
1. Table 1 and/or
2. The BA course and/or
3. Table 2 for program 1000

Year 2

10.111A, 10.1113, 10.1114, 10.2112, 10.311A, 10.311B, 10.3111, 10.3112

Choose 2½ units from:
1. Table 1 and/or
2. The BA course and/or
3. Table 2 for program 1000

1 General Studies elective

Year 3

Choose 4 units from 10.312A, 10.312C, 10.322D, 10.312F, 10.3121, 10.3122, 10.3123, 10.3124

Choose 3 Level III Mathematics and/or Computer Science units

1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 4 Higher Level III Statistics units including 10.3225.

Year 4 (Honours)

10.323

*See footnote to program 0100.
††See footnote to program 0161.

1061

Mathematics or Statistics/Computer Science

General Studies: see Contents

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

Year 1

6.611

10.001 or 10.011

Choose 5 Level I units from:
1. Table 1 and/or
2. The BA course and/or
3. Table 2 for program 1000

Year 2

10.111A, 10.1113, 10.1114, 10.2112, 6.621, 6.641

Either

Mathematics or Statistics/Computer Science

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.

Recommended Double Majors

Mathematics or Statistics/Computer Science

Psychology
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 History and Philosophy of Science 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 professional body of Australian psychologists) require a degree (with a major in psychology) and a fourth year of study of psychology, followed either by further graduate study or two years of supervised experience in some practical field of psychology. A professional qualification in psychology may lead to careers in research, teaching and applied fields such as personnel selection and management, vocational guidance, advertising and clinical practice.

1200
Psychology

General Studies: see Contents

Year 1
10.001 or 10.011 or both 10.021B & 10.021C  Mathematics
Psychology
12.100
Choose 4 Level I units from:
1. Table 1 and/or
2. Table 2 for program 1200

Year 2*
12.200
Choose 2 units from:
12.201, 12.202, 12.204, 12.205
Choose 5 units from Table 1 (no more than 1 from Level II Psychology)
1 General Studies elective

Year 3*
Choose 4 Level III Psychology units
Choose 3 units from Table 1
1 General Studies elective

Year 4 (Honours)
12.403 or 12.404

*Students intending to proceed to honours in Psychology must take 12.200, 12.201 and 12.202 in Year 2, together with 4 other units from Table 1 (a total of 7 units in Year 2). In Year 3 students must take 5 Level III Psychology units including 12.300 and 12.305 from Group A for 12.404 in Year 4. Additionally, students intending to take 12.403 in Year 4 are required to also include 12.301 from Group B.

Recommended Double Majors

Psychology/Anatomy
Psychology/Physiology

Information Systems

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

1400
Information Systems

General Studies: see Contents

Year 1*
6.611
10.001 or 10.011
Choose 5 Level I units from:
1. Table 1 and/or
2. Table 2 for program 1400

Year 2
6.621, 6.641
10.331 or 10.311A
Choose 1 unit from:
1. Table 1 or
2. Table 2 for program 1400
1 General Studies elective
Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)
If 14.611 has not previously been taken this unit should replace 14.857.

*In Year 1 students must enrol in program 6806. Enrolment in Year 2 is based on academic performance in Year 1.

Geology and Geophysics

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

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

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

Program for Professional Geology

After June 1986, the Australasian Institute of Mining and Metallurgy requires that its corporate members, including professional geologists, shall have completed a four year course. Students wishing to enter the geology profession should preferably undertake the four year Course 3000 Applied Geology in the Faculty of Applied Science that is specifically designed to meet the needs of a professional geologist. However, an identical course of study is available in the Science Faculty program 2500 by taking the three year program with a double major in Applied Geology and by achieving a standard that enables progression to the Year 4 program and graduation with Honours. Training of a professional geologist demands a thorough understanding of basic geological principles; accordingly, in the early part of the course students receive instruction in fundamental geological subjects. As with other science based disciplines, appropriate standards in Physics, Chemistry and Mathematics are also required. As the course progresses, increasing emphasis is placed on practical applications of geological principles to mineral and energy exploration and development and to engineering and environmental geology. Mineral and energy exploration techniques including geochemical and geophysical methods are also studied. Year 4 is divided between a core of advanced geological topics, and one strand chosen from mineral resources, sedimentary basin resources, engineering and environmental geology, or geophysics. Session 2 of Year 4 is devoted to a specialized research project.

Geophysics

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

Single Major in Geology

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

Geology with Zoology and Botany

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

Geology in Marine Science

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

Programs in Geology are also offered in the Combined Science/Civil Engineering course 3730, the Science Education course 4080 and the Combined Science/Law Course 4770.
2500

Geology

General Studies: see Contents

Year 1

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

Year 2

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

Year 3

25.311, 25.312  
Choose at least 2 Applied Geology units from:  
(Double Majors in Applied Geology must take all of these subjects)  
Choose further units from Table 1 to give a total of 23 for the complete program*  
1 General Studies elective

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 units. Students following a combination of Applied Geology with Zoology and/or Botany are permitted in Year 1 to substitute the two Biology units, 17.031 & 17.041, for 1.001. In Year 2 they should take 43.111, 45.101, 45.201, 45.301 and 1 unit chosen from 17.012, 43.131 and 43.112; in Year 3 25.324, either 25.321 or 25.325, 45.302 and 2 units chosen from 43.152, either 43.112, 43.172, 45.112, 45.121, 45.402.

2503

Geophysics

General Studies: see Contents

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 Studies electives

Year 3

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

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

Year 4 (Honours)

25.435

Recommended Double Majors

Geology/Botany and Zoology  
Geology/Chemistry  
Geology/Geography  
Geology/Mathematics  
Geology/Physics

Geography

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

Program 2700 comprises a three-year structured sequence of substantive subjects in physical and human Geography, with particular emphasis on studies of the natural environment, as well as a grounding in basic analytical skills and techniques (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 Botany, are encouraged. Details of particular courses of study and subject combinations offered within the program are available from the School Office.

2700

Geography

General Studies: see Contents
### Year 1

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

### Year 2

- Choose 3 Level II Geography units
- Choose 5 units from Table 1
  - 1 General Studies elective

### Year 3

- Choose 4 Level III Geography units
- Choose 3 units from Table 1
  - 1 General Studies elective

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

### Year 4 (Honours)

- 27.844

**Recommended Double Majors**

- Geography/Botany
- Geography/Geology

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### 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 Biochemistry) 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 units are offered which cover various aspects of: Biochemistry. These include 41.102 Biochemistry of Macromolecules (a double unit) and 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.

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**Program 4100 Biochemistry**

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

**4100 Biochemistry**

General Studies: see Contents

### Year 1

- 1.141 or both 1.212 and 1.231
- 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
- 41.101
- Choose 4 or 5 units from Table 1† 
  - 1 General Studies elective

### Year 3

- 41.102
- Choose at least 2 units from: 41.112, 41.122, 41.132, 41.142
- Choose further units from Table 1 to give a total of 23 for the complete program 
  - 1 General Studies elective

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. Also recommended is 68.451.
†Students are recommended to take both 2.102B and 2.102D.
Recommended Double Majors

Biochemistry/Biotechnology
Biochemistry/Botany
Biochemistry/Chemistry
Biochemistry/Microbiology
Biochemistry/Physiology
Biochemistry/Zoology

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 assured 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.

Recommended Double Majors

Biotechnology/Biochemistry
Biotechnology/Chemistry
Biotechnology/Microbiology

Botany

Botany is concerned with all aspects of the structure and function of both green and non-green plants and the relation of plants to their environments. The major aspects of the subject range from plant anatomy and morphology through physiology, ecology, taxonomy and palynology to mycology and plant pathology. The applications of these studies are particularly relevant in the fields of agriculture, horticulture, forestry, conservation and related environmental sciences.

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

4200

Biotechnology

General Studies: see Contents

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
Mathematics
Biology

4300

Botany

General Studies: see Contents

Year 1

2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B and 10.021C

Chemistry
Mathematics
17.031, 17.041
Choose 2 Level 1 units from Table 1

Biology

Year 2
43.111
Choose at least one of the following: 17.012, 43.131, 43.121
Choose additional units from Table 1 to make a total of 8
1 General Studies elective

Year 3
Choose 4 Level III Botany units
Choose 3 units from Table 1
1 General Studies elective

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

Year 4 (Honours)
43.103

Recommended Double Majors

Botany/Biochemistry
Botany/Geography
Botany and Zoology/Geology
Botany/Microbiology
Botany/Zoology

Microbiology

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

The program in Microbiology requires students to take basic courses in Chemistry, Mathematics and Biology in Year 1, as well as 41.101 Biochemistry in Year 2.

4400
Microbiology*

Zoology

Zoology is built on the foundation of the first year units Biology A and B, Mathematics and Chemistry.

In their second year all Zoology students study Biometry, Invertebrate Zoology, Vertebrate Zoology and either General Ecology or Introductory Genetics or both. Students must also complete two Level II units of either Biochemistry of Chemistry or Mathematics or Physics. Other units are then chosen to make a total of seven or eight for the year. The areas from which these units are chosen will depend mainly on the student’s interests.

Examples of some of the units which are often chosen are Flowering Plants, Introductory Microbiology, Control Mechanisms, Organic Chemistry, Analytical Chemistry, Physiology and Mathematics. The choice of optional units is important because it determines which units may be included in the third year.

*1. Those students interested in a specialist career in Microbiology should also choose 44.122 and 44.132 in Year 3. Students wishing to include 44.122 Immunology in their program are strongly advised to take 70.011A History in Year 2.

2. Many students combine a major in Microbiology with a major in Biochemistry or Biotechnology.

3. Students should note that Mycology is an aspect of Microbiology which is taught in the School of Botany in units 43.131 and 43.132. The subject 45.101 Biometry is recommended as a useful elective. In particular, students interested in environmental microbiology or in a research career in any area are strongly advised to take this subject.
Students are urged to seek advice from the school’s student advisors at the end of Year 1 and 2.

A major in Zoology requires the study of at least 4 Level III Zoology units, three of which must be selected from Evolutionary Theory, Insects, Comparative Physiology and Animal Behaviour. The choice of other units in third year depends on students’ interests. For instance those interested in Entomology would probably include Economic Zoology amongst their units; those interested in Ecology might include Population & Community Ecology, Marine Ecology and Vertebrate Zoogeography & Evolution; those interested in Animal Physiology would probably include Ecological Physiology. The additional units may be either chosen from those offered by the School of Zoology or by other schools. In all, seven or eight units are studied in third year to make a total of at least 23 units, as required by the regulations of the Science and Mathematics Course.

It is possible to study other disciplines as a co-major with Zoology eg Botany, Biochemistry, Mathematics, Marine Science, Anatomy, Physiology, Geography, Geology. In general, students completing a co-major with Zoology must satisfy the requirements of the Zoology program but some minor variations may be permitted when students include 4 Level III units from both Zoology and the co-major discipline. Students should consult the School about these prior to enrolment in Year 2.

For students who achieve above average results in their studies a fourth year (Honours) is available. The Honours year is made up of formal course work on Concepts in Biology plus a research project.

## Recommended Double Majors

- Zoology/Anatomy
- Zoology/Biochemistry
- Zoology/Botany
- Zoology and Botany/Geology
- Zoology/Mathematics
- Zoology/Physiology

## 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

With the exception of two subjects which each count as one science unit, all Level II/III subjects in Philosophy are half units, of which three together can be counted as two science units.

### Major in Philosophy

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

### Level II/III

Some Level II/III subjects deal with particular philosophical topics; others can be taken in sequence to give more sustained treatments of larger areas. Students may select freely among these, subject to stipulations regarding prerequisites. They are welcome to seek advice and further information from the School. In certain circumstances the prerequisite specified for 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.
**5200**

**Philosophy**

General Studies: see Contents

**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 Studies elective

**Year 3**

Choose 4 Philosophy units*  
Choose 3 units from Table 1  
1 General Studies elective

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

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**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  
   62.1021, 62.1041

2. Level II/III units  

3. Level III units  

**Social Studies of Science and Technology**

1. Level I units  
   62.1011

2. Level II/III units  

3. Level III units  
   62.300U

**The Honours Degree**

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

**Scientia**

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

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**6200**

**Science and Technology Studies**
Undergraduate Study: 3970 Science and Mathematics Course: Programs

General Studies: see Contents

Year 1
10.001 or 10.011 or both 10.021B
and 10.021C
Mathematics
62.1011 or 62.1021 or 62.1041
S & T Studies
Choose 5 Level I units from Table 1

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

Year 3
Choose 4 S & T units*
Choose 3 units from Table 1
1 General Studies elective*
Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
62.400H
1 General Studies elective*

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

Recommended Double Majors
Science and Technology Studies/Anatomy
Science and Technology Studies/Botany
Science and Technology Studies/Geology
Science and Technology Studies/Zoology

Board of Studies in Science and Mathematics

6801 For Anatomy Programs
General studies: see Contents

Year 1
10.001 or 10.011 or both 10.021B
and 10.021C
Biology
Choose 4 appropriate Level I units from Table 1
Enrolment in Year 2 of program 7000 is based on academic performance in Year 1. Students should select the units specified in the program they wish to pursue in Year 2.
Students may obtain advice from the Office of the Board of Studies in Science and Mathematics in the Biological Sciences Building.

6806 For Computer Science Programs
General studies: see Contents

Year 1
10.001 or 10.011
6.611
Choose 5 units from Table 1
In Year 1 students must enrol in program 6806. Enrolment in Year 2 of program 0600 and 1400 is based on academic performance in Year 1. Students may obtain advice from the office of the Board of Studies in Science and Mathematics in the Biological Sciences Building.

6810 Mathematics of Management**†
General studies: see Contents

Year 1
10.001 or 10.011**
14.501, 14.511
15.001, 15.011
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, 14.602
Choose 1 unit from: 14.542, 14.603, 14.613. 1 General Studies elective

Year 3
Choose 2 further Level III Mathematics units
Choose 2 units from one of the strands:
1. 14.563, 14.583
2. 14.605, 14.607, 14.608
3. 14.614, 14.615
Choose 1 unit from:
1. Table 1 or
2. Table 2 for program 6810
1 General Studies 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
Chemistry
10.001 or 10.011 or both 10.021B or 10.021C
Mathematics
17.031, 17.041
Biology

Choose 2 Level I units from Table 1

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

In 1989 the Faculty of Biological and Behavioural Sciences will introduce a compulsory common core in Level II consisting of four unit equivalents: as follows: Principles of Biochemistry, Molecular Biology, Introductory Genetics, and Biological Function and Evolution.

The core will be compulsory for all students majoring in other than Psychology programs that are offered totally within the Faculty of Biological and Behavioural Sciences (in particular 4100 Biochemistry, 4200 Biotechnology, 4300 Botany, 4400 Microbiology and 4500 Zoology). The changes are being 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 units within the core will be available to students in other programs and will be prescribed in such program as 6832 Marine Science (Biological Oceanography) and 6840 Genetics as well as for interfaculty double majors (eg Biochemistry/Anatomy, Biochemistry/Physiology, Biochemistry/Chemistry and Botany/Geography).

In addition, at Level II, from 1989, optional single units in Biostatistics, Ecology, Microbiology, Botany, and Zoology will be available to supplement the core units in various programs.

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

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### 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 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, 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.

**Biological Oceanography** includes basic Mathematics, Chemistry and Biology as well as advanced courses in 43.111 Flowering Plants, 45.201 Invertebrate Zoology, 43.172 Phycology and Marine Botany, 45.112 Marine Ecology and 44.101 Introductory Microbiology. Further options include 17.012 General Ecology, 10.331 Statistics and 41.101 Biochemistry.


**Environmental Chemistry** includes basic Chemistry and Mathematics, and 2.002A Physical Chemistry, 2.002D Analytical Chemistry, 2.043A Environmental Chemistry and 2.003D Instrumental Analysis.

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.
Undergraduate Study: 3970 Science and Mathematics Course: Programs

6833
Marine Science (Earth Science Oceanography)

General Studies: see Contents

Year 1
10.001 or 10.011 or both 10.021B and 10.021C
Choose 4 units from 2 of the strands:
1. 1.001 or 1.021 and/or
2. 1.031, 1.041 and/or
3. 2.141 or both 2.121 and 2.131

Year 2
68.302
25.621, 25.622
Choose additional units from Table 1 to give a total of 8
1 General Studies elective

Year 3
Choose 3 Level III units from Table 1 which may include the subjects corresponding to the strands chosen in Years 1 and 2:
1. 68.313, 10.032 and/or
2. 43.172, 45.112 and/or
3. 2.123E

Year 4 (Honours)
68.304

6834
Marine Science (Environmental Chemistry)

General Studies: see Contents

Year 1
2.141 or both 2.121 and 2.131
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 4 (Honours)
68.304
Year 2
2.102A, 2.102D
68.302
Continue both of the strands chosen in Year 1:
1. 10.031 or 10.331 and/or
2. At least 1 unit from: 17.012, 43.111, 45.201 and/or
3. 25.622
Choose additional units from Table 1 to give a total of 8
1 General Studies elective

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. 43.172, 45.112 and/or
3. None
Choose 3 units from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 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, Geography, and units in the laboratory applications of computers. Experience with laboratory computers is an asset in many areas of genetics, and 68.451 is therefore strongly recommended as a year 1 subject.

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

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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 units in Mathematics and Physics, the more difficult subjects being given a greater weight. Introductory Chemistry is included in the aggregate even though not counting for a degree. The quota does not apply to the Science/Medicine course (course 3820).

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

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

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

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

---

**7000**  
**Anatomy**

General Studies: see Contents

**Year 1**

10.001 or 10.011 or both 10.021B and 10.021C  
Mathematics 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 Studies elective

**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 Studies elective

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 6901. Enrolment in Year 2 is based on academic performance in Year 1.*

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**Recommended Double Majors**

Anatomy/Biochemistry  
Anatomy/Physiology  
Anatomy/Psychology  
Anatomy/Zoology

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**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 subject with Pharmacology should follow Strand 2.

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

The Honours year program, as presently conducted in this School, requires the student to complete a full year research project on a specific topic under the supervision of a member of staff, and to submit a thesis based on this work. The level of honours awarded is determined on the basis of the thesis, and on course work activities such as the preparation of literature reviews, and participation in seminar programs.
Year 3
Continue the strand chosen in Year 2:
*Either*
1. 73.012
or
2. 73.022
*and either*
2 Level III Chemistry units
or
41.102 and 41.122
or
73.012
Choose further units from Table 1 to give a total of 23 for the complete program.
1 General Studies elective
Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
73.013 or 73.023

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

---

**Recommended Double Majors**

- Physiology/Anatomy
- Physiology/Biochemistry
- Physiology/Chemistry
- Physiology/Psychology
- Physiology/Zoology
Undergraduate Study
Board of Studies in Science and Mathematics
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

These combined courses of five years full time study enable a student in the School of Mechanical and Industrial Engineering to qualify for the award of the two degrees of Bachelor of Engineering and Bachelor of Science (BE BSc). The courses enable such combined degree students to major in the areas of computer science, materials science, mathematics, physics or statistics in addition to studying their chosen engineering specialty. The course is administered by the Faculty of Engineering.

All students who are accepted into the first year ‘science/arts compatible’ course in the School of Mechanical and Industrial Engineering may enrol directly into these combined degree courses. Continued enrolment in Year 2 requires a pass at first attempt in all subjects of Year 1 and students who fail to achieve this will automatically be disenrolled from these courses and be enrolled in their respective engineering programs (3610, 3660, 3680 or 3700). Alternatively, students may transfer into Year 2 of these courses, provided they have obtained a clear pass in the Year 1 ‘science/arts compatible’ course.

Normally, students enrolled in these BE BSc courses will be awarded their degrees at the conclusion of five years study. However, it is possible for students to take out the Science degree prior to the Engineering degree provided they have: 1. completed the requirements for Years 1, 2 and 3, 2. completed the General Studies requirements for the Science degree, and 3. obtained approval from the Board of Studies in Science and Mathematics.

Students may also undertake an additional honours year in Science and Mathematics and automatically re-enter the combined Science/Engineering course without having to re-apply for admission. To undertake such an honours year in Science and Mathematics, permission is to be obtained, at the end of Year 3, both from the head of the School in which the honours year is to be undertaken and from the Head of the School of Mechanical and Industrial Engineering.

Students who commence the course and do not complete the Engineering component may take out a BSc degree on completion of one of the approved programs in the Science and Mathematics course. Similarly, students not wishing to complete the BSc degree course may revert to their respective Engineering programs 3610, 3660, 3680 or 3700 with appropriate credit for subjects satisfactorily completed.

Having completed the first three years as outlined below, students in Years 4 and 5 do Year 3 and Year 4 of their respective Engineering programs 3610, 3660, 3680 or 3700, except that significant repetition of subject material is not allowed. Instead, students are required to substitute either an appropriate Technical Elective or an appropriate Level II or III subject from Table 1 or Table 2, or in exceptional circumstances, some other equivalent subject with the permission of the School of Mechanical and Industrial Engineering. For more details of these combined courses, refer to the Faculty of Engineering Handbook.

Year 1
1.001
2.951 a. (or 2.121)
5.0011, 5.0012, 5.030, 5.0303, 5.061, 5.0721, 5.421
10.001 (or 10.011)

Year 2
5.0201, 5.300, 5.422 s.
10.111A (or 10.121A), 10.1113 (or 10.1213), 10.1114 (or 10.1214)
10.2111 (or 10.2211), 10.2112 (or 10.2212)
Choose 4 units from Table 2 for course 3681 2.

For later Years, see overleaf
Years 5.043, 5.122, 5.620, 5.626
Choose 5 units from Table 2 for course 3681 2.

1 General Studies elective 8.

Years 4 and 5

Years 3 and 4 respective Engineering programs 3610, 3660, 3680, 3700
Subject selections which satisfy the specific requirements for the various majors are summarized below. Provided co-and prerequisites are satisfied, there is scope for some subjects to be taken either in Year 2 or Year 3.

Computer Science Majors 13.

Year 2
5.0201, 5.300, 5.422
6.621, 6.631 7-, 6.641
10.111A (or 10.121A), 10.1113 (or 10.1213), 10.1114 (or 10.1214), 10.2111 (or 10.2211), 10.2112 (or 10.2212), 10.331 (or 10.351)

Year 3
1.002 or 1.012 or 1.022 or 2.102A
5.043, 5.122, 5.620, 5.626
4 Level III units from Table 1 and Table 2 offerings of School of Electrical Engineering and Computer Science for course 3681 8.

1 General Studies elective 8.

Mathematics Majors

Year 2
Same Year 2 as for Computer Science or Materials Science (3 units of Level II mathematics option) or Physics or Statistics majors
or
1.002 or 1.012 or 1.022 or 2.002A
5.0201, 5.200, 5.422
10.111A (or 10.121A), 10.1113 (or 10.1213), 10.1114 (or 10.1214), 10.2111 (or 10.2211), 10.2112 (or 10.2212)
3 units from 10.1115, 10.1116, 10.2113 (or 10.2213), 10.2115 (or 10.2215), 10.4112 (or 10.4212), 10.4111 (or 10.4211) or from any other appropriate Level II units from Table 1 or Table 2 for course 3681.

Year 3
5.043, 5.122, 5.620, 5.626
10.331 or 10.351 12.
4 Level III units from School of Mathematics offerings in Table 1
1 General Studies elective 8.

Physics Majors

Year 2
1.002, 1.012, 1.022, 1.032
5.0201, 5.300, 5.422
10.111A, (or 10.121A), 10.1113 (or 10.1213), 10.1114 (or 10.1214), 10.2111 (or 10.2211), 10.2112 (or 10.2212)

Year 3
1.01331-., 1.023, 1.033311-, 1.043 11.
1 Level III unit from School of Physics offerings in Table 1
5.043, 5.122, 5.620, 5.626
10.331 or 10.351
1 General Studies elective 8.

Statistics Majors

Year 2
1.002 or 1.012 or 1.022 or 2.102A
5.0201, 5.300, 5.422
10.111A (or 10.121A), 10.1113 (or 10.1213), 10.1114 (or 10.1214), 10.2111 (or 10.2211), 10.2112 (or 10.2212)

Year 3
5.043, 5.122, 5.620, 5.626
4 Level III units from Statistics offerings in Table 1
1 Level II or III unit from School of Mathematics or Physics offerings in Table 1
1 General Studies elective 8.

For Notes, see overleaf
Notes
1. Students planning to take higher level Computer Science subjects should also take 6.611 Computing I or 8.1120 Computing. Other students may seek permission to take some appropriate alternative subject.
2. The following considerations pertain to the choice of optional units in Year 2 and 3.
   (1) They include no more than 1 Level I unit.
   (2) They include at least 4 Level III units which satisfy the relevant major requirements.
   (3) They include no more than 1 unit from Schools other than Chemistry, Electrical Engineering and Computer Science, Mathematics, Materials Science and Engineering and Physics.
   (4) They include at least 1 Level II unit from the Schools of Chemistry or Physics.
   (5) They include 10.331 Statistics SS, 10.351 Statistics SM, or 10.311B Basic Inference.
   (6) 4.732 Mechanical Properties of Materials and 4.642 Metallurgical Engineering I both are deemed to have 1/2 unit values.
3. Students are recommended to choose 2.951 unless they wish to pursue studies requiring 2.121. The prerequisites of 2.121 and 2.131 for 2.102A Physical Chemistry may be waived on application to the Head of the School of Chemistry. Materials Science Option 1 majors must choose 2.121.
4. Materials Science majors may omit 10.1114 Complex Analysis or substitute 10.022 Engineering Mathematics 2 for the mathematics subjects. The balance of the units must then be made up from units from the Schools of Chemistry, Materials Science and Engineering or Physics offerings in Table 1 or Table 2 for course 3681.
5. If 4.412A, 4.422B and 4.432, Physical Metallurgy IA, IB and IC respectively, are taken, students should take 5.422 instead of 5.422.
6. Anticipated. Actual General Studies requirements correspond to whatever is required in Year 2 of the normal Mechanical and Industrial Engineering degree course.
8. 6.646 Computer Applications is excluded for students in course 3661 who should substitute a Level III unit from Table 2 offerings of School of Electrical Engineering and Computer Science.
9. Provided 5.4221 is taken concurrently with 4.642, the prerequisite requirement of 4.732 for 4.642 is assumed to be satisfied.
10. Materials Science majors who took 2.121 Chemistry 1A in Year 1 must take 2.131 Chemistry 1B. Those who took 2.951 Chemistry 1AM and wish to keep open the option of majoring in mathematics should include 10.1114 (or 10.1214) Complex Analysis in their selection; otherwise they are advised to select 1.022 Modern Physics or 1.962 Solid State Physics.
11. Under special circumstances, and with permission of the School of Physics, a student may substitute alternative Physics Level III offerings of equivalent unit value.
12. Students who followed the Year 2 for Computer Science majors should substitute 1.002 or 1.022 or 1.102A; those that followed the Year 2 for Statistics majors should substitute 1 Level II or III unit from the Schools of Physics or Mathematics offerings in Table 1.
13. Quota restrictions apply to certain Computer Science Level III units and applications must be made in writing to the Head of the School of Electrical Engineering and Computer Science before the end of Session 2 in the preceding year. Prospective Computer Science majors should aim for a creditable academic attainment (65%) over Years 1 and 2.
14. These must include either 4.413, Physical Metallurgy 2A, 4.433C, 4.443 and 4.453, Physical Metallurgy 2C inclusive and 4.713 X-ray Diffraction and Electron Microscopy together with either 2.003A Physical Chemistry or 1.023 Statistical Mechanics (for which the prerequisite of 1.012 is waived provided students have passed 2.002A).
Students in Electrical Engineering who maintain a creditable performance may qualify for the award of two degrees in five years of combined full-time study in which the requirements of the degrees have been merged. Students wishing to enrol in a combined course may do so only on the recommendation of the Head of School of Electrical Engineering and Computer Science and with the approval of the Faculty of Engineering and the Board of Studies in Science and Mathematics. Students wishing to enrol in, transfer into, or continue in a combined course shall have complied with all the requirements for prerequisite study, sequencing and academic attainment ie an overall creditable performance (65%) including adequate performance in the subjects relevant to the intended majoring area.

Students who commence a course but subsequently do not wish to proceed with both areas of study, or who fail to maintain a creditable performance, revert to a single degree program with appropriate credit for subjects completed. Austudy support is available for the five years of the combined degree programs.

Students may transfer from course 3640 into a combined course after partially completing the requirements for either degree provided suitable subjects have been studied. However, the time taken to complete the program can be seriously affected by the choice of subjects. Thus, students considering course 3725 should contact the Electrical Engineering School before completing their Year 2 enrolment. Application for transfer to a combined course must be made in writing to the Head of School by 8 January 1988.

Having completed Years 1 and 2 of course 3640 students in their third year complete a specific course of study consisting of four Level III Science units chosen from related disciplines, the appropriate General Studies electives and no less than four other Level II or Level III units, and otherwise accords with the rules of course 3970 leading to a major in Computer Science, Mathematics or Physics.

Students wishing to gain a degree at honours level in Science as part of their combined degree program shall meet all the relevant requirements of the Board of Studies in Science and Mathematics and of the School concerned. Such students may enrol for the honours year only on the recommendation of the Head of School of Electrical Engineering and Computer Science and with the approval of the Head of the appropriate Science School, the Faculty of Engineering and the Board of Studies in Science and Mathematics. Austudy support is available for the six years of the combined degree programs including honours level Science.

In Years 4 and 5 the students do Year 3 and 4 of course 3640. Depending on the program followed in their year of Science they may have already completed parts of the normal third and fourth year programs of the Electrical Engineering course, and they will be required to omit these from their program and to include an equivalent amount of other subjects chosen with the approval of the Head of the School.

**Year 1**

<table>
<thead>
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<th>1.961</th>
<th>2.121</th>
<th>5.0011</th>
<th>5.0016</th>
<th>6.010</th>
<th>6.611</th>
<th>10.001</th>
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**Year 2†**

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<tr>
<td>1 General Studies elective</td>
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</table>
Year 3†*

Either

Computer Science
1 General Studies elective

Choose at least 8 Level II or Level III units including at least 4 Computer Science units at Level III, the balance to be chosen from Level III Computer Science units and other Level II or Level III units in Table 1 or Table 2 for program 0600**

or

Mathematics
1 General Studies elective

Choose at least 5 Mathematics units, 4 of which are Level III

Choose at least 3 Level II or Level III units from Table 1 or Table 2 for program 1000

or

Physics
1 General Studies elective

Choose 7 Level II or Level III units from Table 1 of which four must be Level III Physics units, chosen to include 1.0133, 1.0143, 1.023 and 1.0333

Year 4

Year 3 of Electrical Engineering course, modified as required by Head of School

Year 5

Year 4 of Electrical Engineering course

† Students intending to major in Computer Science should include 6.641 in their Year 2 enrolment. Students intending to major in Physics are required to take unit 1.992 in Year 2.

* For Year 3 refer to course 3970 and to this Handbook.

** For this strand only the Level I unit, 14.501 Accounting and Financial Management 1A may be taken in place of one of the other Level II or Level III units. Students should note that this subject is a prerequisite for the Level III unit, 6.647 Business Information Systems.
3730
Programs in the
Combined Science/
Civil Engineering
Course

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

Approval may be given to change the programs listed below to allow for timetabling and the student's academic interests. For any changes to subjects in italic print you should consult the Science and Mathematics Course Office, Room L-G06G, Biological Science Building.

Geography and Environmental Chemistry

Year 1
1.981*
2.121
8.1110, 8.1120, 8.1130, 8.1140
8.1210, 8.1410, 8.1610
10.001
25.5112

Year 2
2.102A, 2.102C, 2.102D, 2.131
8.2110, 8.2210, 8.2320, 8.2410, 8.2420, 8.2430
10.022
27.010, 27.030
1 General Studies elective

Year 3
2.043A
8.2220, 8.2610, 8.3110, 8.3410, 8.3420, 8.3430, 8.3440
Two of the following: 27.133††, 27.243††, 27.253††, 27.183††, 29.441, 29.491
2 General Studies electives

Year 4
8.2120, 8.2310, 8.3210, 8.3220, 8.3230, 8.3310, 8.3320, 8.3330, 8.3510, 8.3610, 8.3620, 8.3640
27.193, 27.175, 27.176
At least 1½ units chosen from:
27.133††, 27.143††, 27.153††, 27.183††, 27.862, 27.863

Year 5
Choose 2 units from Table 1 in the Sciences Handbook at Level II or higher
8.4110, 8.4220, 8.4320, 8.4330, 8.4420, 8.4430, 8.4440, 8.4520, 8.4620
Two of the following subjects:
8.4210, 8.4310, 8.4410, 8.4510, 8.4610

Note: All material not in italic typeface relates to the BE degree component of this combined course.
*See footnotes at end of Course outline.
††These subjects are offered in pairs in alternate years. The two subjects offered in Year 3 are therefore excluded from those available in Year 4.

Physics with Mathematics

Year 1
1.001
2.991**
8.1110, 8.1120, 8.1130, 8.1140
8.1210, 8.1410, 8.1610
10.001
25.5112

Year 2
1.012, 1.022, 1.032
8.2110, 8.2220, 8.2320, 8.2410, 8.2420, 8.2430
10.1113, 10.1114, 10.2111, 10.2112
10.381
1½ General Studies electives

Continued overleaf
Undergraduate Study: 3730 Combined Science/Civil Engineering Course: Programs

Year 3
1.002, 1.023, 1.043
8.2220, 8.2310, 8.2610, 8.3110, 8.3410, 8.3420, 8.3430, 8.3440
10.111A†
29.441, 29.491

Year 4
1.0333
8.2120, 8.3210, 8.3220, 8.3310, 8.3320, 8.3510, 8.3610, 8.3620, 8.3630, 8.3640
1 General Studies elective
Choose 2 Level II or Level III Mathematics units from Table 1 in the Sciences Handbook.
Choose 1 unit from:
1.133, 1.0533, 1.0133, 1.0143

Year 5
8.4110, 8.4220, 8.4320, 8.4330, 8.4420, 8.4430, 8.4440, 8.4520, 8.4620
Choose two of the following subjects:
8.4210, 8.4310, 8.4410, 8.4510, 8.4610
½ General Studies elective
Choose 1 unit from Table 1 in the Sciences Handbook at Level II or higher

Note: All material not in italic typeface refers to the BE degree component of this combined course.

Footnotes to Course 3730 Programs
Note: All material not in italics typeface refers to the BE degree component of this
combined course.
* Students are advised to attempt 1.981 Physics 1CE but if timetabling difficulties arise
or other exceptional circumstances prevail permission will be given to attempt 1.001
Physics I.
** Students who have not satisfied the chemistry prerequisite for 2.991 Chemistry 1CE
are required to take 2.111 Introductory Chemistry in Session 1 and 2.991 in Session 2.
† Students are encouraged to select higher level mathematics units where applicable.

Computing with some Mathematics

Year 1
1.981*
2.991**
8.1110, 8.1120, 8.1130, 8.1140
8.1210, 8.1410, 8.1610
10.001
25.5112

Year 2
6.621, 6.631, 6.641
8.2110, 8.2210, 8.2320, 8.2410, 8.2420, 8.2430
10.111A†
10.1113†
10.1114†
10.331
1 General Studies elective

Year 3
6.642, 6.643
8.2120, 8.2220, 8.2310, 8.2610, 8.3110, 8.3410, 8.3420, 8.3430, 8.3440, 8.3640
10.2111†
10.2112†
29.441, 29.491
Choose ½ Level II or Level III Mathematics unit from Table 1 of
the Sciences Handbook

Year 4
6.646
8.2310, 8.3220, 8.3320, 8.3330, 8.3330, 8.3510, 8.3610, 8.3620, 8.3630
1 General Studies elective
Choose three units, at least one of which is a Computer Science
unit, from 6.613, 6.632, 6.633 or Level II or Level III Mathematics
units from Table 1 in the Sciences Handbook

Footnotes to Course 3730 Programs
Note: All material not in italics typeface refers to the BE degree component of this
combined course.
* Students are advised to attempt 1.981 Physics 1CE but if timetabling difficulties arise
or other exceptional circumstances prevail permission will be given to attempt 1.001
Physics I.
** Students who have not satisfied the chemistry prerequisite for 2.991 Chemistry 1CE
are required to take 2.111 Introductory Chemistry in Session 1 and 2.991 in Session 2.
† Students are encouraged to select higher level mathematics units where applicable.
A limited number of places (up to 16) are available in this course, and these are open only to students who have been accepted into the Faculty of Medicine.

For further details refer to the Faculty of Medicine Handbook. Below are programs for Years 1, 2 and 3 and the optional honours Year only; subsequent years (3, 4 and 5 of the Medical Course) are detailed in the Faculty of Medicine Handbook. Students must major in either Anatomy, Biochemistry, Physiology, Psychology, or any two of these, as well as satisfactorily completing a core course. Students majoring in Biochemistry must decide accordingly before enrolment in Year 2; other majors can be decided before enrolment in Year 3. Subjects chosen each year must be approved by the Course Controller prior to enrolment.

### Year 1

1.001 or 1.021
2.121 & 2.131, or 2.141
10.001 or 10.011 or both 10.021B & 10.021C
17.031, 17.041

1 General Studies elective

### Year 2

41.101 *
70.011A, 70.011C
73.111
80.014**

1 General Studies elective††

Note: Students not majoring in Anatomy commonly take an additional Anatomy unit in Session 2. This may be either 70.012B, 70.011A, or 70.304 (listed in approximate order of likely usefulness).

### Year 3

There are 10 options, as set forth immediately below. The columns represent the primary choice (major in Anatomy, Biochemistry or Physiology); the rows represent the secondary choices (single or double major). Elective units may be selected from Table 1 and/or from the Anatomy units in Table 2.

<table>
<thead>
<tr>
<th>Core Units</th>
<th>Anatomy Major</th>
<th>Biochemistry Major*</th>
<th>Physiology Major</th>
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<td>80.014**</td>
<td>80.014**</td>
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<td>41.102</td>
<td>41.112 and</td>
<td>73.012</td>
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<td>41.12 or 41.132</td>
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<td>together with:</td>
<td>2 Level III</td>
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<td></td>
<td></td>
<td>Anatomy unit†</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>73.012F</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Elective unit</td>
<td>2 Elective units</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Elective units</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Level III</td>
<td>4 Level III</td>
</tr>
<tr>
<td>Single Major</td>
<td></td>
<td>Anatomy unit†</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>73.012F</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Level III</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anatomy unit†</td>
<td></td>
</tr>
<tr>
<td>Double Major</td>
<td>41.102</td>
<td>(double major</td>
<td>41.102</td>
</tr>
<tr>
<td>with Anatomy</td>
<td></td>
<td>not available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41.121 and</td>
<td>41.121 and</td>
<td>41.122 or 41.132</td>
</tr>
<tr>
<td></td>
<td>41.132</td>
<td>41.122 or 41.132</td>
<td></td>
</tr>
<tr>
<td></td>
<td>together with:</td>
<td>(double major</td>
<td>(not available)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>not available</td>
<td></td>
</tr>
</tbody>
</table>

### Year 4

Students may join Year 3 of the Medical Course, or apply to take Honours and proceed to the Medical Course the following year. For honours courses, see Table 3.

*Students majoring in Biochemistry should take 2.102B Organic Chemistry.
**80.014 Human Behaviour is taken in either Years 2 or 3.
††Enrolment in General Studies may be deferred until later years but two electives must be satisfactorily completed for a BSc degree, and three electives for the MB BS degrees. Students must complete these requirements during the first three years, before entering the Medical Course, otherwise there will be timetabling difficulties.
3995

Combined Science/Commerce Course

Finance and Mathematics

For details of the Combined Science/Commerce Course refer to the Faculty of Commerce Handbook.
4070 Mathematics Education Course

4080 Science Education Course

Objectives of the Course

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

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

Honours and Pass Degree Requirements

The course is offered at both pass and honours levels.

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

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

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

The grades in this program are Honours Class I, II/1, II/2 and III.
Students who wish to proceed to the honours year should apply in writing to the Head of the School of Education. A letter of acceptance from the Head of the School in which they wish to study during the honours year should be included with this application.

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

Components of the Course

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

1. Mathematics Component

Alternative programs are available to students in the course in 1988. The programs consist of units ranked as Level I, Level II, Level III/IV, Level III and Level IV. These units vary from 56 to 84 hours in duration. The terms Levels I, II and III do not necessarily refer to the years in which the unit must be studied. Units at the various levels may be taken in other years provided the prerequisites are met. Level II/III units have only Level I prerequisites.

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

5811 The Mathematics and Science Program

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

or

5812 The Mathematics and Liberal Studies Program

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

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

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

(2) The following subjects or their higher equivalents shall be included:

10.001, 10.111A, 10.1113, 10.1114, 10.2111, 10.2112.

(3) Subjects amounting to at least 2 full units chosen from:

10.1111, 10.1112, 10.1121, 10.1123, 10.1127, 10.1128, provided that a student may substitute for any of the above units such higher units as are deemed equivalent (for the purposes of satisfying this rule) by a professor of Pure Mathematics.

(4) Not less than 2 units from the following:

10.1127, 10.2113, 10.2115, 10.212L, 10.212M, 10.331, 10.311A, 10.311B, 10.3111, 10.3112, 10.312A, 10.312B, 10.312C, 10.312D, 10.312E, 10.2116, 10.292A, provided that a student may substitute for any of the above units such higher units as are deemed equivalent (for the purposes of satisfying this rule) by the Head of the School of Mathematics.

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

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

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

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

2. Education Component

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

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

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

58.013 Theory of Education;
58.014 Curriculum and Instruction and
58.015 Teaching Experience

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

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

3. General Studies Component

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

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

Enrolment Requirements

1. No new student shall be enrolled in the first year of the Mathematics Education course (4070) in 1988. Students proceeding to all but the fourth year of the course should be enrolled in one of the Mathematics Education programs or one of the Mathematics programs for Science and Mathematics (3970) and, where appropriate, general studies. Fourth year students in 1988 must be enrolled in the Education program.

2. A student may with the approval of the Director of Science Teachers’ Courses, and in consultation with the Head of the School of Mathematics, change from one selected Mathematics program to another. A written application to make the change must be lodged, including details of optional units selected in the new program, at the Science Education Office, Room 41, Building G2, Western Campus.
3. A student must take care to satisfy the requirements of sequences of units such as prerequisites and co-requisites. A prerequisite subject is one which must be completed prior to enrolment in the subject for which it is prescribed. A co-requisite subject is one which must either be completed successfully before or be studied concurrently with the subject for which it is prescribed. In exceptional circumstances, on the recommendation of the Head of the School of Mathematics, the particular prerequisite or co-requisite may be waived by the Director of Science Teachers' Courses.

Programs

The course taken by each student has three component programs:

1. Education Program

Students enrolled in the pass course in 1988 and 1989 will study education only in the fourth year of their course. Students enrolled in the education honours course will also study education in their fifth year. In 1988 the subjects available are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject†</th>
<th>Hours/week*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>58.013</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>58.014</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>58.015</td>
<td>††</td>
</tr>
</tbody>
</table>

Honours in Education

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject†</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>58.793</td>
</tr>
<tr>
<td>5</td>
<td>58.794</td>
</tr>
<tr>
<td></td>
<td>58.795</td>
</tr>
<tr>
<td></td>
<td>58.799</td>
</tr>
</tbody>
</table>

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

2. General Studies Program

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

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

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

No specific General Studies subjects are required.

3. Mathematics Program

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

5811
Mathematics and Science

Year 1
10.001 or 10.011
Choose 6 units from:
Table 1 &/or
The BA course* † &/or
Table 2† for program 5811 except 14.501

Year 2
10.111A or 10.121A, 10.113 or 10.1213, 10.1114 or 10.1214, 10.2111 or 10.2211, 10.2112 or 10.2212
Choose 5 units from:
Table 1 &/or
The BA course* † &/or
Table 2† for program 5811

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

Year 4
Education subjects

Year 5
10.123 or 10.223 or 10.323

*Up to 5 units of this program may be replaced by subjects offered in the BA degree course (6 credit points at Level I, or 4 credit points at Upper Level are equivalent to 1 unit). The BA degree subjects are limited to those offered by the following schools: Economics, English, French, German, History, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre Studies. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273.

†Not more than 8 units that are not in Table 1 may be taken without the approval of the Director of Science Teachers' Courses.

5812
Mathematics and Liberal Studies

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

Year 2
10.111A or 10.121A, 10.113 or 10.1213, 10.1114 or 10.1214, 10.2111 or 10.2211, 10.2112 or 10.2212
Choose 5 units from:
Table 1† &/or
The BA course*
Undergraduate Study: 4080 Science Education Course: Programs

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

Year 4
Education subjects

Year 5
10.123 or 10.223 or 10.323

*Units in Geography, Science and Technology Studies and Philosophy shall be those
from the BA degree course.

†At least 8 units of this program must come from subjects offered in the BA degree
course (6 credit points at Level I, or 4 credit points at Upper Level are equivalent to 1
unit). The BA degree subjects are limited to those offered by the following Schools:
Drama, Economics, English, French, Geography, German, History, History and Philo-
osophy of Science, Philosophy, Political Science, Russian, Sociology, Spanish and Latin
American Studies. Upper Level subjects from the School of Economics are restricted
to all those in Economic history plus 15.062, 15.072, 15.263 and 15.273.

4080
Science Education Degree Course

Bachelor of Science Diploma in Education
BSc DipEd

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

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

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

1. Students in this course (4080) who have completed the
Science component should enrol in the Year 4 Education pro-
gram in 1988. Those who have not completed the Science
component should discuss their 1988 enrolment with an ap-
propriate member of the School of Education.

2. All other pass degree students registered in this course should
enrol in 1988 with a view to completing the Science component
of the course. The Education component will be available only
in the fourth year of the course after completion of all or most
of the Science component.

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

Students enrolling in this course must seek advice from the
Director of Science Teachers' Courses, Room 41, Building G2,
Western Campus or at the enrolment centre.

Objectives of the Course

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

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

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

Honours and Pass Degree
Requirements

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

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

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

Physics, Chemistry, Geology, Biochemistry, Biotechnology,
Botany, Microbiology, Zoology, Education*, Physiology.

The grades in this program shall be Honours Class I, II/1,
II/2 and III.
Students who wish to proceed to the honours year should apply in writing to the Head of School of Education. A letter of acceptance from the Head of the School in which they wish to study during the honours year should be included with this application.

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

Components of the Course

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

1. Science Component

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

1. There shall be ten units from Level I and these must come from the following subjects: 1.001 (or 1.021 for biological science programs from the Science and Mathematics Course), 2.121, 2.131, 10.001 or 10.011 or 10.021B and 10.021C, 17.031, 17.041, 25.110, 25.120.

2. At least four units from Level III. For purposes of this clause Level II/III units are counted as Level III units.

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

4. One unit shall be a Science and Technology Studies subject selected from a list of subjects approved by the Director of Science Teachers' Courses. In special circumstances this requirement may be waived with the permission of the Director of Science Teachers' Courses or as specified in individual programs.

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

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

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

2. Education Component

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

<table>
<thead>
<tr>
<th>Subject</th>
<th>58.702</th>
<th>58.703</th>
<th>58.704</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory of Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science Curriculum and Instruction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Practice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honours</td>
<td>58.795</td>
<td>58.799</td>
<td></td>
</tr>
</tbody>
</table>

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

- 58.013 Theory of Education
- 58.014 Curriculum and Instruction
- 58.015 Teaching Experience

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

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

3. General Studies Component

The General Studies component involves 56 hours in the pass course, which is made up of two half electives or their equivalent. The distribution of the two half electives may be varied to suit the programs of individual students.

Enrolment Requirements

1. No new student shall be enrolled in the first year of the Science Education course (4080) in 1988. Students proceeding to all but the fourth year of the course should be enrolled in one of the Science Education programs listed below, and general studies.

Fourth year students in 1988 must be enrolled in the Education program.

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

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

4. A prerequisite subject is one which must be completed prior to enrolment in the subject for which it is prescribed. A co-requisite subject is one which must either be completed successfully before or be studied concurrently with the subject for which it is prescribed. An excluded subject is one which cannot be counted together with the subject which excludes it towards the degree of qualification. In exceptional circumstances, on the recommendation of the head of the appropriate school, the particular prerequisite or co-requisite may be waived by the Director of Science Teachers' Courses.
5. Students lacking the HSC prerequisites for 1.001 Physics 1 and/or 2.121 Chemistry 1A may satisfy prerequisites by completing the respective introductory subjects 1.021 Introductory Physics for Health and Life Scientists or 2.111 Introductory Chemistry. Students requiring 10.001 Mathematics 1 for Physics programs may satisfy prerequisites by completing 10.021B where appropriate. Under these circumstances these introductory subjects are not counted among the units required for the degree course.

Programs

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

1. Education Program

Students enrolled in the pass course in 1988 and 1989 will study education only in the fourth year of their-course. Students enrolled in the education honours course will also study education in their fifth year. In 1988 the subjects available are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject*</th>
<th>Hours/week*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>58.013</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>58.014</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>58.015</td>
<td>++</td>
</tr>
</tbody>
</table>

Honours in Education

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>58.793</td>
</tr>
<tr>
<td></td>
<td>58.794</td>
</tr>
<tr>
<td>5</td>
<td>58.795</td>
</tr>
<tr>
<td></td>
<td>58.799</td>
</tr>
</tbody>
</table>

†See the information about the Education component.
*For 20 weeks
††For 8 weeks

2. General Studies Program

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

3. Science Program

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

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

5801††
Physics

Year 1

1.001
2.121 & 2.131, or 2.141
10.001 or 10.011†
17.031, 17.041

or
25.110, 25.120

Year 2

1.002, 1.012, 1.022, 1.032
10.1113†, 10.1114†
10.2111†, 10.2112†
17.031, 17.041

or
25.110, 25.120

Year 3

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

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

Year 4

Education subjects.

Year 5 (Honours)

Choose one of 1.104, 1.304 or 1.504

††Students should read carefully the notes accompanying program 0100 Physics and seek advice from the School of Physics regarding choice of units. For students proceeding to Year 5 consideration is given in Year 4 to students wishing to include further units of Mathematics.

5820
Chemistry

Year 1

1.001
2.141 or both 2.121 and 2.131
10.001 or 10.011 or both 10.021B & 10.021C
17.031, 17.041

or
25.110, 25.120

Year 2

2.102A, 2.102B, 2.102C, 2.102D
17.031, 17.041

or
25.110, 25.120

Choose 1 Science & Technology Studies unit
Choose 1 unit from: Table 1 *
Sciences

Year 3
Choose 4 Level III Chemistry units
Choose 3 units from Table 1 *
Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 4
Education subjects

Year 5
2.004
*See this footnote to program 5801.

5825
Geology

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

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

Year 3
25.311, 25.312 Choose 2 Level III Geology units
Choose 3 units from Table 1 *
Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 4
Education subjects

Year 5 (Honours)
25.434
*See this footnote to program 5801.

5843
Botany

Year 1
1.001 or 1.021
2.121 and 2.131, or 2.141
10.001 or 10.011 or both 10.021B & 10.021C
17.031, 17.041

Year 2
25.110, 25.120
43.111
Choose 1 Science & Technology Studies unit
Choose 4 units from Table 1 *

Year 3
Choose 4 Level III Botany units
Choose 3 units from Table 1 *
Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 4
Education subjects

Year 5 (Honours)
43.103
*See this footnote to program 5801

5841
Biochemistry

Year 1
1.001 or 1.021
2.121 and 2.131, or 2.141
10.001 or 10.011 or both 10.021B & 10.021C
17.031, 17.041

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

Year 3
41.102 Choose at least 2 units from:
41.122, 41.132
Choose 3 units from Table 1 *
Students proposing to proceed to Year 5 (Honours) must complete 7 Level III units

Year 4
Education subjects

Year 5 (Honours)
41.103
*See this footnote to program 5801.

5844
Microbiology

Year 1
1.001 or 1.021
2.121 and 2.131, or 2.141
10.001 or 10.011 or both 10.021B & 10.021C
17.031, 17.041
Year 2

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

Year 3

44.102, 44.122
Choose 3 units from Table 1*

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

Year 4

Education subjects

Year 5 (Honours)

44.103

*See this footnote to program 5801.

5873

Physiology

Year 1
1.001 or 1.021
2.121 and 2.131, or 2.141
10.001 or 10.011 or both 10.021B & 10.021C
17.031, 17.041

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

Year 3

73.012 Choose 3 units from Table 1*

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

Year 4

Education subjects

Year 5 (Honours)

73.013

*See this footnote to program 5801.

5845

Zoology

Year 1
1.001 or 1.021
2.121 and 2.131, or 2.141
10.001, or 10.011 or both 10.021B & 10.021C
17.031, 17.041

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

Year 3

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

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

Year 4

Education subjects

Year 5 (Honours)

45.103

*See this footnote to program 5801.
Sciences
Undergraduate Study
Board of Studies in Science and Mathematics
and the Faculty of Law

4770
Programs in the Combined Science/Law Course

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

Below is a course description for Years 1, 2 and 3 only. Years 4 and 5 are detailed in the Faculty of Law Handbook.

The reference to Science units in the following course description must meet the following requirements:

1. The Science units must be selected such that they lead to a major in a Science discipline and be compatible with the compulsory subjects specified in nominated program from Course 3970 (see Contents for details).

2. The maximum number of Level I units, viz 8, is not exceeded.

Year 1
90.112, 90.741
6 Level I Science units

Year 2
90.141, 90.161
6 Science units

Year 3
90.216, 90.301, 90.621
6 Science units
## 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, ie both sessions); S1 (Session 1); S2 (Session 2); SS (single session, ie one only); I, II, III (Levels, I, II, III); Hpw (Hours per week); C (Credit).

### Physics

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For students who enrol in and successfully complete the subjects 1.021 Introductory Physics (2 units) and 1.001 Physics (2 units) the total unit value of the combined subjects will be counted as 3 units.

Where mathematics units are specified as prerequisites or as co-requisites, the higher levels of such units are acceptable and preferable. Similarly Physics 1.001 is acceptable in place of 1.021. Students are also advised that other units may be acceptable equivalent prerequisites or co-requisites to those listed, eg Unit 1.982 of course 3640 may be acceptable in place of 1.022. Enquiry should be made to the School of Physics.

**Students wishing to enrol in units 1.713, 1.763 or 1.773 without the stated prerequisites or co-requisites should enquire from the School of Physics as to the suitability of their previous studies.

†††Not offered in 1988.

## Chemistry

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<th>Unit Value</th>
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‡Students majoring in Chemistry may take 2.141 in lieu of 2.121 and 2.131.
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*Excluded for students in programs 0600, 6806.
**Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.
### Mathematics

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#### Pure Mathematics

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**Higher Pure Mathematics Level II††**

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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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*10.1128 is highly recommended.
†10.122B is highly recommended.
‡‡‡Admission to Higher Pure Mathematics 2 traditionally requires completion of 10.011 Higher Mathematics 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 also advised.
1. 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.
2. Students considering doing Higher Pure Mathematics in years III or IV should take 10.121A, 10.1213, 10.1214 and 10.2212 or 10.2111, and 10.2212 or 10.2112; 10.1116 and 10.1118 Finite Mathematics A and B are also advised.
3. 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.
4. Students wishing to enrol in Level III Higher Pure Mathematics units should consult with the Department before enrolling. Normal prerequisites for attempting Level III Higher Pure Mathematics units are at least two Level II Mathematics units, including any course prerequisites, at an average of distinction level, or their higher equivalents. Subject to the approval of the Head of Department, these may be relaxed.
5. These subjects are to be offered in odd numbered years.
**These subjects are to be offered in even numbered years.
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Statistics

**Theory of Statistics Level II**

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† For any listed unit an appropriate higher unit may be substituted.
‡ Plus any two Level III Pure Mathematics, Applied Mathematics, Theoretical Mechanics or Computer Science units. It is sufficient to take 10.312B (10.322B) in the same year.
** For a student taking four of the higher units 10.322A, 10.322C, 10.3221, 10.3222, 10.3223, 10.3224, 10.312F is required to take 10.3225.
$ The evening course 10.311A will, subject to a sufficient enrolment, run at 2 hours per week throughout the year.
* At least four units from 10.322A, 10.322C, 10.3221, 10.3222, 10.3223, 10.3224, 10.312F.

### Psychology

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*Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.

**Notes:**
1. A student may not enrol in more than four Level II Psychology units.
2. A student may not enrol in more than three Level III Psychology units unless 12.200 Research Methods 2 has been passed.
3. A student may not enrol in more than six Level III Psychology units unless 12.300 Research Methods 3A has been passed.
4. A major in Psychology is 12.100, two Psychology Level II units, including 12.200 and four Psychology Level III units.
5. A student may not enrol in more than three Psychology Level III units selected from 12.304 Personality and Individual Differences 3, 12.322 Abnormal Psychology 3, 12.324 Experimental Psychopathology 3, 12.331 Counselling Psychology 3, and 12.335 Behavioural Evaluation and Assessment 3.
6. A student may not enrol in more than two Psychology Level III units selected from 12.320 Social Psychology 3, 12.329 Social Behaviour 3 and 12.334 Behaviour in Organizations 3.
7. A student may not enrol in more than eight Level III Psychology units in course 3970.

### Biological Sciences

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*Students with percentile range 65-100 in HSC Examination 4 unit Science with Biology, or 2 unit Biology may apply to enrol in 45.201 or 45.301 in lieu of 17.041 after completion of 17.031. Students are selected by the Head of School for enrolment in these units. If successful, students will have met the prerequisite requirement of 17.041 Biology B for all units.

### 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.
Field work of up to 4 days.
Field work of up to 5 days.
Field work of up to 8 days.
Not available for programs 2500, 2503 nor in Geology program of Course 4770, nor in Geology with some Mathematics program of Course 3730.
It is desirable that students taking 25.312 should also have taken 25.223.
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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.  
‡Up to 5 days fieldwork, equivalent to 40 tutorial hours, is compulsory.  
§Offered in alternate years.  
§Offered subject to availability of staff.
### Surveying

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*These two subjects must be taken together in the one year.

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*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.
†Terminating pass not acceptable

### Biotechnology

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*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.
†Pass Conceded (PC) or Terminating Pass (PT) awarded prior to Session 2, 1983 is not acceptable.
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***A student may apply to the School for variation of the prerequisites.

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†All units available only during the daytime.
*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.
§Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.
### Zoology

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

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

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

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

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

### Philosophy‡

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*In exceptional circumstances a student may apply to the School for variation of the prerequisite or co-requisite.

**Level II status in Philosophy consists in 1. being in second or later year of university study, and 2. having taken and passed at least one Level I Philosophy unit. If the unit is composed of two half-units, these must have been passed in the same session. The prerequisite may be waived in certain cases by the School.

†Due to the extra library work required in the preparation of essays a combination of three half-unit Philosophy subjects count as the equivalent of two Science units.

### Science and Technology Studies

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

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†Note: only two Level 1 units may be counted towards Course 3970.
## Board of Studies in Science and Mathematics

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### Pathology

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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 should note Physiology 2 prerequisites.*
### Community Medicine

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†One unit of statistical methods, or theory, as approved by the Head of School.
*A unit of genetics and a unit of statistical methods, or theory, as approved by the Head of School.
Course 3970
Units available in specific programs and double degree courses

Table 2

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Table 2: Board of Studies in Science and Mathematics (units offered)

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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.

**In exceptional circumstances the Head of School may give permission for students outside the specified programs to undertake one of these subjects.**

***Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable.***

$**Not available in Year 1 of Programs 1000, 5811, 1400.***

†This unit must be taken in Session 1.

‡‡The combination of 5.620 and 5.626 is worth ½ units.

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

∥Excluded by 25.211.

### May not be offered in 1988 if insufficient enrolments.

§§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

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

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<th>No.</th>
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<th>Unit Value</th>
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<td>At least 3 of the following: 41.102, 42.102C, 44.122, 45.121, 79.201, 79.202, 79.302, 68.403</td>
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*Some Higher Mathematics units 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.

oField work of up to 7 days duration is a compulsory part of the subject.
Undergraduate Study:
Faculty of Biological and
Behavioural Sciences
Faculty of Biological and Behavioural Sciences

Introduction

The Schools of the Faculty of Biological and Behavioural Sciences contribute programs to the Science and Mathematics Course 3970 and the Faculty supervises the undergraduate course in Psychology 3431. The Schools of the Faculty also offer facilities for students to proceed to the award of a Graduate Diploma in Biochemical Engineering (5320); Graduate Diploma in Biotechnology (5340); to masters degrees in Biological Technology (8260) and in Psychology (8250 and 8255); and to the award of masters degrees by research and the award of the degree of Doctor of Philosophy.

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

Student requiring advice about graduate studies should check details later in this handbook and also enquire from the Head of the appropriate School.
Sciences
Faculty of Biological and Behavioural Sciences
Course Outline 3431

3431 Psychology Degree Course — Full-time Course
Bachelor of Science (Psychology) BSc(Psychol)

The four year course in Psychology, which leads to the award of the degree of Bachelor of Science (Psychology), is designed to meet the requirements of students who intend to become professional psychologists, as either practitioners or research workers. It provides extensive study of psychological theory and practice, supported by an appropriate selection of other subjects.

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.

(a) Each of:
12.100 Psychology 1
12.200 Research Methods 2
12.201 Biological Basis of Psychology 2
12.202 Social and Cognitive Psychology 2
12.203 Psychology 2A

A total of 8 Level III units of Psychology including 12.300 and 12.305 from Group A (see Table 1). Additionally, students intending to take the thesis alternative in Psychology Level IV Honours are required to include 12.301 Research Methods 3B from Group B (see Table 1).

(In special cases, the Head of the School of Psychology or his representative may approve of the substitution of some other appropriate course or equivalent units.)

and either
12.400 Psychology 4 (Thesis — Course 3431) or 12.401 Psychology 4 (Course 3431) leading to the award of the degree of Bachelor of Science (Psychology).

(b) Five other subjects (or their equivalent in units) selected to meet the following requirements:

(i) that they shall include at least one of:
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 subjects:

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 subjects:

(They may include both the above alternatives.)
(ii) that they shall include at least one of:

53.001 Introduction to Sociology or
15.001 Microeconomics 1 and 15.011 Macroeconomics 1 or
Political Science 1 (select two of 54.1003 Australian Political Institutions, 54.1004 Government in the Modern World, 54.1005 A History of Political Thought and 54.1006 The Australian Political System) or
52.103 Introductory Philosophy A and 52.104 Introductory Philosophy B.

or

with the approval of the Head of the School of Psychology, one other Arts 1 subject.

(iii) that they shall include at least one subject (two Science and Mathematics Level II units or twelve Arts Upper Level credit points are equivalent to one Level II subject) which together with the subject meeting the requirements of (i) or (ii) immediately above constitutes a recognized sequence of two courses.

Examples of recognized sequences are:

- 10.001 Mathematics 1, followed by two Mathematics Level II units (chosen from 10.111A, 10.1113, 10.1114, 10.2111 and 10.2112) or by both of 10.311A Probability and Random Variables and 10.311B Basic Inference;
- 17.031 Biology A and 17.041 Biology B followed by two Level II units chosen from the following units according to the regulations of the Board of Studies in Science and Mathematics:
  - 41.101 Biochemistry (equivalent to 2 units)
  - 45.101 Biometry
  - 45.201 Invertebrate Zoology
  - 45.301 Vertebrate Zoology
  - 68.601 Genetics of Behaviour 1
  - 68.602 Genetics of Behaviour 2
  - 73.111 Physiology 1 (equivalent to 2 units)
- 53.001 Introduction to Sociology followed by twelve credit points value of Sociology Upper Level subjects
- 15.001 Microeconomics 1 and 15.011 Macroeconomics 1 followed by twelve credit points value of Economics Upper Level subjects
- Political Science 1 followed by twelve credit points value of Political Science Upper Level subjects
- 52.103 Introductory Philosophy A and 52.104 Introductory Philosophy B followed by twelve credit points value of Philosophy Upper Level subjects.

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.

Recommended Psychology Course patterns

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 his representative before completing enrolment.

In Year 1, students must take four subjects which include 12.100, either Biology 1 or a first-year Mathematics, one of Economics 1, Sociology 1, Philosophy 1 or Political Science 1 or one other Arts 1 subject, and a fourth subject. (It should be noted that the University has arranged these subjects so that there is no clash of timetables. If other subjects are taken, care must be taken to check that there is no timetable clash in the program that is chosen.)

In Year 2 students take 12.200, 12.201, 12.202, 12.203, a second-year follow on subject from one of the non-Psychology subjects completed in Year 1, and one other Level I, II or III non-Psychology subject. Eight Level III units of Psychology are taken in Year 3, while Year 4 consists of either 12.400 or 12.401 only.

Some examples of patterns, based on different supporting subjects are suggested below:

Compulsory Psychology Subjects

Year 1
12.100

Year 2
12.200, 12.201, 12.202, 12.203

Year 3
8 Psychology Level III units including 12.300 and 12.305 from Group A. Additionally, if intending to take the thesis alternative in Psychology 4 12.301 must be taken from Group B.

Year 4
Either 12.400 or 12.401

With Pure Mathematics or Statistics as the main supporting subject

Year 1
10.001 Mathematics 1
A Level I Social Science subject, and
One other Level I subject

Year 2
Either two units of Level II Pure and Applied Mathematics, or 10.311A and 10.311B Theory of Statistics Level II, and
One other Level I or II subject

With Biochemistry or Physiology as the main supporting subject

Year 1
2.121 Chemistry 1A and 2.131 Chemistry 1B
Either 10.001 Mathematics 1, or 10.021B General Mathematics 1B and 10.021C General Mathematics 1C, and
17.031 Biology A and 17.041 Biology B

Year 2
A Level I Social Science subject, and
Either 41.101 Biochemistry, or 73.111 Physiology 1

With Zoology or Genetics as the main supporting subject

Year 1
10.001 Mathematics 1, or 10.021B General Mathematics 1B and 10.021C General Mathematics 1C
17.031 Biology A and 17.041 Biology B, and
A Level I Social Science subject

Year 2
Either 45.101 Biometry, 45.201 Invertebrate Zoology, 45.301 Vertebrate Zoology and one other unit for Zoology, or 68.601 Genetics of Behaviour 1, 68.602 Genetics of Behaviour 2 and two other units of Genetics

With Social Sciences as the main supporting subject

Year 1
10.001 Mathematics 1, or 10.021B General Mathematics 1B and 10.021C General Mathematics 1C, or
17.031 Biology A and 17.041 Biology B
A Level I Social Science subject, and
One other Level I subject

Year 2
An Upper Level Social Sciences subject, and
One other Level I or II subject

Notes: 1. For details of Psychology units, Science and Mathematics units, including pre- and co-requisites, refer to Table 1 of the Science and Mathematics Course details set out earlier in this handbook.
2. For details of Social Science (Arts) subjects, including pre- and co-requisites, refer to the Faculty of Arts Handbook.
Undergraduate Study: Board of Studies in Science and Mathematics
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 .................................................. Dr J. A. Alexander

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 .................................................. Professor P.S. Clezy
School of Mathematics .............................................. Associate Professor W.E. Smith
School of Optometry ................................................. Professor H.B. Collin
School of Physics ..................................................... Professor H.G.L. Coster
### Optometry Course Outlines

**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**

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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.

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

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

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

1. The authority offering the subject, normally a School of the University, is indicated by the number before the decimal point.
2. Each subject number is unique and is not used for more than one subject title.
3. Subject numbers which have not been used for some time are not used for new subject titles.
4. Graduate subjects are indicated by a suffix 'G' to a number with three digits after the decimal point. In other subjects three or four digits are used after the decimal point.

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

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

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

HSC Exam Prerequisites

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

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

Information Key

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

- S1 Session 1, S2 Session 2
- F Session 1 plus Session 2, ie full year
- S1 or S2 Session 1 or Session 2, ie choice of either session
- SS single session, but which session taught is not known at time of publication
- CCH class contact hours
- L Lecture, followed by hours per week
- T Laboratory/Tutorial, followed by hours per week
- hpw hours per week
- C Credit point value
- CR Credit
- DN Distinction
- HD High Distinction
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<td>4 School of Materials Science and Engineering</td>
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<td>5 School of Mechanical and Industrial Engineering</td>
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<td>6 School of Electrical Engineering and Computer Science</td>
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<td>7 School of Mines (Mineral Processing and Extractive Metallurgy and Mining Engineering)</td>
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**Physics**

**Physics Level I Units**

1.001 Physics 1  
Prerequisites:  
HSC Exam Score Range  
Required  
2 unit Mathematics* or  
67-100  
3 unit Mathematics or  
1.5-0  
4 unit Mathematics and  
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  
31-100  
4 unit Science or  
1.021  

Co-requisite: 10.021C or 10.001 or 10.011.  

*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: None. Co-requisites: 10.021A and 10.021B, 10.021B and 10.021C, or 10.001 or 10.011.

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  
Prerequisites: As for 1.001. Co-requisite: 10.001, and 1.021 or 1.001 or 1.011. Excluded: Programs 0601, 0610 and 0611, 6806.

Fundamentals of binary logic, binary arithmetic, arithmetic operations as logical algorithms. Electronic logic devices, principles of computer operation, microprocessors and microcomputer architecture. Machine language and BASIC programming in microcomputers. Fundamentals of real world interfacing techniques, flow of data and control across the interface. Mathematical modelling of the real world in BASIC, iteration and simulation techniques, laboratory experiments collecting real world data via an interface and analysing it in the microcomputer. The developing role of the laboratory computer in scientific research.

1.061 Computer Applications in Experimental Science 1  
Prerequisites: 6.611. Co-requisite: 1.001, 10.001 or 10.011. Excluded: 1.041, 1.042.

Review of binary logic variables, arithmetic operations as logical algorithms on binary variables, computer architecture and machine language instruction sets. Microprocessor and microcomputer architecture; Apple II microcomputer architecture, disc operating system, graphics, languages. Computer modelling of real physical systems iterative techniques. Fundamentals of interfacing, data and control flow across the interface. Transducers, encoding. Data collection techniques used in experimental sciences. Laboratory experiments involving direct data collection via-interfaces, data reduction and comparison with computer models. The developing role of the laboratory computer in experimental science.

**Physics Level II Units**

1.002 Mechanics, Waves and Optics  
Prerequisites: 1.001 or 1.011, 10.001 or 10.011. 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 or 1.011, 10.001 or 10.011. Co-requisite: 10.2111. Excluded: 1.972, 1.992.

Electric field strength and potential, Gauss’ law, Poisson’s and Laplace’s equations, capacitance, dielectrics and polarization, magnetism, electromagnetic 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  
Prerequisites: 1.001 or 1.011, 10.001 or 10.011. Co-requisite: 10.2112. Excluded: 1.9322, 1.982.

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

1.032 Laboratory
**Prerequisites:** 1.001 or 1.011, 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
**Prerequisites:** 1.001, and 10.001 or 10.011. **Co-requisites:** 10.2111 or 10.2211 and 10.2112 or 10.2212.
Not offered in 1987.

1.062 Computer Applications in Experimental Science 2
**Prerequisite:** 1.061. Excluded: 1.042.
Interface between computer and experiment, programmed and interrupt interaction, direct and dual port memory access concepts, hardware, software and timing restraints. Real-world variables, transducers and conversion to binary representation, converters and counters, signals and noise. Data collection, reduction and storage as digital matrices. Numerical modelling, analysis and elementary control of a system.

1.9222 Electronics
**Prerequisites:** 1.001 or 1.002 or 1.021. Excluded: 1.032.
The application of electronics to other disciplines. Includes: principles of circuit theory and analogue computing; amplifiers, their specification and application, transducers; electronic instrumentation; industrial data acquisition.

1.9322 Introduction to Solids
**Prerequisites:** 1.001 or 1.011 or 1.021. Excluded: 1.022, 4.402, 4.412.
Introductory quantum mechanics and atomic physics; crystal structure; point and line defects, introductory band theory; conductors, semi-conductor and insulators; energy level diagrams.

1.9422 Introduction to Physics of Measurement
**Prerequisites:** 1.001 or 1.011. Excluded: 1.042.
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 Units**

1.0133 Quantum Mechanics
**Prerequisites:** 1.022, 10.2112. Excluded: 2.023A, 10.222F.
Revision of basic concepts, harmonic oscillator systems, spherically symmetric systems, angular momentum, Hamiltonian, first-order perturbation theory, identical particles, Exclusion Principle, atomic structure, spin-orbit coupling. Helium atom, introductory quantum theory of molecules.

1.0143 Nuclear Physics
**Prerequisites:** 1.012, 1.022, 10.2112.
Nuclear shell model; theory of beta decay; the deuteron, nucleon-nucleon scattering; theories of nuclear reactions, resonances; mesons and strange particles, elementary particle properties and interactions; symmetries and quark models; strong and weak interactions.

1.023 Statistical Mechanics and Solid State Physics
**Prerequisites:** 1.012, 1.022, 10.2112.
Canonical distribution, paramagnetism, Einstein solid, ideal gas, equipartition, grand canonical ensemble, chemical potential, phase equilibria, Fermi and Bose statistics, Bose condensation, blackbody radiation. Crystal structure, bonding, lattice dynamics, phonons, free-electron models of metals, band theory, point defects, dislocations.

1.0333 Electromagnetism
**Prerequisites:** 1.012, 10.2111, 10.2112. Excluded: 10.222C.
Electromagnetic fields; Maxwell’s equations, Poynting theorem, electromagnetic potentials, electromagnetic waves. Reflection and transmission, Fresnel equations, waveguides, radiation fields, dipoles and antenna theory.

1.0343 Advanced Optics
**Prerequisites:** 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
**Prerequisites:** 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
**Prerequisites:** 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 L1½ T ½
Co-requisite: 1.1033. Excluded: 2.023A, 10.222F.
Formal structure, matrix formalism, relativistic quantum mechanics, spin, scattering theory, Born approximation, phase shifts, many particle systems, occupation number formalism.

1.133 Electronics S1 L2T4
Prerequisites: 1.9222 or 1.032.

1.1433 Biophysics S1 L2T1
Prerequisites: 1.012, 1.022.

1.1533 Biophysical Techniques S2 L2T1
Prerequisites: 1.012, 1.022, 1.032.
Theory and application of physical techniques of relevance to the study of biological systems. Techniques considered may include optical and electron microscopy X-ray and neutron diffraction, magnetic resonance, lasers, light scattering, calorimetry, fluorescence, electrochemical techniques and electrophysiological methods and dielectric measurements.

1.1633 Astrophysics S2 L1½ T½
Prerequisites: 1.022.

1.3033 Mechanical Properties of Materials S1 L1½ T½
Properties of materials in relation to their structure: atomic and molecular structure of solids; elasticity, inelasticity, long-range (rubber) elasticity, viscoelasticity; plasticity; brittle fracture; viscosity and surface tension of liquids; adhesion; friction and lubrication.

1.3133 Physics of Solid State Devices S2 L1½ T½
Prerequisite: 1.023.
Review of electronic structure in semiconductors; p-n junctions; bipolar and field effect transistors including formation, characteristics and electrical breakdown. Optical devices including light emitting diodes and junction lasers. Integrated circuit structures.

1.3143 Topics in Condensed Matter Physics S2 L1½ T½
Prerequisite: 1.023.
Superconductivity, Meißner-Ochsenfeld effect, entropy, thermodynamics and relevant theories, Josephson junctions. Amorphous materials, preparation, magnetic properties, bandgaps, dangling bonds and ESR, mobility edge, solar cells. Polymers, structure, bonding, relaxation phenomena, electrical breakdown, liquid crystals.

1.3533 Marine Acoustics S2 L1½ T½
Wave theory: general wave equation for fluids, viscoelastic media and solids. Travelling and standing wave solutions. Wave guides: fluid and solid wave guides, ray and mode theories. Sound transmission in the ocean and application of reflection and refraction theory, scattering and diffraction effects.

1.5133 Classical Mechanics and Field Theory S1 L1½ T½
Prerequisites: 1.002 or 10.411B, 10.1113, 10.2111, 10.2112.
Lagrange’s equations and applications, variational principles, Hamiltonian formulation, canonical transformations, Poisson brackets, Hamilton-Jacobi equation, continuous systems and fields.

1.5233 Electrodynamics S2 L1½ T½
Prerequisites: 1.022, 10.1113, 10.2111, 10.2112. Co-requisite: 1.0333. Excluded: 10.222C.
Special relativity, covariant formulation of electrodynamics, stress tensor, radiation from moving charges, Lienard-Wiechert potentials, synchrotron radiation, bremsstrahlung, electro-magnetic mass, radiative damping, multipole expansion for fields, scattering.

1.5333 Radiation and Matter S2 L1½ T½
Prerequisites: 1.012, 1.022, 10.2111, 10.2112. Co-requisites: 1.0133 or 10.222F or 2.023A; 1.0333 or 10.222C.
The interaction of electromagnetic radiation with matter. Blackbody radiation; Einstein coefficients. Dipole radiation; shape and

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. Excluded: 1.523.

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.

1.713 Advanced Laser and Optical Applications

Co-requisite: 1.002. See also Table 1.

Laser operation, characteristics, theory, design of such types as gas, ion, molecular, excimer and dye lasers. Filter design, multiple beam interference, etalon use, dielectric mirror design. Modulators, theory and application, electro and acousto-optic phenomena. Detectors, types, basic theory and design. Solid state and vacuum tube systems. Non-linear optics, theory and applications. A design study and case history of a typical optical system. Materials processing fundamentals. Laser safety.

1.763 Laser and Optical Technology Laboratory 1

Prerequisite: 1.032. See also Table 1.

Aims to make students conversant with the techniques employed in advanced laser technology and to become familiar with the various components used in such applications. Includes: a study of advanced optical techniques including the construction, operation and characterization of various types of laser; preparation and investigation of optical, electro-optical and other related devices in terms of their basic behaviour and with respect to applications in complex optical systems; a small lecture content on a variety of topics to laser applications and including safety aspects.

1.773 Laser and Optical Technology Laboratory 2

Co-requisite: 1.763. See also Table 1.

This laboratory unit extends the work of the 1.763 unit in providing further experience with advanced optical systems. Students visit external establishments where lasers are being used for commercial purposes and are involved with experimental tasks related to these high technology applications. Session 2, each student is required to complete a design study and assembly of an advanced optical system selected to answer a specific problem appropriate to the subject.

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 unit. 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 units 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

Involves an overview of Astronomy, from the solar system to the galaxies. Includes an exploration of the solar system, to indicate the advances that have been made, particularly and most recently with space probes, in our understanding of planetary systems. The characteristics of stars discussed along with their use in establishing an understanding of stellar evolution. The treatment of galaxies includes consideration of the nature of our
galaxy and its relation to other external systems, concluding with a brief discussion of aspects of observational cosmology. Discussion of such recent topics as black holes, pulsars, quasars.

For further information regarding the following subject see the Faculty of Architecture Handbook.

1.931 Physics 1 (Building)  S2 L4T2
4 credit points; compulsory. Prerequisites: nil.


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

1.951 Physics 1 (Mechanical Engineering)  F L2T2s
Prerequisite: As for 1.001 Physics 1.
For students in the School of Mechanical and Industrial Engineering.

1.961 Physics 1 (Electrical Engineering)  F L3T3
Prerequisite: As for 1.001 Physics 1.
For students in the School of Electrical Engineering.
Electrostatics in vacuum, electrostatics in dielectrics, steady state currents, magnetostatics in vacuum, ferromagnetism, electromagnetic induction, transient currents. Vectors motion in one dimension, motion in a plane, particle dynamics, work and energy, the conservation of energy, conservation of linear momentum, collisions, rotational kinematics, rotational dynamics, simple harmonic motion, gravitation. Temperature, heat and the first law of thermodynamics, kinetic theory of gases. Waves in elastic media, sound waves, geometrical optics, interference, diffraction, gratings and spectra, polarization.

1.971 Physics 1 (Surveying)  F L3T3
Prerequisite: As for 1.001. Physics 1.
For students in the School of Surveying.
Aims and nature of physics, linear and rotational mechanics, hydrostatics, elasticity, gravitation, temperature, electricity and magnetism, wave motion, optical instruments, interference and diffraction, lasers and atomic clocks. The importance in surveying of precise frequency, time, speed and distance measurements.

1.981 Physics 1 (Civil Engineering)  S1 L2T2 and S2 L2T1
Prerequisite: As for 1.001 Physics 1.
For students in the School of Civil Engineering.

1.982 Solid State Physics (Electrical Engineering)  S1 or S2 L2T2
Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Co-requisites: 10.2111, 10.2112. Excluded: 1.012.
Electrostatics in vacuum, electrostatics in dielectrics, electric currents, magnetostatics in vacuum, magnetic scalar potential, magnetostatics in magnetic media, time varying fields, Maxwell’s equations.

For students in the School of Surveying.
1.992 Mechanics and Thermal Physics
(Electrical Engineering)  F L1½T½


Note: Students who have passed 2.121 or 2.131 may not enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.

2.131 Chemistry 1B  S1 or S2 L2T4
Prerequisite: 2.121.

Chemical equilibrium, equilibrium constants, quantitative calculations applied to acid-base and solubility equilibria; buffers, titrations, chemical analysis. Oxidation and reduction reactions, electrode potentials. Chemical thermodynamics, entropy, free energy. Chemistry of carbon compounds, stereoisomerism; alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines.

Note: Students who have passed 2.111 may be permitted to enrol in 2.131 on application to the Head of the School of Chemistry.

2.141 Chemistry 1M  F L2T4
Prerequisites:

- HSC Exam Required
- 2 unit Mathematics* 67.100
- 3 unit Mathematics 1-50
- 4 unit Mathematics 1-100
- 2 unit Science (Chemistry) or 60.100
- 4 unit Science or 1-50
- 3 unit Science or 90-150
- 2.111

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

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 Units

2.102A Physical Chemistry  S1 or S2 L3T3
Prerequisites: 2.121 and 2.131, or 2.141, and 10.011 or 10.001 or 10.021B and 10.021C. Excluded 2.002A.

Thermodynamics: first, second and third laws of thermodynamics; statistical mechanical treatment of thermodynamic...
properties; applications of thermodynamics: chemical equilibria, phase equilibria, solutions of nonelectrolytes and electrolytes, electrochemical cells. Kinetics: order and molecularity; effect of temperature on reaction rates; elementary reaction rate theory. Surface chemistry and colloids: adsorption, properties of dispersions; macromolecules and association colloids.

2.102B Organic Chemistry Prerequisite: 2.131 or 2.141. Excluded: 2.002B
Discussion of the major types of organic reaction mechanisms (eg addition, substitution, elimination, free-radical, molecular rearrangement) within context of important functional groups (eg aliphatic hydrocarbons, monocyclic aromatic hydrocarbons, halides, organometallic compounds, alcohols, phenols, aldehydes, ketones, ethers, carboxylic acids and their derivatives, nitro compounds, amines and sulfonic acids). Introduction to application of spectroscopic methods to structure determination.

2.102C Inorganic Chemistry and Structure Prerequisites: 2.121 and 2.131, or 2.141. Excluded: 2.042C.

2.102D Chemical and Spectroscopic 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 Units

2.103A Physical Chemistry Prerequisites: 1.001, 2.102A and 2.102C. Excluded: 2.013A.

2.103B Organic Chemistry S1 L3T3
Prerequisite: 2.102B. Excluded 2.003B.
Heterocyclic Chemistry: synthesis and reactions of the following heteroaromatic systems: pyridine, quinoline, isoquinoline, pyrimidine, pyrrole, furan, thiophen, indole, imidazole; examples of naturally occurring alkaloids where relevant. Aliphatic Chemistry: stereochemistry of acyclic systems; classical and non-classical 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 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 carboxyls; descriptive chemistry of transition metals; special characteristics of second and third transition series metals; Lanthanide elements: lanthanide contraction and its consequences: electronic configurations and oxidation states; spectral and magnetic properties; stabilities of complexes; separation. p-block elements: the inert pair effect; bonding, structure, and reactivity of representative compounds; halogen chemistry.

2.103D Analytical Chemistry S1 L2T4
Prerequisite: 2.102D. Excluded: 2.003D.
Instrument design, theory and operating principles for the following instrumental areas: electrochemical, atomic and molecular spectroscopy, chromatography, mass spectrometry, automated analysis, thermal analysis.

Chemistry Level III Elective Units

2.113A Kinetics and Mechanism of Chemical Change S2 L3T3
Prerequisite: 2.103A. Excluded: 2.053A.
Molecular collision dynamics, reactions in molecular beams, energy disposal and equilibrium 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 L2T4
Prerequisite: 2.103B. Excluded: 2.013B.


2.113C Advanced Inorganic Chemistry  S2 L2T4
Prerequisites: 2.102C. Co-requisite: 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 co-ordination redox and proteolytic metalloenzymes; metal storage and transport proteins; Innovations and technological developments; accounts of current advances, including topics such as inorganic polymers, inclusion compounds, zeolites, electronically delocalised compounds, and metal clusters.

2.113D Advanced Instrument Analysis  S2 L2T4
Prerequisite: 2.102D. Co-requisite: 2.103D. Excluded: 2.013D.

Advanced approaches to problem solving in analytical science using modern instrumental techniques and microcomputers for the analysis of complex organic, biological, inorganic and environmental materials. Sample selection procedures; extraction and recovery of major, minor, trace and ultra-trace constituents; origins, identification and elimination of interference effects. Selection and optimisation of instrumental parameters; theory of separation strategies for identification and quantitative determinations. Networking of computer-controlled workstations for laboratory automation and management.

2.113E Nuclear and Radiation Chemistry  S2 L2T4
Prerequisite: 2.102A or 2.102B or 2.102C or 2.102D. Excluded: 2.003E.


2.123A Biophysical and Interfacial Chemistry  S2 L3T3
Prerequisite: 2.102A. Excluded: 2.033A.

Interplay of interfacial, colloidal and macromolecular science. Physical properties of macromolecules. Determination of molecular size from gel permeation chromatography, diffusion, sedimentation, viscometry, osmometry and light scattering. Spectroscopic properties: circular dichroism, optical rotary dispersion and X-ray diffraction; conformation of macromolecules; Helix/random coil transitions. The use of modern spectroscopic techniques in surface chemistry including low energy electron diffraction, Auger electron, UV and X-ray photo-electron spectroscopy; electron energy loss, ion scattering and secondary ion emission at the gas/solid interface. Surface free energy and related thermodynamic concepts applied to the study of solutes at interfaces; wetting behaviour, capillarity, detergency, mineral flotation, micelles and bio-physical membranes. Adsorption and its significance in resulting biological and synthetic catalytic processes.

2.123B Biological Organic Chemistry  S2 L2T4
Prerequisite: 2.103B. Excluded: 2.023B.


2.123E Environmental Chemistry  S2 L3T3
Prerequisites: 2.102A and 2.102D. Excluded: 2.043A.


2.133B Applied Organic Chemistry  S2 L2T4
Prerequisite: 2.102B. Co-requisite: 2.103B. Excluded: 2.003L.

Discussion at advanced level of the chemistry of selected commercially important groups of organic materials with emphasis on reaction mechanisms and model systems. Polymerization processes and synthetic polymers: Thermal and oxidative polymerization, treatment of initiators, chain transfer agents, retarders; sulfur-olefin reactions. Pigments and dyestuffs: Basis of colour in organic compounds, azo, carbonyl, cationic dyes, colour photography; synthetic and natural pigments, eg phthalocyanines, carotenes, flavones, anthocyanins; fluorescent whiteners. Oxidation and reduction processes: Oxidation of allylic compounds, phenols, sulfur compounds etc; catalytic dehydrogenation and hydrogenation; hydride and dissolving metal reductions.
2.1813 Quantum Chemistry and 
Symmetry S2 L1½T1½
Prerequisites: 2.102C, and 10.111A or 10.031. Excluded: 2.023A.

2.1823 Computers in Chemistry S2 L1T2
Prerequisites: 2.102A and 2.102D.
Computing techniques introduced through specific chemical applications; simple and complex equilibria, rate equations, analysis of multicomponent mixtures, instrumental calibration curves. Treatment of transient signals. Specific case studies selected from spectroscopy, chromatography, and electrochemistry. Chemical databases and the literature, spectroscopic databases.

2.1833 Molecular Structure 
Determination S2 L1½T1½
Prerequisites: 2.102C and 2.102D.
The theory and practice of 1. crystal structure determination by x-ray diffraction. 2. multinuclear NMR spectroscopy, and 3. mass spectrometry, in the determination of molecular structure. Experimental requirements and procedures; instrumentation. Interpretation of results; applications to contemporary chemical systems; examples from current research problems. Databases and computing. Evaluation of complementary information from these techniques about molecular structure, chemical bonding, and chemical reactivity.

2.1843 Organometallic Chemistry S2 L1T2
Prerequisites: 2.102B and 2.102C. Excluded: 2.003M.
Preparation, structure and reactions of transition metal and main group organometallic compounds; metal vapour syntheses. Structure and bonding of ligands; ligand stabilisation and activation; novel effects of ligand bulk and geometry. Catalytic applications of organometallic compounds.

Chemistry Level IV Unit
2.004 Chemistry Honours
An honours program consisting of selected series of lectures on advanced topics in Chemistry and a research project.
Students intending to seek admission to this program should consult the School re selection of units in the earlier years and apply to the Head of the School for consideration for admission at the end of Year 3 (or completion of requirements for the pass degree).

Servicing Subjects
These are subjects taught within courses offered by other faculties.

For further information regarding the following subjects see the Faculty of Applied Science and Engineering Handbooks.

2.003J Fundamentals of Biological and 
Agricultural Chemistry S1 L2T4
Prerequisites: 2.121 and 2.131, or 2.141. Excluded: 2.013L, 41.101.
Aspects of the chemical and physical properties of materials important in biological systems. Methods of separation, of purification and estimation, and correlations of structure with reactivity. Methods of separation and identification, such as gel permeation, discussed as appropriate to each topic. Significance of isomerism in biological systems, optical and geometrical, absolute configuration. Amino acids, peptides and introduction to protein structure. Relevant properties, acid/base properties, pK values, zwitterion, isoelectric points. Simple peptide synthesis. Treatment of carbohydrates, establishment of structures, reactivity. Chemistry of monosaccharides, disaccharides and polysaccharides. Methods of analysis, chemical and physiochemical. Fats, correlation of properties with saturated and unsaturated fatty acid composition. Structural chemistry of fatty acids. Reaction of unsaturated fatty acids, urea complexes. Detergents. Trace elements in biological systems. Chemistry of common heterocyclic systems with emphasis on molecules of biological importance.

2.043L Chemistry and Enzymology of Foods F L2T4
Prerequisite: 2.102B. Excluded: 2.003J, 2.043L.
The chemistry of food constituents at an advanced level and the relationship between the chemistry and enzymology associated with the origin and handling of foodstuffs. Treatment of the stability of constituents, changes in colour and texture occurring during processing and storage. Methods of assessment, chemical and physical. General classification of constituents, role of free and combined water. Fixed oils and fats, rancidity of enzymic and autodisintegrative origin, antioxidants — natural and synthetic — theories on mechanisms of action, carbohydrates, reactivity, role in brewing processes, carbohydrate polymers, starch structure, enzymic susceptibility and mode of action, estimations, enzymic degradation and enzymic browning, reactions and stability of natural pigments, vitamins, preservatives.

2.030 Organic Chemistry S1 L2T4
Prerequisite: 2.102B.
The spectroscopic identification of organic compounds, free radical chemistry and electro-organic processes, various aspects of the organic industrial processes such as industrial synthesis based on petrochemicals, and organometallic reactions of industrial interest. Selected topics from the dyestuff, pharmaceutical and agricultural industries discussing syntheses and reactions including degradation.

2.951 Chemistry 1ME S1 L3T3
Prerequisite: As for 2.121.
A treatment of chemistry which illustrates the application of the principles of chemistry to problems of concern to mechanical engineers. Topics: chemistry of materials, thermochemistry, chemical kinetics and equilibrium, radioactivity and nuclear power, electrochemistry and corrosion of metals. Introduction to
organic chemistry, structure and properties of polymers, fuels and lubricants. Surface chemistry.

2.991 Chemistry 1CE  S2 L3T3
Prerequisites: As for 2.121.

For further information regarding the following subject see the Faculty of Medicine Handbook.

81.002 Chemistry and Biochemistry for Medical Students
Prerequisites:

<table>
<thead>
<tr>
<th>HSC Exam</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 unit Science (Chemistry) or</td>
<td>53-100</td>
</tr>
<tr>
<td>4 unit Science or</td>
<td>1-50</td>
</tr>
<tr>
<td>3 unit Science</td>
<td>90-150</td>
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</tbody>
</table>
Conjoint subject with the School of Biochemistry.

Materials Science and Engineering

4.413 Physical Metallurgy 2A  S1 L1 T1½
Prerequisite: 4.412A.

4.423

4.433C Physical Metallurgy 2C  S1 L2½T1½
Prerequisite: 4.412A.

4.442

4.443 Physical Metallurgy 2D  S2 L2T2
Prerequisite: 4.432.

4.453 Physical Metallurgy 2E  S2 L1T1½
Prerequisite: 4.432.

4.633 Metallurgical Engineering 2C  F L2T1½
Prerequisites: 10.001 or 10.011.

Mechanical and Industrial Engineering

5.006
5.0011 Engineering Mechanics 1  S1 or S2 L2T2
Prerequisite: 
HSC Score

Either
2 unit Science (Physics) or 53-100
3 unit Science or 90-150
4 unit Science (multistrand) 1-50
or
2 unit Industrial Arts (Engineering Science) or 53-100
3 unit Industrial Arts (Engineering Science) 1-50

Excluded: 5.010, 5.0101, 5.0201.

Note: Students who wish to enrol in this subject in courses other than the full-time courses in Aeronautical Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture can make up for the lack of the prerequisite by work taken in Physics in the first half of the first year.


5.0012 Introductory Engineering Design and Materials Science  S1 or S2 L2 T0
Excluded: 5.0016, 5.010.

Introduction to engineering design: Engineering method, problem identification, creative thinking, mathematical modelling; computer-aided design; materials and processes; communication of ideas; the place of engineering in society.

Introduction to materials science: Structure and properties of main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

5.0201

5.030

5.0721 Computing  S1 or S2 L2T1
Co-requisite: 10.001 or 10.011.


5.300

5.421 Mechanics of Solids 1  S1 or S2 L2T1
Co-requisite: 5.010 or 5.0011.


5.4220 Mechanics of Solids 2 ½S1S2L1½T2
Prerequisites: 5.421 or 8.171, 10.001 or 10.011. Excluded: 5.422, 5.4221.


5.4221 Mechanics of Solids 2  F L1½T2
Intended for Materials Science Majors in combined BE BSc degree course.
Prerequisites: 5.421 or 8.171, 10.001 or 10.011. Excluded: 5.422, 5.4220, 5.4222.


5.620 Fluid Mechanics 1  F L1T1
Prerequisites: 1.001 or 1.951, 5.010, 10.001 or 10.011. Co-requisite: 5.300. Excluded: 5.622.


5.621G Gasdynamics 1  C2
Excluded: 5.653, 5.811.

One dimensional steady flow: isentropic channel flow, normal shock waves, supersonic wind tunnels and diffusers. Two dimensional steady flow: oblique shock waves, Prandtl-Meyer expansions, nozzles, airfoils. One dimensional unsteady flow: moving waves, reflections, explosions in ducts, shock tubes; method of characteristics, internal flows, piston and valve effects.
Electrical Engineering and Computer Science

6.010 Electrical Engineering 1  S2 L3T3
Prerequisite: Electricity and magnetism section of 1.961.

6.021A Circuit Theory 1  S1 or S2 L2T2
Prerequisites: 1.961 or equivalent, 6.010, 10.001.

6.021C Electronics 1  S1 or S2 L2T2
Prerequisite: 1.982, 6.021A (one of these to be passed, the other to be attempted at an acceptable level and to be repeated concurrently).
Principles of operation and low-frequency characteristics of PN diodes, bipolar and field effect transistors, thyristors and various optoelectronic devices. Transistor low-frequency small-signal equivalent circuits. Design and analysis of low frequency Class A transistor amplifiers. Temperature effects. Device ratings and use of data sheets.

6.066 Computing Science Honours

6.611 Computing 1  S1 or S2 L3T3
Prerequisite: As for 10.001. Co-requisite: 10.001 or 10.001 or 10.011. Excluded: 6.600, 6.620.
Introduction to programming: design and correctness of algorithms and data structures; programming in a high-level algorithmic language which provides simple, high level program control and data structuring facilities. Problem solving: basic ideas of problem solving; introduction to abstract structures used for computing solutions to problems. Introduction to propositional logic, computing machinery, computer arithmetic, artificial intelligence, and operating systems.

6.613 Computer Organization and Design  SS L3T2
Prerequisites: 6.631 or 6.021E, 6.021E, 6.021D or 6.620 or 6.621 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for these subjects). Excluded: 6.031B.
Bussing structures (asynchronous and synchronous); input/output organization; polling, interrupt and DMA control; parallel and serial device and processor communication and interfacing. Memory organization; CPU and control unit design. Microprocessor case studies.

6.621 Computing 2A  S1 or S2 L3T2
Prerequisites: 6.611, 10.001 or 10.011. Excluded: 6.620, 6.021D.
For those students who intend to take further subjects in computer science.

6.621 Computing 2B  S1 or S2 L3T2
Prerequisite: 6.620 or 6.621 or 6.021D. Excluded: 6.021E.
Assembler programming: programming in a low level machine oriented language in order to illustrate the mapping of higher level language constructs onto a typical machine and the interaction between operating systems and devices. Digital Logic Design: Boolean algebra and logic gates, simplification of Boolean functions, combinational logic, medium scale integration building blocks, clocked sequential circuits, registers and memory, computer arithmetic.

6.632 Operating Systems  SS L2T3
Introduction to operating systems via an intensive case study of a particular system, namely the UNIX Time-sharing systems which runs on the PDP11 computer. Includes system initialization, memory management, process management, handling of interrupts, basic input/output and file systems. A comparison of UNIX with other operating systems. General principles for operating systems design.

6.633 Data Bases and Networks  SS L3T2
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; cir-
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

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.

Mathematics

Note: When a unit is listed as a prerequisite or co-requisite, the appropriate higher unit may be substituted.

Many units in the School of Mathematics are offered at two levels. The higher level caters for students with superior mathematical ability. Where both levels are offered grades higher than Credit are only awarded in the ordinary level in exceptional circumstances.

Students should note that all of the Mathematics honours programs require them to take most of their Mathematics units at higher level. However, students should not think that the higher level units are intended only for those in honours programs. Any student with the ability to undertake higher units 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 Sciences, Engineering and Applied Science who intend to pursue further studies in mathematics, computer science, physics, chemistry or engineering.

10.011 Higher Mathematics 1 (day course only). This subject has the same purpose as 10.001, but is aimed at the more mathematically able students, including those who may wish to take an honours degree in mathematics. It covers all the material in 10.001, plus other topics, at greater depth and sophistication. It is intended for students who have obtained high marks in the 3 unit mathematics course of the Higher School Certificate as well as for those who have taken 4 unit course.

General Mathematics

This is a combination of the single session units 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 Sciences. Optometry, Applied Psychology and Wool and Pastoral Sciences. However, students who select this subject should weigh seriously the implications of their choice because no further mathematical units 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 unit 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 units 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 unit in Statistics. 10.331, which provides an introduction to statistical procedures commonly used in Science, and which also leads to the Level III units 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 units the entry qualification is a pass in 10.001 Mathematics 1, but in appropriate cases students who have passed in 10.021C General Mathematics 1C at a satisfactory level may be given permission to enrol.

10.001 Mathematics 1
F L4T2
Prerequisite:
HSC Exam
Score Range 67-100
Required
1-50
1-100

Excluded: 10.011, 10.021B, 10.021C.
*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).

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

10.011 Higher Mathematics 1
F L4T2
Prerequisite:
HSC Exam
Score Range 120-150
Required
1-100
Excluded: 10.001, 10.021B, 10.021C.
Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

10.021B General Mathematics 1B
S1 L4T2
Prerequisite:
HSC Exam
Score Range 60-100
Required
1-50
1-100

Excluded: 10.011, 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).

Functions (and their inverses), limits, asymptotes, continuity, differentiation and applications; integration, the definite integral and applications; inverse trigonometric functions; the logarithmic and exponential functions and applications; sequences and series; mathematical induction; the binomial theorem and applications; introduction to probability theory; introduction to 3-dimensional geometry; introduction to linear algebra.

10.021C General Mathematics 1C
S2 L4T2
Prerequisite: 10.021B. Excluded: 10.001, 10.011.

Techniques for integration, improper integrals; Taylor’s theorem; first order differential equations and applications; introduction to multivariable calculus; conics; finite sets; probability; vectors, matrices and linear equations.

10.031 Mathematics
F L1T1
Prerequisite: 10.001 or 10.011 or 10.021C (CR).

Note A: A unit, together with 10.032, which is available to Faculty of Science students as one of a sequence of two units constituting a terminating service course in mathematics. As such it is mutually exclusive to any other Level II or Level III unit in Pure and/or Applied Mathematics and/or Theoretical Mechanics except that 10.412A may be taken with 10.031 and 10.032.

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

Differential equations, use of Laplace transforms, solutions by series; partial differential equations and their solution for selected physical problems, use of Fourier series; multiple integrals, matrices and their application to theory of linear equations, eigenvalues; introduction to numerical methods.

10.032 Mathematics
F L1T1
Prerequisite: 10.031.

Note A: As for Note A in 10.031 Mathematics.

Note B: Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics, Applied Mathematics or Theoretical Mechanics are taken. 10.032 Mathematics will not be counted.

Vector calculus; special functions; convolution theorem and applications; complex variable theory; Fourier integrals; Laplace Transformations; multiple integration; operators; linear differential equations; boundary value problems.
transforms with application to ordinary and partial differential equations.

10.081 Discrete Mathematics S2 L4T2
Co-requisites: 10.001 or 10.011.

Pure Mathematics

10.111A Pure Mathematics 2 — Linear Algebra F L1½T1
Prerequisite: 10.001 or 10.011. Excluded: 10.121A.

10.1113 Pure Mathematics 2 — Multivariable Calculus S1 or S2 L1½T1
Prerequisite: 10.001 or 10.011. Excluded: 10.1213.
Multiple integrals, partial differentiation. Analysis of real valued functions of one and several variables.

10.1114 Pure Mathematics 2 — Complex Analysis S1 or S2 L1½T1
Prerequisite: 10.001 or 10.011. Excluded: 10.1214.
Analytic functions, Taylor and Laurent series, integrals. Cauchy's theorem, residues, evaluation of certain real integrals.

10.1115 Pure Mathematics 2 — Finite Mathematics A S1 L1½T½
Prerequisite: 10.001.
Positional number systems, floating-point arithmetic, rational arithmetic, congruences. Euclid's algorithm, continued fractions, Chinese remainder theorem, Fermat's theorem, applications to computer arithmetic. Polynomial arithmetic, division algorithm, factorization, interpolation, finite field. Codes, error-correcting codes, public-key cryptography.

10.1116 Pure Mathematics 2 — Finite Mathematics B S2 L1½T½
Prerequisite: 10.1115 (or any other Year 2 Mathematics half-unit).
Introduction to combinatorial computing, recurrence relations, examples of divide and conquer strategies, backtrack and branch and bound algorithms. Finite Fourier transforms, roots of unity, convolutions, application to fast multiplication and the analysis of pseudo-random numbers. Boolean algebra, switching circuits.

10.121A Higher Pure Mathematics 2 — Algebra F L2T½
Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.111A, 10.1111.
Linear algebra: vector spaces, commutative rings, polynomials, modules, linear transformations, eigenvectors, invariant subspaces, canonical forms, linear functions, bilinear and multilinear algebra. Group theory; subgroups, quotient groups, isomorphisms. Lagrange’s theorem, Sylow’s theorem.

10.1213 Higher Pure Mathematics 2 — Multivariable Calculus S1 L2T½
Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.1113.
As for 10.1113 Pure Mathematics 2 — Multivariable Calculus but in greater depth.

10.1214 Higher Pure Mathematics 2 — Complex Analysis S2 L2T½
Prerequisite: 10.1213. Excluded: 10.1114.
As for 10.1114 Pure Mathematics 2 — Complex Analysis, but in greater depth.

10.1111 Pure Mathematics 3 — Group Theory S1 L1½T½
Prerequisites: *** Excluded: 10.121A.
Mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups.

10.1112 Pure Mathematics 3 — Geometry S2 L1½T½
Prerequisites: *** Excluded: 10.1424.
Elementary concepts of Euclidean, affine and projective geometries.

10.1121 Pure Mathematics 3 — Number Theory SS L1½T½
Prerequisites: *** Excluded: 10.1421.
Euclidean algorithm, congruences, sums of squares, diophantine equations.

10.1123 Pure Mathematics 3 — Logic and Computability SS L1½T½
Prerequisites: ***
The propositional calculus — its completeness and consistency; Turing machines; unsolvable problems; computability and Church's thesis; Godel's incompleteness theorems.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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| 10.1124      | Pure Mathematics 3 — Combinatorial Topology      | SS   | **Prerequisites:**
|              |                                                   |      | Elementary combinatorial topology of surfaces.                                |
| 10.1125      | Pure Mathematics 3 — Ordinary Differential Equations | S1   | **Prerequisites:** 10.111A, Excluded: 10.1425.                                |
|              |                                                   |      | Systems of ordinary differential equations: variations of constants formula;   |
|              |                                                   |      | stability; Poincare space; Lyapunov’s direct method.                         |
| 10.1126      | Pure Mathematics 3 — Partial Differential Equations | S1   | **Prerequisites:** 10.1113, 10.1114, **Co-requisite:** 10.1125. Excluded:    |
|              |                                                   |      | 10.1426.                                                                      |
|              |                                                   |      | Systems of partial differential equations characteristic surfaces;           |
|              |                                                   |      | classifications. Cauchy problem.                                              |
| 10.1127      | Pure Mathematics 3 — History of Mathematics       | S2   | **Prerequisites:**
|              |                                                   |      | Topics from the history of mathematics, with emphasis on the development of  |
|              |                                                   |      | those ideas and techniques used in undergraduate courses. Students are       |
|              |                                                   |      | expected to read widely and to present written material based on their       |
|              |                                                   |      | readings.                                                                     |
| 10.1128      | Pure Mathematics 3 — Foundations of Calculus      | S1   | **Prerequisites:** **. Excluded: 10.122B.**
|              |                                                   |      | Properties of the real numbers. Convergence of sequences and series.         |
|              |                                                   |      | Properties of continuous and differentiable functions of a real variable.    |
| 10.1521      | Pure Mathematics 3 — Combinatorics and its       | SS   | **Prerequisites:**
|              | Applications                                       |      | Generating functions, their properties and applications to partitions and    |
|              |                                                   |      | recurrence relations. Branching processes, trees and the analysis of their   |
|              |                                                   |      | paths, the analysis of algorithms and the Galton-Watson process. Coding      |
|              |                                                   |      | theory and other design problems. Latin squares, block designs and error-     |
|              |                                                   |      | correcting codes.                                                            |
| 10.1522      | Pure Mathematics 3 — Differential Geometry       | SS   | **Prerequisites:** 10.1113, **Excluded: 10.1325.**
|              |                                                   |      | Curves and surfaces in space. Gaussian curvature, Gauss theorem. Gauss       |
|              |                                                   |      | Bonnet theorem.                                                               |
| 10.1523      | Pure Mathematics 3 — Functional Analysis and      | S1   | **Prerequisites:** 10.111A, 10.2112, **Co-requisite:** 10.1128 (strongly    |
|              | Applications                                       |      | recommended). Excluded: 10.122B.                                             |
|              |                                                   |      | Geometry of Hilbert spaces, approximation problems, linear operators, filters,|
|              |                                                   |      | spectral methods for differential equations.                                  |
| 10.1525      | Pure Mathematics 3 — Differential Geometry       | S1   | **Prerequisites:** 10.121A or 10.1111A (DN). **Co-requisite:** 10.1213 or    |
|              |                                                   |      | 10.1113 (DN), **Excluded:** 10.1128. 10.1523.                                |
|              |                                                   |      | The limit processes of analysis; introduction to Lebesgue integration;       |
|              |                                                   |      | introduction to metric spaces. Hilbert spaces; linear operators; Fourier     |
|              |                                                   |      | series.                                                                      |
| 10.1521      | Pure Mathematics 3 — Calculus on Manifolds       | S2   | **Prerequisites:** **Co-requisites:** 10.1325.                                |
|              |                                                   |      | Manifolds; vector fields; flows. Introduction to Morse theory. Differential   |
|              |                                                   |      | forms; Stokes’ theorem; the Gauss-Bonnet theorem.                            |
10.1421 Higher Pure Mathematics 3 — 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 — Groups and Representations
Prerequisites: 10.121A or 10.111A (DN) and 10.111 (DN),
Abelian groups, composition series; nilpotent groups; soluble groups. Representations and characters of finite groups; induced representations.

10.1423 Higher Pure Mathematics 3 — Topology
Prerequisite: 10.1213 or 10.1113 (DN),
Naive set theory, the axiom of choice Metric and topological spaces, compactness.

10.1424 Higher Pure Mathematics 3 — Geometry
Prerequisites: 10.121A or both 10.111A (DN) and 10.1111 (DN), Excluded: 10.1112.
Axioms for a geometry; affine geometry, Desargues’ theorem; projective geometry.

10.1425 Higher Pure Mathematics 3 — Ordinary Differential Equations
Prerequisite: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN),
Existence and uniqueness theorems. Linearization. Qualitative theory of autonomous systems.

10.1426 Higher Pure Mathematics 3 — Partial Differential Equations
Prerequisites: Co-requisites: 10.1425. Excluded: 10.1126.
Classification, characteristics. Cauchy problem; Dirichlet and Neumann problems. Distributions.

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.

10.2111 Applied Mathematics 2 — 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 — Mathematical Methods for Differential Equations
Prerequisite: 10.001. Excluded: 10.2212.

10.2113 Applied Mathematics 2 — 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 — Discrete-Time Systems
Applications selected from problems of importance in engineering, biological, social, management, and economic systems.

10.2116 Applied Mathematics 2 — 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.
10.261A Applied Mathematics 2 — Mathematical Computing F L1½T½
Prerequisite: 10.001.
The development of efficient and reliable software for mathematical applications using FORTRAN. Data types, input/output, structured programming, communication between sub-programs, file manipulation, portability, efficiency, accuracy, documentation, debugging. Examples will be chosen from the following areas: non-linear equations in one and two variables, extrapolation procedures, numerical quadrature, systems of linear equations, difference equations, ordinary differential equations.

10.2211 Higher Applied Mathematics 2 — Vector Analysis S1 L2T½
Prerequisite: 10.011 or 10.001 (CR). Excluded: 10.2111.
As for 10.2111 but in greater depth.

10.2212 Higher Applied Mathematics 2 — Mathematical Methods for Differential Equations S2 L2T½
Prerequisite: 10.011 or 10.001 (CR) Excluded: 10.2112.
As for 10.2112 but in greater depth.

10.2213 Higher Applied Mathematics 2 — Linear Programming S1 or S2 L1½T½
As for 10.2113 but in greater depth.

10.2215 Higher Applied Mathematics 2 — Discrete-Time Systems S2 L1½T½
As for 10.2215, but in greater depth.

10.2216 Higher Applied Mathematics 2 — Continuous-Time Systems S2 L1½T½
Prerequisite: 10.011 or 10.001 (CR). Excluded: 10.2116.
As for 10.2116 but in greater depth.

10.212A Applied Mathematics 3 — Numerical Analysis S1 L3T1
Prerequisites: 10.2112, 10.111A. Excluded: 10.222A.

10.212B Higher Applied Mathematics 3 — Fluid Dynamics S1 L3T1
Prerequisite: 10.2111, 10.2112. Excluded: 10.222B, 10.422A.
The mathematical modelling and theory of problems arising in the flow of fluids. Cartesian tensors, kinematics, mass conservation, vorticity, Navier-Stokes equation. Topics from inviscid and viscous fluid flow, gas dynamics, sound waves, water waves.

10.212D Applied Mathematics 3 — Mathematical Methods S2 L3T1
Prerequisites: 10.2112, 10.111A, 10.1113, 10.1114. Excluded: 10.0331, 10.033, 10.222D, 10.4120, 10.422D, 10.4331, 10.2921.

10.212L Applied Mathematics 3 — Optimization Methods S1 L3T1
Prerequisite: 10.111A, and 10.1113 or 10.2111. Excluded: 10.222L.
Development, analysis and application of methods for optimization problems. Theory of multivariable optimization; including necessary and sufficient optimality conditions, stationary points, Lagrange multipliers, Kuhn-Tucker conditions, convexity and duality. Numerical methods for one dimensional minimization, uncostrained multivariable minimization (including steepest descent, Newton, quasi-Newton and conjugate gradient methods) and constrained multi-variable minimization (including linear programming and quadratic programming).

10.212M Applied Mathematics 3 — Optimal Control S1 L3T1
Prerequisites: 10.1113 and 10.1114, 10.111A. Excluded: 10.222M

Examples and applications are selected from physical, engineering economics, resource and financial management, social and biological systems.
10.212N Applied Mathematics 3 —
Dynamical Systems S2 L3 T1
Prerequisites: 10.111A, 10.2112, 10.1125. Excluded: 10.222N
Nonlinear differential equations and applications to time-dependent systems. Perturbation methods, averaging and asymptotic techniques, Floquet theory, bifurcation theory. Hamiltonian dynamics, Liouville's theorem, integral invariants, canonical transformations, action-angle variables. Applications to ecological, biological and mechanical systems.

10.222A Higher Applied Mathematics 3 —
Numerical Analysis S1 L3T1
Prerequisites: 10.2212 or 10.2112 (CR), 10.121A or 10.111A (CR). Excluded: 10.212A.
As for 10.212A but in greater depth.

10.222B Higher Applied Mathematics 3 —
Fluid Dynamics S1 L3T1
Prerequisites: 10.2111 or 10.2111 (CR), 10.2212 or 10.2112 (CR). Excluded: 10.212B, 10.422A
As for 10.212B but in greater depth.

10.222C Higher Applied Mathematics 3 —
Maxwell’s Equations and Special Relativity S2 L3T1
Prerequisites: 10.2211 or 10.2111 (CR), 10.2212 or 10.2112 (CR). Excluded: 10.1212, 10.033, 1.033.

10.222D Higher Applied Mathematics 3 —
Mathematical Methods S2 L3T1
Prerequisites: 10.2212 or 10.2112 (CR), 10.121A or 10.111A (CR), 10.2113 or 10.1113 (CR), 10.1214 or 10.1114 (CR). Excluded: 10.0331, 10.033, 10.212D, 10.412D, 10.422D, 10.4331, 10.2921
As for 10.212D but in greater depth.

10.222L Higher Applied Mathematics 3 —
Optimization Methods S2 L3T1
Prerequisites: 10.121A or 10.111A (CR), 10.2211 or 10.2111 (CR) or 10.1213 or 10.1113 (CR). Excluded: 10.212L.
As for 10.212L but in greater depth.

10.222M Higher Applied Mathematics 3 —
Optimal Control S1 L3T1
Prerequisites: 10.1213 or 10.1113 (CR), 10.1214 or 10.1114 (CR), 10.121A or 10.111A (CR). Excluded: 10.212M.
As for 10.212M but in greater depth.

10.222N Higher Applied Mathematics 3 —
Dynamical Systems S2 L3T1
Prerequisites: 10.121A or 10.111A (CR), 10.1425 or 10.1125 (CR), 10.2212 or 10.2112 (CR). Excluded: 10.212N.
As for 10.212N but in greater depth.

10.223 Applied Mathematics 4
An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: advanced mathematical methods for applied mathematics, advanced optimization, numerical analysis, theory of linear and non-linear dynamical systems, optimal control, operations research, functional analysis and applications, mathematics of economic models and of economic prediction, fluid mechanics, oceanography, microhydrodynamics, and analytical and numerical solution of partial differential equations. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

10.233 Applied Mathematics 4 (Short Course)
6 units consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: topics listed in 10.223. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

10.262A Applied Mathematics 3 —
Mathematical Software S2 L3T1
Prerequisites: 10.111A, 10.2112, and either 6.621 or 10.211E or 10.261A or equivalent. Excluded: 10.612.
Underlying methods, development, and use of mathematical software packages; primarily of those written in FORTRAN. Numerically stable methods for matrix factorizations, solution of systems of linear equations and calculation of matrix eigenvalues and eigenvectors. Numerical quadrature, including special methods for singular, oscillatory, and infinite integrals and for multiple integrals. Numerical solution of ordinary differential equations, including initial and boundary value problems. Extensive use is made of computers and software packages. A basic knowledge of Fortran is assumed.

10.292A Applied Mathematics 3 —
Oceanography S1 L3T1
Prerequisite: 10.2111 or 10.031, 1.001. Excluded: 10.412A.
Review of basic physical features and mathematical description of oceans. Physical properties of sea water. Elementary hydrodynamics. An elementary discussion of turbulence. Geostrophy,

10.2921 Applied Mathematics 3 —
Transform Methods  
Prerequisites: 10.1113, 10.1114, 10.2122 or equivalent. Excluded: 10.0331, 10.033, 10.212D, 10.222D, 10.412D, 10.422D, 10.4331.


10.2922 Applied Mathematics 3 —
Applied Time Series Analysis  
Prerequisites: 10.2112 or 10.031 or 10.022. Co-requisites: 10.331 or equivalent, 10.2921 or 10.212D or equivalent. Excluded: 10.4129.

Techniques for analyzing time-varying data. Classification of random processes, sampling for discrete analysis, Fourier analysis, spectra, filtering. Cross-spectra, estimation and hypothesis testing, confidence limits, application to experiment planning. Emphasis on computer analysis of actual data.

Statistics

10.311A Theory of Statistics 2 —
Probability and Random Variables  
Prerequisite: 10.001 or 10.011 or 10.021C(CR). Excluded: 10.321A, 10.301, 10.331, 45.101.

Probability, random variables, standard discrete and continuous distributions, multivariate distributions, transformations, random sampling, sampling distributions, limit theorems.

10.311B Theory of Statistics 2 —
Basic Inference  
Prerequisite: 10.311A. Excluded: 10.321B, 10.301, 10.331, 45.101.

Point estimation: general theory, estimation by moments, maximum likelihood, interval estimation with general theory and application, hypothesis testing using Neyman Pearson theory, linear regression and prediction, analysis of variance.

Probability and Random Variables  
Prerequisite: 10.001 or 10.011. Excluded: 10.311A, 10.301, 10.331, 45.101.

As for 10.311A but in greater depth.

10.321B Higher Theory of Statistics 2 —
Basic Inference  
Prerequisite: 10.321A. Excluded: 10.311B, 10.301, 10.331, 45.101. As for 10.311B but in greater depth.

10.3111 Theory of Statistics 2 —
Statistical Computing and Simulation  
Prerequisite: 10.001 or 10.011 or 10.021C(CR). Co-requisite: 10.311A.

Introduction to APL, random variables, univariate transformation, simulation of random variables, APL programming, integer value random variables, random walks — theory and simulation, introduction to Markov chains.

10.3112 Theory of Statistics 2 —
Nonparametric Statistical Inference  
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.

10.312A Theory of Statistics 3 —
Stochastic Processes  
Prerequisites: 10.311A. 10.111A. 10.1113. Excluded: 10.322A.


10.312B Theory of Statistics 3 —
Linear Models  
Prerequisites: 10.311B, 10.111A, 10.1113. Excluded: 10.322B.


10.312C Theory of Statistics 3 —
Statistical Computation  
Prerequisites: 10.311B, 10.111A, 10.1113. Excluded: 10.322C.

Array and sequential processing in APL. Standard statistical operations and their efficient coding. Simulation of random vari-

10.3121 Theory of Statistics 3 — Sample Survey Theory S1 L1½T½
Prerequisite: 10.311B. Excluded: 10.3221.
Finite population sampling theory illustrated by mean estimation; simple random, stratified, cluster, systematic, multisite and ratio sampling, sampling proportional to size.

10.3122 Theory of Statistics 3 — Design and Analysis of Experiments S2 L1½T½
Prerequisites: 10.311B, 10.312C. Excluded: 10.3222.

10.3123 Theory of Statistics 3 — Statistical Inference SS L1½T½
Prerequisite: 10.311B. Excluded: 10.3223.

10.3124 Theory of Statistics 3 — Nonparametric Methods SS L1½T½
Prerequisite: 10.311B, 10.3112. Excluded: 10.3224.

10.3321 Regression Analysis and Experimental Design S1 L1½T½
Prerequisite: 10.331 or 10.311B or approved equivalent. Excluded: 10.3122, 10.3222.

10.3322 Applied Stochastic Processes S2 L1½T½
Prerequisite: 10.331 or 10.311A or 10.321A, or approved equivalent. Excluded: 10.312A, 10.322A.
An introduction to processes in discrete and continuous time Markov chains and Markov processes, branching processes, time series with moving average models.

10.322A Higher Theory of Statistics 3 — Stochastic Processes S1 L3½T½
Prerequisites: 10.321A, 10.111A, 10.1113. Excluded: 10.312A.
As for 10.312A but in greater depth.

10.322C Higher Theory of Statistics 3 — Linear Models S1 L3½T½
Prerequisites: 10.321B, 10.111A, 10.1113. Excluded: 10.312C.
As for 10.312C but in greater depth.

10.322D Higher Theory of Statistics 3 — Probability Theory S2 L3T½
Prerequisites: 10.321A, 10.111A, 10.1113.

10.3221 Higher Theory of Statistics 3 — Sample Survey Theory S1 L1½T½
Prerequisite: 10.321B. Excluded: 10.3121.
As for 10.3121 but in greater depth.

10.3222 Higher Theory of Statistics 3 — Design and Analysis of Experiments S2 L1½T½
Prerequisites: 10.321B, 10.322C. Excluded: 10.3122.
As for 10.3122 but in greater depth.

10.3223 Higher Theory of Statistics 3 — Statistical Inference SS L1½T½
Prerequisite: 10.321B. Excluded: 10.3123.
As for 10.3123 but in greater depth.

10.3224 Higher Theory of Statistics 3 — Nonparametric Methods SS L1½T½
As for 10.3124 but in greater depth.

10.3225 Higher Theory of Statistics 3 — Statistic Project F
Prerequisites: 10.321A, 10.321B. Co-requisites: At least four units from 10.322A, 10.322C, 10.3221, 10.3222, 10.3223, 10.3224, 10.322D, 10.312F.

10.323 Theory of Statistics 4

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.

10.331 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.

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.

10.0331 Electrical Engineering
Mathematics 3 — Transform Methods
Prerequisites: 10.111A, 10.1113, 10.1114, 10.2122. Exclusions: 10.412D, 10.422D and 10.4331.
Psychology

Psychology Level I Unit

12.100 Psychology 1  F L3T2

An introduction to the content and methods of psychology as a basic science, with emphasis on the biological and social bases of behaviour, relationship to the environment, and individual differences. Training in the methods of psychological enquiry, and in the use of elementary statistical procedures.

Psychology Level II Units

12.200 Research Methods 2  F L2T1

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

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  S1 L2T2

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

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  S2 L2T2

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

Two strands: one provides a consideration of the content, methods and models of social psychology and evaluates effects of social factors on behaviour of individuals and groups; the other strand is concerned with cognitive behaviour of humans, particularly in relation to speech, pattern recognition, memory and thinking.

12.203 Psychology 2A  F L2T2


Available to Course 3431 students only.

Computing, assessment and introduction to clinical practice.

12.204 Human Relations 2  S1 L2T2

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

Social and personality 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  S2 L2T2

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

Measurement and significance of individual differences in intellectual, motivational and personality functioning. Statistics, to cover the fundamentals of hypothesis testing.

Psychology Level III Units: Group A

12.300 Research Methods 3A  S1 L2T2

Prerequisite: 12.200.

Analysis of variance for single factor and multifactor designs. Test procedures for planned and post-hoc contrasts defined on parameters of fixed and mixed models. General principles of experimental design.

12.305 Learning and Behaviour 3  S1 or S2 L2T2

Prerequisites: 12.200 and 12.201.

The establishment and elimination of extended sequences of behaviour in complex environments. Implications of the theories and research for applied work.

Psychology Level III Units: Group B

12.301 Research Methods 3B  S2 L2T2

Prerequisites: 12.200 and 12.300.

Multivariate statistics and computing. Data analysis using the SPSS and PSY computer programs; their statistical basis.

12.304 Personality and Individual Differences 3  S1 L2T2

Prerequisites: 2 Psychology Level II subjects.

Personality dynamics and structure and differences in ability and intelligence.

12.310 Physiological Psychology 3  S2 L2T2

Prerequisites: 12.200 and 12.201.


12.311 Perception 3  S2 L2T2

Prerequisites: 12.200 and 12.201.

Studies of infant perception, conflict between vision and other senses, certain illusions, and of the perception of size and distance generally.
12.312 Language and Cognition 3  
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.
An examination of contemporary research regarding ‘drives’, ‘incentives’ and ‘emotions’ as determinants of animal and human action. Theoretical perspectives cover biological and social influences.

12.315 Theories of Associate Learning 3  
Prerequisite: 12.305.
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.
The major theoretical, methodological, and applied issues in psychophysiology. Topics may include: arousal, attention, habituation, lie detection, clinical assessment, and biofeedback.

12.320 Social Psychology 3  
Contemporary research areas in social psychology. Topics may include the social basis of human interaction, interpersonal relationships, social perception and cognition, and interpersonal communication.

12.321 Development Psychology 3  
The development of perception and the development of operational thought, the development of language and its relationship to the development of thought, and the development of reading.

12.322 Abnormal Psychology 3  
Prerequisites: 12.200 and 12.201.
Descriptive psychopathology; symptomatology and diagnostic features of schizophrenia, organic brain syndromes, affective disorders, neurotic disorders, psychopathy, sexual aberrations, and addictions.

12.324 Experimental Psychopathology 3  
Prerequisite: 12.322.
An examination of the aetiology and mechanisms of behavioural disorders in the light of experimental research and theory construction. Major topics include: aetiology and mechanisms of schizophrenia, affective disorders; psychophysiological disorders, anxiety, depression, driven behaviours.

12.325 Social Behaviour 3  
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. Excluded: 12.203.
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.
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 1988.

12.333 Ergonomics 3  
Prerequisite: 12.200.
Aspects of human performance relevant to work design. The principles involved in designing the environment in general, and work in particular, to suit humans’ capabilities.

12.334 Behaviour in Organizations 3  
Prerequisites: 2 Psychology Level II subjects.
Theories and research methods for understanding behaviour in organizations and in the environment.

12.335 Behavioural Evaluation and Assessment 3  
Prerequisite: 12.200.
Assessment and evaluation of individual behaviour and behavioural change. Problems of measurement and scale construction; objective versus subjective measures; self report, behavioural and psychophysiological measures. Interviewing and behavioural analysis; psychometric testing and case history taking.

12.340 Special Topic 3  
An occasional elective dealing with a special field of psychology.
Psychology Level IV Units

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 and 12.305 from Group A and 12.301 from Group B, with a weighted average of at least 68% and at the discretion of the Head of School.
Psychology 4 in the Arts, and Science and Mathematics degree courses. A 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 from Group A with a weighted average of at least 68% and at the discretion of the Head of School.
Psychology 4 in the Arts, and Science and Mathematics degree courses. Course work and a 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 1988.
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.

Accountancy

14.501 Accounting and Financial Management 1A  S1 or S2 L2T2½
Prerequisite: Nil.
The basic concepts of financial model building and information systems, including the double-entry recording system, the accounting cycle, income measurement and financial reporting, and an introduction to basic elements of auditing.

14.511 Accounting and Financial Management 1B  S1 or S2 L2T2½
Prerequisite: 14.501.
Development of basic concepts introduced in 14.501 Accounting and Financial Management 1A, including corporate reporting, business finance, system design, elementary computer applications.

14.522 Accounting and Financial Management 2A  S1 or S2 L2T2½
Prerequisites: 14.511 plus

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<th>Units</th>
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<td>4 unit</td>
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The design, production and use of accounting and other quantitative information in the planning and control of organizations, with particular reference to manufacturing activities.

14.542 Accounting and Financial Management 2B  S2 L2T2½
Prerequisite: 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  
Prerequisite: 14.542.

14.573 Accounting and Financial Management 3A (Honours)  
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  
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)  
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.

14.602 Computer Information Systems 1  
Prerequisite: 15.411 or 15.401 or approved studies in computer science.
Information systems and the organization, architecture of typical commercial application systems, the systems lifecycle, the systems analysis/design task, tools and techniques of the systems analyst, documentation techniques, internal controls and interfacing with the edp auditor, file design concepts, logic and computer hardware, commercial computer programming.

14.603 Computer Information Systems 2  
Systems design: physical design of business systems, specifications and updating of VSAM files, man-machine dialogue procedures, top-down structured design and evolutionary design methodologies. Introduction to communications networks. Operating systems concepts, processor, storage, device and process management, segmentation and paging systems. COBOL programming.

14.605 Information Systems Implementation  
Prerequisite: 14.603.
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.

14.607 Distributed Computer Systems  
Prerequisite: 14.603.
Advanced data communication concepts, computer networks, reference to international standards and common industry communications software packages; transaction processing software and interface with data management systems; local networks; interaction between text processing and data processing: a case study based on a microcomputer network.

14.608 Database Systems  
Prerequisite: 14.603 or 14.606.
Advanced data storage concepts, including detailed study of alternative approaches to database management systems. Management information needs and database specification in a commercial environment. Detailed evaluation, with project work, of a microcomputer based database management system. Information retrieval concepts, relational query-systems, security, control and audit considerations.

14.611 Information Systems Development  
Prerequisite: 14.603 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.

14.613 Business Finance 2A  
Prerequisite: 14.511, 15011 and 15.421.
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.

14.614 Business Finance 2B  
Prerequisite: 14.613.
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.
14.615 Business Finance 3  
Prerequisite: 14.614.

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.

14.774 Legal Environment of Commerce S1 or S2 L2T1

Prerequisite: 

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<tr>
<td>2 unit English (General)</td>
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<tr>
<td>3 unit English</td>
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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.

14.794 Honours Thesis

14.853 Advanced Systems Management L3

Prerequisite: Admission to BCom degree course at Honours level.

As for 14.953G. See Graduate Study: Subject Descriptions.

14.857 Operations Research for Management 1 L3

Entry approval by Head of Department of Information Systems.

As for 14.957G. See Graduate Study: Subject Descriptions.

14.886 Research Topics in Information Systems 1 L3

Entry approval by Head of Department of Information Systems.

As for 14.986G. See Graduate Study: Subject Descriptions.

14.887 Research Topics in Information Systems 2 L3

Entry approval by Head of Department of Information Systems.

As for 14.987G. See Graduate Study: Subject Descriptions.

14.891 Decision Support Systems L3

Prerequisite: 14.603

As for 14.991G. See Graduate Study: Subject Descriptions.

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### Economics

15.001 Microeconomics 1 S1 or S2 L2T1½ or T2

Commerce/Arts/Applied Science/Sciences prerequisite:

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<td>3 unit English</td>
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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.

15.002 Microeconomics 2 S1 L2T2

Commerce prerequisite: 15.011.

Arts/Applied Science/Sciences prerequisites: 15.011 plus 15.401 or 15.411 or 10.001 or 10.011. Co-requisite: 15.412

Excluded: 15.012, 15.072.


15.003 Macroeconomics 3 S1 L2T2

Commerce prerequisite: 15.042 or 15.052.

Arts/Applied Science/Sciences prerequisites: 15.042 or 15.052. plus 15.422 or 15.416

Excluded: 15.013.


15.011 Macroeconomics 1 S1 or S2 L2T1½

Commerce/Arts/Applied Science/Sciences prerequisite: 15.001.

Introduction to the analysis of aggregate output, employment and economic growth and their relationship to the policy issue of unemployment, inflation and the balance of payments. Social accounting and aggregate income and expenditure analysis. Introduction to macroeconomic models of income determination; consumption and investment functions. The role of money and financial institutions; interactions between goods and money markets in equilibrium and disequilibrium situations. Analysis of recent Australian macroeconomic experience.
15.042 Macroeconomics 2  
S2 L2T2

Commerce prerequisite: 15011.
Arts/Applied Science/Sciences prerequisites: 15.002 plus 15.412.
Co-requisites: 15.422 or 15.416.
Excluded: 15.052, 15.062.


15.062 Applied Macroeconomics  
S1 or S2 L2T1½

Commerce/Arts/Applied Science/Sciences prerequisite: 15.011.
Excluded: 15.052 and 15.042.


15.072 Applied Microeconomics  
S1 or S2 L2T1½

Commerce/Arts/Applied Science/Sciences prerequisite: 15.011.
Excluded: 15.012 and 15.002.

Structural change in the Australian economy. The effect of different market structures on firms and consumer welfare. The consequences of markets failure and the effects of government regulation. Investment decisions in the public and private sectors, including the estimation of future benefits, revenues and costs, the measurement of consumer and producer surplus. The economics of non-renewable and other resources. Australia's international trade and investment and the effects of restrictions on international trade and investment.

15.143 Microeconomics 3  
S2 L2T2

Commerce prerequisite: 15.002 or 15.012.
Arts/Applied Science/Sciences prerequisite: 15.002 or 15.012 plus 15.422 or 15.416.
Excluded: 15.153.


15.901 Australia in the International Economy in the 20th Century  
S1 or S2 L2T1½

Commerce/Applied Science/Arts/Sciences prerequisite:

HSC minimum mark required

| 2 unit English (General) or | 60 |
| 2 unit English or | 53 |
| 3 unit English | 1 |

The international economy at the end of the 19th century: trade, factor flows, and payment arrangement. Problems of the international economy between the wars. The impact of World War II and the international economy in the post-war era. Australian economic development and its relationship with the international economy; economic fluctuations; problems of the inter-war period; growth of manufacturing; government policy and action; the importance of the mining industry; economic development and the distribution of income and wealth.

15.902 Management Strategy and Business Development  
S2 L2T1½

Commerce prerequisite: 15.901.
Applied Science/Arts/Sciences prerequisite:

HSC minimum mark required

| 2 unit English (General) or | 60 |
| 2 unit English or | 53 |
| 3 unit English | 1 |

The strategy and structure of large scale business enterprise over the past century. An analysis of the process of growth from small family firms and partnerships to corporate enterprises and multi-national corporations. The external business environment. Case studies of managerial hierarchies, investment strategy and diversification of firms in transport, mass retailing and mass production.

**Biological Sciences**

17.031 Biology A  
S1 L2T4

Prerequisite:

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<td>4 unit Science</td>
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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. Excluded: 17.021.

The evolution, diversity and behaviour of living things and the ways in which they have adapted to varying environments. Emphasis on the structure and function of flowering plants and vertebrate animals, and their roles in Australian ecosystems. The theory covered in lectures and tutorials is illustrated by observation and experiment in laboratory classes.

17.012 General Ecology
Prerequisites: 17.031 and 17.041.

Evolution and environmental selection in the Australian continent; geological, palaeoclimatological, biogeographical and historical background. Functional organization of ecosystems; energy budgets, hydrological and biogeochemical cycles. Integrated structure and function of ecosystems, including cropping and management of natural resources. Aspects of microbial ecology. Students are required to attend a field camp as an integral part of the course.

**Applied Geology**

25.110 Earth Materials and Processes
Prerequisite: 25.120.


25.120 Earth Environments and Dynamics
Prerequisites:
- 2 unit Mathematics * or 3 unit Mathematics or 4 unit Mathematics
- and
- 2 unit Science (Physics) or 2 unit Science (Chemistry) or 4 unit Science (multistrand)
- and
- 25 110

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

25.211 Earth Materials 1
Prerequisite: 25.120.


25.212 Earth Environments 1
Prerequisite: 25.120.


25.221 Earth Materials 2
Prerequisite: 25.211.

25.223 Earth Physics  
Prerequisite: 25.110.


25.226 Mathematical Geology 1  
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  
Prerequisite: 25.221.


25.321 Earth Materials 4  
Prerequisite: 25.221.


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


25.320 Meteorology  
Prerequisite: 25.211.

Atmospheric and oceanic systems and processes. Analysis and interpretation of weather maps. Introduction to numerical weather prediction. Introduction to climate. Application of the concepts of circulation and climate to current regional and world-wide issues. Field work.

25.321 Earth Materials 4  
Prerequisite: 25.221.


25.314 Mineral and Energy Resources 1  
Co-requisite: 25.221 or 25.311.

Metallic Resources: Classification and origin of the ore deposits, geochemical processes, research methods. Orhomagmatic, 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.

25.315 Earth Physics  
Prerequisite: 25.110.

Geophysical methods of exploration. Features and characteristics of geophysical methods. Geophysical sampling and test of significance. Application of these techniques using geological data. Geophysical Computing: FORTRAN programming; text editing; control language for VAX and CYBER.

25.316 Mathematical Geology 2  
Prerequisite: 25.226.

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.

**25.324 Mineral and Energy Resources 2**

**Prerequisite:** 25.212 or 25.5212.


**25.325 Engineering and Environmental Geology**

**Prerequisite:** 25.212 or 25.5212.


**25.3261 Geochemical Analytical Techniques**

**Prerequisite:** 25.311.


**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.

**25.333 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.

**25.410 Resource Geology**

**Exploration Geochemistry:** Principles and techniques of soil, drainage and rock geochemistry as applied to mineral exploration. **Mathematical Geology:** Application of probability graphs to exploration data. Processing and interpretation of geological data using selected univariate and multivariate statistics; typical case studies in mathematical geology exemplifying these techniques.

**Remote Sensing:** Principles of various remote sensing techniques including landsat and side-looking airborne radar. The techniques of image enhancement and digital processing. Applications of remote sensing in lithological mapping and tectonic analysis. Integration of remotely sensed data with conventional data sources. Practical work with the interactive computer on image analysis with particular reference to student field study areas. **Precambrian Geology:** Distribution, terminology, concepts, general features of the Archaean and Proterozoic. **Archaean of Australia:** Pilbara, Yilgarn, Proterozoic of Australia: Kimberleys, Broken Hill. Precambrian syntheses: tectonic, plate tectonics. Aspects of Precambrian mineralization. **Resource Economics:** Introduction to the role of earth resources in industrial society; availability of resources and consideration of grade, price, economic, technical and political factors. Distribution, production, consumption and trade in minerals. Supply adequacy and resource assessment. Review of Australian and New South Wales mineral industry. Economics of engineering geological works. **Report Writing:** Techniques of scientific report writing, especially preparation of theses and research articles. Methods of illustrating verbal and written presentations. Guidelines to verbal presentations. **Field work** of up to seven days is a compulsory part of the subject.

**25.412**

**25.414**

**25.415**
25.420 Field Project

A major field-laboratory project, which generally includes geological mapping, on some aspect of mineral or sedimentary basin resources, engineering or environmental geology or resource geophysics.

25.4101 Topics In Advanced Geology

Topics in geology selected from a list of subjects available from the Head of Department.

25.434

25.5212 Sedimentology

Prerequisite: 25.120. Excluded: 25.212.

As for Sedimentology in 25.212 Earth Environments 1. Available only to Course 3145.

25.5313 Stratigraphy

Prerequisite: 25.5212. Excluded: 25.312.

As for Stratigraphy, in 25.312 Earth Environments 2.

25.621 Marine Geology 1

Prerequisites: 25.601 or both 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

Prerequisites: Nil.

General principles of surveying, with particular reference to coastlines and off-shore techniques. Optical and electronic methods of distance measuring and position fixing. Methodology for short-term and long-term measurement of tides and flow currents. Bathymetric surveys in shallow and deep water conditions. Coastline morphologies and their relationship to the behaviour of water masses. Analysis of sedimentary systems in deltaic, estuarine and near-shore environments. Data collecting, processing and storage. Shallow-water investigations for bedrock morphologies. Field work of five days is a compulsory part of the subject.

25.631 Marine Geology 2

Prerequisite: 25.621.


25.632 Estuarine Geology

Prerequisite: Nil.


25.6341 Marine Mineral Deposits and Oceanic Minerals


25.6342 Exploration and Seismic Methods

Geophysics of ocean basins and off-shore areas and the techniques of their study. Seismic refraction, reflection and computational methods, instrumentation of seismic and acoustic sources, recording systems and signal processing. Geological and physical interpretation of results. Practical work on instrumentation, recording and interpretation of field data.

25.931
25.9311 Gravity and Magnetic Methods  S1 L2T1
Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.

Fundamental principles. Field procedures and instruments. Reduction of field data. Regionals and residuals. Effects of sources of simple geometrical shapes and generalized two and three-dimensional distributions. Applications. Field work of one day is a compulsory part of the subject.

25.9312 Seismic Methods  S1 L2T1
Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.


25.9313 Electrical Methods  S1 L2T1
Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.

Introductory theory and field practice of resistivity, self-potential, induced polarization and airborne and ground electromagnetic methods. Geological interpretation of field data. Geophysical logging. Field work of one day is a compulsory part of the subject.

25.9314 Geological Applications  S1 L1T1
Prerequisite: 25.120.

A subject of ten weeks’ duration. Structural Geology: Elements of structural geology, stereographic projection and fracture analysis. Geology of Fuels: Origin of coal, oil and natural gas; stratigraphic and structural consideration of oil and coalfields. Hydrogeology: Principles of hydrogeology; transmission of groundwater in rocks and soils. Field work of one day is a compulsory part of the subject.

25.9321 Geophysical and Geological Applications  S2 L1T2
Prerequisite: 25.120. Excluded: 25.6342.

Geological Interpretation of Geophysical data: Seismic stratigraphy. Coal-seam geometry from high resolution seismic and in-seam data. Geology of Ore Deposits: Mineralogy of industrially important metallic and non-metallic minerals. Theories of ore formation including secondary enrichment processes. Available only in program 2503.

Geography

27.010 Land Studies  S1 L2T2
Concepts, significance and problems of land. Land as territory and land as resource in Australia. Constraints imposed by the physical environment on human occupancy and settlement patterns, the variety of conflicts that result and management strategies. Practical work involves study of the ways in which the attributes and characteristics of land are displayed on maps, aerial photos and satellite imagery, and introduces these as basic information sources and research tools in applied geography.

27.030 Environmental Processes  S2 L2T2
Essential and continuing links between components of the physical environment. Movement of energy and matter in the physical environment, including consideration of Earth’s energy balance, the hydrological cycle, nutrient cycles in vegetation and soil, imbalances leading to land degradation and instability, alternatives to and movement of materials.

27.050 Geographical Data Analysis  F L2T2
Prerequisites: 27.111 or 27.010 and 27.030. Excluded: 27.162, 27.632, 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  S2 L2T3
Prerequisites: 27.010 and 27.030 or 27.111 or any two units from 2.111, 2.121, 2.131, 2.141, and 2.611, 2.628 or 2.311 or 25.012 or 25.022.

Methodology of pedogenic studies and the application of these studies to the understanding of soil-landform relationships. Soil physical and chemical properties and their interrelationships, emphasizing clay-mineral structure and behaviour, soil solution chemistry, soil water movement and the application of these properties to elements of soil mechanics. Soil properties in natural, rural and urban landscapes, including assessment of soil fertility, swelling characteristics, dispersibility, erodibility and aggregate stability. Laboratory analysis of soil physical and chemical characteristics with emphasis on properties associated with land capability assessment. Statistical analysis of soil data and its application to mapping. The use of soil micromorphological and mineralogical studies in pedology.

27.143 Biogeography  S1 L2T3
Prerequisites: 27.010 and 27.030 or 27.811 or 27.828 or 17.031 and 17.041 or 27.111 or 27.172.

27.153 Climatology  
Prerequisites: 1.001 or 27.811 or 27.828 or 25.110 or 25.120 or 17.031 and 17.041 or 27.111.


27.172

27.175 Introduction to Remote Sensing  
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 aerial photography techniques relevant to environmental assessment. Introduction to principles of the electromagnetic 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  
Prerequisite: 27.175 or 27.1711, 29.514 or 29.511 and 29.631. Excluded: 27.1712

Spectral characteristics of natural phenomena and image formation. Ground truthing, collection and calibration. Introduction to computer classification procedures. Multitemporal sampling procedures, image to image registration and map to image registration. Major applications of remote sensing in the investigation of renewable and non-renewable resources to include: soils, geology, hydrology, vegetation, agriculture, rangelands, urban analysis, regional planning, transportation and route location and hazard monitoring.

27.183 Geomorphology  
Prerequisites: 25.110 and 25.120 or 27.010 and 27.030 or 27.081 or 27.828 or 27.111 or 27.172. Excluded: 27.860.


27.193 Environment Impact Assessment  
Prerequisites: 1.001 or 27.811 or 27.828 or 25.110 or 25.120 or 17.031 and 17.041 or 27.111.

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.

27.432 Computer Mapping and Data Display  
Prerequisites: 10.021B and 10.021C, or 10.001 or 10.011 or 27.432

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  
Prerequisites: 10.021B and 10.021C, or 10.001 or 10.011 or 27.432.

An introduction to information systems of particular relevance for geographers with special reference to computer-based systems for resource evaluation. Problems of data structures, geocoding, and spatial identifiers. Model-based information systems. Project work: case study evaluation and the development of information systems for monitoring spatial change.

27.753 Social Welfare and Urban Development  
Prerequisite: 27.829 or 27.812. Note: This prerequisite does not necessarily apply to students enrolled in the Faculty of Applied Science.

Offered subject to availability of staff.

A consideration of welfare aspects of urban development, including social policies and urban structure; social costs and benefits of urban renewal especially in the inner city; growth centres and new towns; distributional aspects of social services; and spatial disparities in social well-being.

27.813 Geographic Methods  
Prerequisites: 27.010 and 27.030, or 27.111 or 27.801 and 27.802, or 27.818 and 27.819. Excluded: 27.050, 27.813.

Statistical procedures and field methods used in both human and physical geography. Includes: measures of dispersion; measures of spatial distribution; samples and estimates; correlation and regression; tests for distribution in space; data collection and analysis; field observations.
Themes selected from the mechanisms of the physical environment with particular reference to Australia and the Sydney region. Landscape as an expression of dynamic response: land capability and land use problems, humans as agents of landscape change. Energy and Atmospheric Circulation over Australia: local weather patterns and weather extremes, human responses to fire, flood, and drought hazards. Development and Stability of Hillslopes: soil, vegetation and drainage relationships, problems of soil erosion. Coastal Ecosystems: problems of demand, risk and management in the coastal zone. Lectures are supplemented with tutorials, workshops, and field tutorials. Students are required to provide some materials for workshop exercises and to contribute to the cost of field tutorials.

Prerequisite: Nil. Excluded: 27.802.

The impact of technological change on the spatial organization of human activities and regional development and disparities. The implications of technological change on population distribution, resource utilization, and settlement patterns are examined at different scales emphasizing the social consequences at the community and regional level. Examples are taken from Third World and modernized countries, with particular reference to Australian case studies.

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

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 disadvantage; public transport problems and issues in Australian capital cities; travel and activity consequences of transport infrastructure developments.

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.

The structure and functioning of ecosystems, human interaction with ecosystems; Australian case studies of ecosystem resolution and evaluation techniques including cost-benefit analysis and environmental impact assessment. Lectures accompanied by seminars and workshop sessions which concentrate on methodology.
management, including pastoral, cropping, forestry, coastal and urban ecosystems.

27.883 Special Topic
Prerequisites: Nil.
Admission by permission to suitable students with good Passes in at least four subjects at Upper Level. A course of individually supervised reading and assignments as an approved topic in Geography not otherwise offered.

27.884 Advanced Geographic Methods
Prerequisites: 27.813 or both 27.2813 and 27.2814. Excluded: 27.050, 27.060, 27.080.
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.

Surveying

29.1010 Surveying 1

29.2010 Surveying 2
Theodolites; principles and construction. Horizontal and vertical angle measurement. Areas of regular and irregular figures. Traversing and traverse computations.

29.441 Surveying for Engineers

29.491 Survey Camp
A one-week field camp for students studying 29.441 Surveying for Engineers.

Optometry

31.821 Anatomy and Physiology of Eye and Visual System
Prerequisites: 17.031, 17.041. Co-requisite: 73.011A.

31.851 Optics
Prerequisites: 10.001 or 10.021, 10.001 or 10.021B and 10.021C or 10.011.

31.852 Visual Optics
Prerequisites: 10.001 or 10.021, 10.001 or 10.021B and 10.021C or 10.011.
Optical systems of the eye: schematic eye, reduced eye, emmetropia, spherical ametropia, astigmatic ametropia, correction of ametropia, elementary magnification effects, aphakia. Accommodation, presbyopia, correction of presbyopia. Accommodation and convergence. Aberrations of the eye Phorias, measurement of phorias. Modulation transfer function Gradient index optics.
31.855 Measurement of Light and Colour  S2 L1T1
Prerequisite: Nil.


31.841 Clinical Optometry  F L1T15½

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.

31.861 Optometry A  F L5½T1½

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. Orthoptics and binocular vision: convergence/accommodation anomalies, strabismus, amblyopia. Contact lenses: corneal anatomy and physiology, contact lens design and manufacture, fitting techniques. Low vision: examination of the low vision patient, selection of aids.

31.862 Diagnosis and Management of Ocular Disease  F L5T½
Prerequisites: 31.821.


31.863 Theory of Spectacle Lenses and Optical Instruments  F L1½
Prerequisite: 31.851, 31.852.

Advanced geometrical optics and spectacle lens design. Aberrations and their control. The elements of microscopic and macroscopic systems.

31.864 Clinical Methods  F T5

Practical assignments in ophthalmoscopy, biomicroscopy, tonometry, gonioscopy, visual fields, colour vision tests, refraction, assessment of binocular vision, strabismus.

31.871 Optometry B  F L6


Biochemistry

41.101 Biochemistry  F L2½T3½
Prerequisites: 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. Photosynthesis. Practical work to amplify the lectures.

41.102 Biochemistry of Macromolecules  S1 L3T9
Prerequisites: 41.101, and 2.102B or 2.102D. Excluded: 41.102A

Complex carbohydrates. Chemistry and biology of polynucleotides. Methods of amino acid and nucleic acid sequence analysis. Protein structure and synthesis. Active centres of some
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.

The role of triglyceride, cholesterol and lipoprotein metabolism in human health, and other selected areas of human nutrition. Exercise, the metabolic fuels utilized and the use of in vivo NMR to monitor changes in energy metabolism. Specialized aspects of endocrinology and neurochemistry including prostaglandins, leukotrienes, enkephalins and endorphins. The interrelation of purines, pyrimidines, folate and cobalamin metabolism in humans. Xenobiotics: the metabolism of foreign compounds by humans. Biochemical aspects of genetic disease including the use of recombinant DNA techniques for prenatal diagnosis and carrier detection. Practical work to amplify the lectures.

41.122 Cellular Biochemistry and Control

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 cultured plant cells and the technology of plant cell culture. Structure and expression of plant genes. Plant molecular biology including cloning plant genes and vectors for gene cloning. Genetic manipulation of plants to improve their natural resistance to pests, disease and environmental stress. Practical work provides training in the basic techniques of plant tissue culture with application of selected techniques to plant genetic engineering.

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.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

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

41.001 Biochemistry for Medical Students

41.002 Medical Biochemistry and Genetics

Biotechnology

42.101 Introduction to Biotechnology

Prerequisites: 2.121 and 2.131, or 2.141; 17.041; 10.011 or 10.001 or 10.021B and 10.021C.

An introduction to biotechnology as a multidisciplinary subject, dealing with the application of biochemical systems or their products in industry. Industrial uses include: production of single products (such as amino acids, vitamins, antibiotics etc), single cell protein, alternate fuels from renewable resources and fermented foods and beverages; biological waste treatment; aspects of pollution control, biodegradation and biodegradation; and principles of enzyme technology. Concepts relevant to productivity in these systems, including: thermodynamic feasibility, techniques of environmental and genetic manipulation, choice of the appropriate biological catalyst(s) for a particular
process, regulation of gene activity. The laboratory component emphasizes the manipulation of different classes of microorganisms and the use of biochemical products involved in a variety of biotechnological areas.

42.102A Biotechnology A

Prerequisites: 41.101 and 42.101 or 44.101 (Pass Conceeded (PC) awarded prior to Session 2, 1983, is not acceptable).

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 (Pass Conceeded (PC) awarded prior to Session 2, 1983, is not acceptable).

Application of principles of biotechnology to the analysis and design of microbial processes of industrial relevance (antibiotics, microbial enzymes, single cell protein from carbohydrates and hydrocarbons, fermented foods and beverages, amino acids and vitamins, microbial polysaccharides, activated sludge and photosynthetic processes for waste treatment, microbial teaching of low-grade minerals). Emphasis on quantitative approach; mass and heat balance calculations, kinetic and thermodynamic analysis, detailed equipment design and specification, process design and layout, process simulation, plant location, application of optimization techniques. The economics of microbial processes are considered and comparison made with alternative modes of production or treatment. The economics of agro-industry in Australia using microbial processes. Marketing of fermentation products, clinical trials required, legal constraints, patent rights. Technical and economic feasibility studies, and a design project.

4.102C Microbial Genetics

Prerequisites: 41.101 or 44.101. Excluded: 43.102.

A detailed study of the mutational basis of microbial variation. Mutagens: mechanisms of mutagenesis; induction, enrichment, isolation and characterization of mutants; mechanisms of repair of mutational damage. Systems of gene transfer and recombination in fungi, bacteria and bacterial viruses; the use of these systems in constructing genetic maps, and as tools for probing aspects of microbial physiology and biochemistry. Genetic control of gene expression; the operon concept and its application to specific regulatory systems. Genetic code, collinearity between a gene and its product, genes within genes, suppression of mutations. Restriction and modification of DNA; genetic engineering — its implications and prospects. Genetics of nitrogen fixation.

42.103 Biotechnology (Honours)

Advanced formal training in selected areas of biotechnology and participation in one of the school's research projects.

42.114 Fermentation Processes

Factors governing the use of micro-organisms in industrial processes, including the selection, maintenance and improvement of micro-organisms, the control of environmental factors, batch and continuous flow operational patterns, product recovery, process optimization and waste disposal. Demonstrations of the operation and control of fermenter systems and of microbial process simulation.

Botany

43.111 Flowering Plants

Prerequisites: 17.031 and 17.041.

Plant cell structure, structure and functions of the major organs in angiosperms (flowers, roots, stems and leaves), secondary thickening and arborescence, transport systems in plants, seeds and germination. Variation in structure and function in relation to environment. Introduction to taxonomy and identification of major Australian plant families. A short field excursion is part of the subject.

43.131 Fungi and Man

Prerequisites: 17.031 and 17.041.

An introduction to the biology and taxonomy of fungi followed by a study of their economic importance to man. Includes: fungi as pathogens of plants and animals; use of fungi as food in the production of useful chemical products; medical uses of fungi, including drugs and hallucinogens; degradation of organic matter, particularly in soils and of timber, interaction of fungi with other organisms; chemical control of fungi.

43.112 Taxonomy and Systematics

Prerequisite: 43.111.

The assessment, analysis and presentation of data for classifying organisms both at the specific and supra-specific level.

43.121 Environmental Physiology

Prerequisites: 17.031, 17.041, 2.121 and 2.131, or 2.141.

How plants function in relation to the constraints imposed on them by soil and atmospheric environments. Includes: germination, growth and development, particularly photosynthesis, respiration, inorganic nutrition, water relations, transport processes and reproductive physiology. Important practical applications of various physiological mechanisms.
43.132 Mycology and Plant Pathology  

**Prerequisite:** 43.131.

A detailed study of the fungi, including both saprophytic and plant pathogenic species. Includes: hyphal structure and ultrastructure; morphology and taxonomy of members of major taxonomic groups; spore liberation, dispersal, deposition, germination, infection and the establishment of a host-pathogen relationship; morphogenesis of vegetative and fruiting structures; cytology, genetics; ecological considerations of fungi in specialized habitats, survival mechanisms and methods of control of plant pathogens.

43.142 Environmental Botany  

**Prerequisites:** 17.031 and 17.041.

The soil and atmospheric environments in which plants live and a study of the interaction of plants with their environment. Energy and mass transfer. Emphasis is placed on the role of environmental science in food production.

43.152 Plant Community Ecology  

**Prerequisites:** 43.111 and 17.012 or 27.111.

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.

43.172 Phycology and Marine Botany  

**Prerequisite:** 43.111.

The biology of freshwater, marine and soil algae with particular emphasis on the marine flora of SE Australia. Field work is part of the subject.

43.192 Ultrastructure  

**Prerequisite:** 43.111 or 43.121 or 41.101 or 44.101 or 45.201 or 45.301.  
**Excluded:** 43.182.

The impact of the study of ultrastructure in biological research. Techniques currently used in ultrastructural research. The basic ultrastructure of prokaryotes and of eukaryote cells and organelles, emphasis also on areas where ultrastructural research is at present making an important contribution to understanding how cells work; for example, motility, secretion, control of cell wall deposition transport and cell communication. 

**Practical work:**

Students use transmission and scanning electron microscopes to investigate material they themselves prepare, using negative staining, ultra-microtomy and freeze-fracture also includes optical systems in light microscopy, principles and practice of fixation and embedding tissues for light and electron microscopy; histochemistry and techniques of enzyme localization.

**Servicing Subjects**

These are subjects taught within courses offered by other faculties.

43.202 Botany for Landscape Architects  

**Prerequisite:** Nil.

How green plants function. What is known about how plants grow. Specific topics include: what happens in a plant meristem, hormone interactions and growth, transport systems in plants, water uptake and use, mineral nutrition, the role of light and leaves in photosynthesis, control of flowering process, germination and senescence. Emphasis is on the interaction between plant structure and function.

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**Microbiology**

**Level II Units**

44.101 Introductory Microbiology  

**Prerequisites:** 17.031 and 17.041.

The general nature, occurrence and importance of microorganisms. A systematic review of the major groups of microorganisms; the eucaryotic protista (micro-algae, protozoa and fungi); procaryotic protista (blue-green algae, "higher" bacteria, typical unicellular bacteria and small bacteria-like forms); plant, animal and bacterial viruses. The relationship between microorganisms and their environment, ecological considerations. Interactions between microorganisms and higher organisms.

44.121 Microbiology 1  

**Prerequisites:** 44.101 and 41.101 or 2.003J.

The balanced structure of this unit makes it suitable for students majoring in microbiology and also for students who wish to enlarge their knowledge and skills in microbiology beyond those obtained in 44.101 Introductory Microbiology or equivalent units at other institutions.


**Level III Units**

44.102 General Microbiology  

**Prerequisites:** 44.101, 44.121 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable). 41.101.

Systems for the isolation, identification and taxonomic description of microorganisms; fine structure, cyto-chemistry, genetics of bacteria and viruses; metabolic requirements of microorganisms; microorganisms and their environment, growth, inhibition and death; energy-yielding and biosynthesizing systems; genotypic and phenotypic control systems.
44.112 Applied Microbiology  
Prerequisite: 44.102.

Endeavours to relate the basic facts about microorganisms to a variety of practical conditions. The occurrence, importance, activity and control of microorganisms in soil, air, water and in their relationship with higher organisms (other than humans), their industrial applications including manufacture, preservation and spoilage of food and dairy products. The nature of bacterial and fungal diseases of humans, their cultural and serological diagnosis, epidemiology, treatment and prevention will be discussed in some detail.

44.122 Immunology  
Prerequisites: 17.031 and 17.041, 41.101.

Basic immunology and immunological techniques. The interdisciplinary nature of the subject makes this unit suitable for students taking any major sequence in biological science and also for higher degree students who require a background training in immunology. The course includes phylogeny and ontogeny of the immune response, antigen and antibody structure, antigen-antibody reaction, immunochemistry, immunogenetics, clinical immunology, transplantation.

44.132 Virology  
Prerequisite: 44.102.

The structure, replication and behaviour of animal, plant and bacterial viruses; applications of virological techniques; virus diseases of animals and plants, their epidemiology and control.

Zoology

Students are not admitted to Level III Zoology units, without special permission of the Head of School, unless Chemistry 2.121 and 2.131, or 2.141, has been completed.

45.101 Biometry  

Statistical methods and their application to biological data, including introduction to probability; the binomial, Poisson, normal distributions; student’s t, f and variance ratio tests of significance based on the above distributions, the analysis of variance of orthogonal and some non-orthogonal designs; linear regression and correlation. Non-linear and multiple regression. Introductory factorial analysis. Introduction to experimental design. Non-parametric statistics, including tests based on f, the Kruskal-Wallis test, Fisher's exact probability test and rank correlation methods. Introduction to programming in BASIC.

45.112 Marine Ecology  
Prerequisite: 17.031, 17.041, 45.201 or 25.022 or 2.002D.

A study of the ecology of marine organisms with particular reference to the physical, chemical and biological environment in which they occur. Both field and laboratory practical work are included.

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

Level IV Units

44.103 Microbiology Honours  
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.

45.121 Evolutionary Theory  
Prerequisites: 17.031, 17.041.

Current evolutionary theory, emphasizing the population level. Ecological genetics, evolutionary aspects of ecological niche theory, speciation, evolution of social behaviour, molecular evolution and general evolutionary genetics. Some background in genetics is desirable.

45.122 Animal Behaviour  
Prerequisites: 45.101, and 45.201 or 45.301.

An introduction to Ethology, the biological study of behaviour. Physiological, ecological, developmental and evolutionary aspects of behaviour are examined as important elements in the analysis of behaviour, particularly social behaviour. Both field and laboratory work are included.

45.132 Ecological Physiology  
Prerequisites: 45.201 or 45.301.

A study of physiological adaptation to habitat in animals. The problems imposed by the basic physiological characteristics of major animal groups under different environmental conditions are
examined, especially osmotic and ionic regulation, oxygen availability, metabolism and temperature regulation/acclimation. Particular attention is given to Australian fauna and conditions.

45.142 Comparative Physiology  
Prerequisite: 45.201 or 45.301.

Basic physiology of nerves, muscles, sensory perception, blood circulation, respiration, gastrointestinal tract, kidneys and hormones. Physiology of reproduction. The control of organ systems and body functions.

45.152 Population and Community Ecology  
Prerequisites: 17.041 and 10.001 or 10.011 or both 10.021B and 10.021C.

Examination of the dynamics of one, two or more interacting populations. Systems analysis and simulation in ecology. Theoretical and mathematical analysis of the dynamics and stability of ecosystems. Topics in the optimal management of renewable resources. Unifying concepts in ecology.

45.201 Invertebrate Zoology  
Prerequisites: 17.031, 17.041.

A comparative study of the major invertebrate phyla with emphasis on morphology, systematics and phylogeny. Practical work to illustrate the lecture course. Obligatory field camp.

45.301 Vertebrate Zoology  
Prerequisites: 17.031, 17.041.

A comparative study of the Chordata, with particular reference to the vertebrates, including morphology, systematics, evolution and natural history, with reference to selected aspects of physiology and reproduction. Practical work to supplement the lecture course. Field excursions as arranged.

45.302 Vertebrate Zoogeography and Evolution  
Prerequisite: 45.301.

A geographic approach to the current distribution, abundance and types of vertebrate species in the Australian region. Particular emphasis is placed on the basic principles of speciation, the history of the Australian continent, vertebrate adaptations and changes in the distribution and abundance of the Australian vertebrate fauna under the influence of humans. Field excursions as arranged.

45.402 Entomology  
Prerequisites: 17.031, 17.041, 45.201.

Classification, external morphology and internal anatomy of insects, studies on environmental sensory physiology and behaviour—especially reproductive behaviour, social organization, pheromones and rhythms. Practical work to illustrate the lectures.

45.422 Economic Zoology  
Prerequisite: 45.201 or 45.402.

A study of the biology, ecology and control of vertebrate and invertebrate animals which harm humans and their possessions. Human and domestic animal parasitology, pests on plants, diseases caused or spread by animals, chemicals, biological and physical control, and side effects.

45.601 Introductory Genetics  
Prerequisites: 2.131 or 2.141, 17.031, 17.041. Excluded: 9.801.


Chemical Engineering and Industrial Chemistry

48.023

48.024

48.037

48.038 Chemical Engineering Principles 2  
Prerequisite: 48.024.

The following topics, from 48.037; Mass Transfer (Theory), Heat Transfer 2 (Theory), Fluid-particle Systems, Surface Separation Processes.

48.403 Polymer Science  
Prerequisites: 2.102A, 2.102B, 10.031, 10.301. Co- or prerequisites: 48.001, 48.113.

Polymerization processes; step growth and chain growth (free radical and ionic), stereospecific catalysts. Methods of polymer-

Philosophy

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

First Enrolment in Philosophy

There are two Level I subjects:
52.103 Introductory Philosophy A (Session 1)
52.104 Introductory Philosophy B (Session 2)

Each of these has 1-unit value they can be taken separately, and a student can gain Upper Level status in Philosophy (quality to enrol in Upper Level subjects) by passing in only one. However, students enrolling in one will normally enrol in both, and students wishing to major in Philosophy must do so.

Value of Upper Level Subjects in Philosophy

With the exception of two which count as full units, all upper level subjects in Philosophy are part units, of which three together have the value of two full units; otherwise, each one counts as a half-unit.

Major in Philosophy

Students majoring in Philosophy must take the equivalent of two full Upper Level (II/III) units in Year 2, and the equivalent of 4 full Upper Level (II/III) units in Year 3.

Level II/III

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

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

52.103 Introductory Philosophy A S1 L3T1 C6
Prerequisites: Nil.
Consult School for details.

52.104 Introductory Philosophy B S2 L3T1 C6
Prerequisites: Nil.
Consult School for details.

52.219 Philosophical Foundations of Marx's Thought S2 L3 C6
Neil Harpley, Barbara Roxon
Prerequisite: Upper Level status in Philosophy. Excluded 52.373.
Not offered in 1988.

52.2001 The Nature of Mind S1 L2 C4
Philip Cam
Prerequisite: Upper Level status in Philosophy.
Not offered in 1988.

52.2002 Contemporary Philosophy of Mind S1 L2 C4
Philip Cam
Prerequisite: Upper Level status in Philosophy.

General introduction to current issues in the Philosophy of Mind: intentionally and intentional systems; computational models and their physical basis; the nature of mental representation; theories of consciousness; philosophy and artificial intelligence; the concept of a person; mechanism, freedom and responsibility.

52.2003 Issues in the Philosophy of Psychology S2 L2 C4
Philip Cam
Prerequisite: Either 52.2001 or 52.2002.

A philosophical investigation of some theoretical issues in psychology and related sciences: folk psychology and psychological science; behaviourism and its critics; some limits of cognitive psychology; relations between psychological and physiological explanation; the computer as a model of the mind; perceptions as hypotheses; the character and status of mental images.

52.2010 Reasoning Skills S1 L2 C4
Prerequisite: Any Level I subject. Excluded: 52.233.
Reasoning skills in which practical arguments are examined in classroom exercises; lectures on practical argument in politics
and everyday life as compared with arguments in mathematics and theoretical science.

Assessment: Exercises, essay and class examination.

52.2020

52.2021

52.2030

52.2031

52.2040 Greek Philosophy: Thales to Plato  S2 L2 C4
Ray Walters
Prerequisite: Upper Level status in Philosophy. Excluded: 52.183.
The leading ideas of the Greek philosophers from Thales to Plato with special reference to the Pre-Socratics.
Assessment: To be decided in consultation with students.

52.2050 Classical Political Philosophy  S1 L2 C4
Stephen Cohen
Prerequisite: Upper Level status in Philosophy. Excluded: 52.203.
The basis of political society, its various functions and its relation to the individuals in it, investigated primarily through the works of Hobbes, Locke, Rousseau and Mill. Topics include the theory of a social contract, the establishment of political rights and obligations, and the relation of moral and political concerns within a political society.
Assessment: Two short essays and an examination.

52.2060 Sartre  S1 L2 C4
Barbara Roxon
Prerequisite: Upper Level status in Philosophy. Excluded: 52.213.
An examination of Sartre’s account of emotion; freedom and contingency; and action.
Assessment: Essays.

52.2130 British Empiricism  S2 L2 C4
Neil Harpley
Prerequisite: Upper Level status in Philosophy. Excluded: 52.173.
A survey of the empiricist tradition with special concentration on Locke and Berkeley.
Assessment: Exercises and essays or examination.

52.2140 Scientific Method  S1 L2 C4
Ray Walters
Prerequisite: Upper Level status in Philosophy. Excluded: 52.193.
The nature of empirical knowledge as exemplified in the physical and social sciences, with emphasis on the concept of explanation, the nature of induction and scientific laws, and controversies over the nature of scientific knowledge.
Assessment: Exercises or essay and examination.

52.2150 Philosophy of Law  S2 L2 C4
Stephen Cohen
Prerequisite: Upper Level status in Philosophy. Excluded: 52.105.
Selected conceptual and normative issues in the philosophy of law, centring around the broad areas of law (eg, its nature, validity, bindingness, and relation to morality), liberty, justice, responsibility (including strict and vicarious liability), and punishment.
Assessment: Essays, possibly an examination.

52.2170 Hume  S1 L2 C4
Neil Harpley
Prerequisite: Upper Level status in Philosophy. Excluded: 52.152, 52.563.
A study of Hume’s epistemology, his discussion of arguments for the existence of God and free will.
Assessment: Essay and exercises or examination.

52.2220 The Ethics of Plato and Aristotle  S1 L2 C4
Stephen Cohen
Prerequisite: Upper Level status in Philosophy. Excluded: 52.523, 52.5231.
A systematic investigation of the moral theories of Plato and Aristotle. Beginning with the immoral and subsequent amoral position of Thrasymachus and his question in Book 1 of The Republic, “Why should I be just?”, the subject investigates the ways in which Plato and Aristotle each set out the problems of the nature of morality and why a person should be moral, their approaches to the solutions of these problems, and their positive moral theories.
Assessment: Two short essays and an examination.

52.2230 Theories in Moral Philosophy  S2 L2 C4
Stephen Cohen
Prerequisite: Upper Level status in Philosophy. Excluded: 52.523, 52.5232.
Three moral theories central in the history and development of moral philosophy. Hume, Kant, and Mill offer differing kinds of moral theories, differing approaches to arriving at a moral theory, and specific theories which are markedly different from each other. Each moral theory in itself and in comparison with the other two theories examined.
Assessment: Two short essays and an examination.

52.2240 Philosophical Study of Woman  S1 L2 C4
Prerequisite: Upper Level status in Philosophy. Excluded: 52.283.
Not offered in 1988.
### Sciences

**52.2250 Plato’s Theory of Forms**  
S2 L2 C4  
*Prerequisite: Upper Level status in Philosophy. Excluded: 52.483.*  
Not offered in 1988.

**52.2260 Aesthetics**  
Ray Walters  
S2 L2 C4  
*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.  
*Assessment: Exercises or essay and examination.*

**52.2270 Social and Political Philosophy**  
Stephen Cohen  
L2 C4  
*Prerequisite: Upper Level status in Philosophy. Excluded: 52.513.*  
Not offered in 1988.

**52.2330 Psychoanalysis — Freud and Lacan**  
Barbara Roxon  
S2 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.

**52.2360 Theories, Values and Education**  
Martin Bibby  
S2 L2 C4  
*Prerequisite: Upper Level status in Philosophy. Excluded: 52.583.*  
The nature of theories of education, and the contributions to them of philosophy, psychology and sociology; values in education and the social sciences; the justification of an ordering of educational goals.  
*Assessment: Essay.*

**52.2371 Plato’s Later Dialogues**  
S2 L2 C4  
*Prerequisite: 52.483 or 52.2250 (or, by permission, a course covering similar material). Excluded: 52.293.*  
Not offered in 1988.

**52.2990 Reading Option A**  
S1 or S2 C4  
*Excluded: 52.413.*  
Admission by permission, to suitable students with good Passes in at least two subjects at Upper Level. A course of individually supervised reading and assignments on an approved topic not otherwise offered.  
*Assessment: Essay.*

**52.3010 Seminar B**  
S1 T2 C4  
*Excluded: 52.433.*  
As for 52.2980 Seminar A.

**52.3020 Seminar C**  
S2 T2 C4  
*Excluded: 52.443.*  
As for 52.2980 Seminar A.

**52.3030 Reading Option B**  
S1 or S2 C4  
*Excluded: 52.453.*  
As for 52.2990 Reading Option A.

### Sociology

**53.001 Introduction to Sociology**  
F 3CCH C12  
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.

### Education

**58.704 Theory of Education 3**  
F L3  
*Prerequisite: 58.703.*  
Sociology of Education: Includes sociology of the school and classroom, deviance, knowledge and the curriculum, sexism, in schools, social trends and problems and their implications for education, technology work and lifelong learning. Selected Studies in Education: two education theory options to be selected from among a number available; some deal with the
separate disciplines of philosophy, psychology, sociology, others may draw from more than one. In any given year the options offered depend on the staff available and on student demand. Topics may include the following: Computer assisted instruction, the talented child, learning disabilities, social trends and problems, sociology of the school and classroom, methodology for criticism, ethical theory and moral education, science and religion in education.

58.714 Teaching Practice 3  F 15 days
Prerequisites: 58.713, 58.723 or 58.733 or 58.743 or 58.753. Co-requisites: 58.724 or 58.734 or 58.744 or 58.754 or 58.764.

Provision for further opportunities for students to develop teaching competence; each student is placed in a high school for 15 days and works in close association with a teacher.

58.734 Science Curriculum and Instruction 3 S1 L1T4 S2 T3
Prerequisites: 58.703, 58.713, 58.733.

Examination of NSW secondary school science syllabuses, investigation of curriculum material suitable for use in teaching secondary school science, development of teaching resources, the professional development of the science teacher, the teaching of biology, chemistry, geology and physics. Classroom Issues and Strategies: aspects relating to assessment and measurement including test planning, standardized tests, marking and reporting, essay-type tests, scaling of test scores, uses and effects of assessment.

58.744 Mathematics Curriculum and Instruction 3 S1 L3 S2 L2
Prerequisites: 58.703, 58.713, 58.743.

The teaching of senior secondary school mathematics syllabuses, curriculum development projects in mathematics and their application in NSW, critical analysis of learning problems of school students, investigation of practical remedies for such problems. The subject is designed to complement 58.714 Teaching Practice 3, taken together these subjects provide a wide set of experiences which equip potential teachers to fit successfully into the NSW teaching environment. Classroom Issues and Strategies: aspects relating to assessment and measurement including test planning, standardized tests, marking and reporting, essay-type tests, scaling of test scores, uses and effects of assessment.

58.793 Advanced Education 1 F 1CCH
Students study one of the following segments: Philosophy of Education segment: some connected issues in social and political philosophy, and their implications for educational theory and practice. Includes: freedom, compulsion and the aims of education; neutrality of education systems, schools, teachers and courses; and justice and equality. Educational Psychology segment: introduction to selected aspects of on-going research activities in educational psychology. The area is selected following discussions with staff members. Sociology of Education segment: more detailed and extensive examination of central topics studied in the pass strand. Consideration of selected issues to do with social theory, the nature of the sociological enterprise and sociological methods.

58.794 Advanced Education 2 F 1CCH
Each student engages in twenty-eight hours of supervised study appropriate to his or her proposed research, as approved by the Head of School.

58.795 Advanced Education 3 F 4CCH
Enrolment is subject to approval by the Head of School.

In their full-time Honours year, all students enrol in four twenty-eight-hour units of study appropriate to their research, as approved by the Head of School.

58.799 Thesis

Science and Technology Studies

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

Level I

62.101I Science, Technology and Social Change S1 L2T1 C6
Prerequisite: Nil. Excluded: 62.110.

Relations between science, technology and society which have evolved in the 20th century. 1. Topics which illustrate the effects of scientific and technological development on society — especially those, such as pollution and unemployment, which are apparently unintended; and 2. Selected theories which have been proposed to explain and evaluate the nature of technological change. Topics include: the use of pesticides; the implications of microprocessor technology; the development of nuclear energy and the debate about recombinant DNA research. Theories of Galbraith, Commoner, Dickson and others — particularly in relation to the question as to whether unintended consequences of scientific and technological development can be eliminated by "technological fixes" or whether they are inevitable in modern industrial society.

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

62.102I Man, Megalith and Cosmos S1 L2T1 C6
Prerequisite: Nil. Excluded: 62.111, 62.219U.

The roots of scientific thinking in antiquity, and the development of the central traditions which were to form the foundations of modern science, stressing origins of geometry, astronomy, astrology and cosmology. Emphasis on the interpretation of evidence from archaeology, particularly that relating to the megalithic cultures, and on the assessment of the rele-
vance of anthropological studies, particularly of Australasia and the Pacific region. Topics include: evidence for archaeoastronomical interpretations of prehistoric sites; theories of the origins of geometry; inter-relationships of science and religion; traditional Pacific navigation; patterns of reasoning in early times, and in primitive cultures today; the evolution of mythology; cosmology and astronomy in mythology; the scientific and philosophical legacy of Greek science, particularly of Aristotle, Euclid and Ptolemy; a comparative study of the astronomy and cosmology of Mesopotamia, Egypt, Greece, America, etc; the background to the Copernican Revolution; the Von Daniken phenomenon; the mystery of the Dogons; an appraisal of astrology.

Assessment: 2 short essays (33 1/3 percent); 2 tests (33 1/3 percent); tutorials (33 1/3 percent).

62.1041 The Seventeenth Century Intellectual Revolution S2 L2T1 C6

Prerequisite: Nil. Excluded: 62.211, 62.219U.

The intellectual revolution, centred upon science of the 17th and early 18th centuries, which led on to the Enlightenment. The Mediaeval and Renaissance background. Bacon and Baconianism; empiricism; experimentation and the virtuosi; the idea of progress. The mechanization of the world picture; Descartes and Cartesianism; rationalism; the revival of atomism, materialism. The Copernican Revolution. Locke. Hobbes.

Assessment: Essay (40 percent), tutorials (30 percent); examination (30 percent).

Level II/III

62.201U Materials, Machines and Men S2 L2T1 C6

Prerequisite: Completion of Arts subjects carrying at least 24 credit points; or a Pass in four Level I Science units. Excluded: 26.564, 26.251, 62.022, 62.253.

The rise of technology in its social and cultural context before, during and since the Industrial Revolution. This Revolution, which has been described as the most significant event in human history since the Agricultural Revolution of the New Stone Age, is examined in some detail, and concentrates on technology and its effects on human beings. Considers the professionalization of engineering, the spread of industrialization in Britain, in Europe and the USA, and examines the Second Industrial Revolution. Emphasis on the social and economic effects of the interactions of technology and society.

Assessment: Tutorial paper (30 percent); performance in class (40 percent); class test (10 percent); examination (20 percent).

62.202U The Scientific Theory S2 L2T1 C6


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 1/3 percent); tests (33 1/3 percent); tutorials (33 1/3 percent).

62.203U Scientific Knowledge and Political Power S1 L2T1 C6

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

An introduction to the political dimensions of 20th century science. Topics include: growth of expenditure on science in the 20th century; attempts to define the social function of science in the inter-war years; the radical scientists’ movement of the 1930s — the freedom versus planning debate; science and politics in the Second World War; government patronage and political expectations in the post-war period; science and economic growth; the science-technology relationship; the rejection of laissez-faire in the 1960s; approaches to science policy; critiques of the role of science in contemporary society; scientists as experts; the question of social responsibility in science.

Assessment: Essays (50 percent) tutorials (50 percent).

62.204U The Social System of Science S2 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.062, 62.262.

An introduction to the social dimension of the practice of science. The production and application of scientific knowledge as an activity in constant interaction with its socio-economic, political and cultural environments. The principal features of this interaction in relation to each of the following aspects of scientific activity: the processes of research and discovery; the dissemination of research findings and their acceptance or rejection; the development or abandonment of accepted theories; and the technological applications of scientific knowledge.

Assessment: Essays and tutorial work.

62.205U Historical Origins of the American Scientific Estate S1 L2T1 C6

Prerequisite: As for 62.201U. Excluded: 62.072, 62.272.

The development of American scientific institutions and research from the early years of the Republic, when that country was a scientific backwater, to its present position of global dominance in terms of research resources. Questions about the historical roots of organized research in universities, industrial corporations and government organizations. The American case illustrates well the processes whereby the rapidly emerging scientific profession and its varied specialisms forged links between these sectors of society. Topics: the place of science in a young resource-rich democracy, the uses of science in Progressive ideology, and the war-born relationship of science, government and the military.

Assessment: 2 essays (60 percent); tutorial assessment (40 percent).
62.206U Science, Technology and Developing Countries  S1 L2T1 C6

The disparities between the scientific and technical capabilities of industrialized and developing societies. The reasons for these disparities and their economic and social consequences. Aspects include: the problems of dependency; the product cycle and its impact on location of production; concepts of the 'learning curve', aspects of technology choice; bargaining processes; transnational corporations and the 'truncation' of the industrial sector; efforts to define 'appropriate' technologies; modes of technology transfer; alternate models and policies for scientific and technological development; the role of traditional technology; the impact of modern technology on international relations. Issues: the consequences of modern science and technology for the role of the military in developing countries; food and population problems; energy use; environmental impacts; class structure, etc. The social role and function of scientific communities in less developed countries and the process of diffusion of science from the centre to the periphery and the evolution of national scientific communities and institutions are addressed through the use of case studies.

Assessment: Essay (50 percent); tutorials (50 percent).

62.207U The Discovery of Time  S1 L2T1 C6
Prerequisite: As for 62.201U. Excluded: 62.103, 62.223.

The history of time, from the Ancient World through the Twentieth Century. The principal strands studied: clocks and other instruments for the measurement of time, civil and religious calendars, concepts of time, philosophy and theology of time, concepts 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 (33½ percent); tutorials (33½ percent); 2 class tests (33½ percent).

62.208U The Darwinian Revolution  S1 L1T1 C6

Scientific, philosophical, and social antecedents and consequences of Darwin's theory of evolution. The prevailing ideas in biology before Darwin in the context of the general climate of ideas in the 18th and early 19th centuries. Darwin's life and work in some detail, followed by a consideration of the work of Mendel and the establishment of the 'synthetic' theory of evolution. The impact of evolutionary ideas in such diverse fields of thought as religion, literature, music, political theory, epistemology, ethics, and the social and behavioural sciences.

Assessment: Examination (30 percent); tutorial exercises (40 percent); essay (30 percent).

62.209U Mind, Mechanism and Life  S1 L2T1 C6

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 (33½ percent); tutorial assessment (33½ percent); tests (33½ percent).

62.210U History of Medicine  S L2T1 C6

Not offered in 1988.

62.211U Relations Between Science and the Arts  S1 L2T1 C6


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

62.212U The New Biotechnologies and Their Social Context  S2 L2T1 C6
Prerequisite: 62.101U 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  S2 L2T1 C6

The historical development of technology in Australia during the 20th century, with an analytic focus on three key dimensions:
linkages between scientific research, industrial development and economic growth, technological change and its impact on Australian society: the distinctive features of Australia's geopolitical situation. Topics include: The origin, expansion and transformation of the CSIRO, the maturation and professionalization of the Australian research community; the politicization of science and the post-war legacy; the failure of Australian research to serve an industrialized economy; science policy and technological change in the 1970s and 1980s; comparison with the Canadian situation and the experience of newly industrializing countries.

62.214U Man, Woman and Deity S2 L2T1 C6
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 to 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 environmental movement; the Gaia hypothesis.
Assessment: 1 essay (33½ percent); 2 tests (33½ percent); tutorials (33½ percent).

62.215U The Arch of Knowledge: Philosophy and Methodology of Science to 1800 S1 L2T1 C6
The development of ideas concerning the nature and methods of the sciences from antiquity to 1800: Platonism and Aristotelianism; scholastic philosophy, the realist/nominalist debate; the Paduan school; Galileo and the matematization of nature; Bacon and Baconianism; Descartes and Cartesianism; Newton and Newtonianism; Locke as an under-labourer in the Newtonian garden; criticisms of Newtonian science and Lockeian empiricist epistemology; Leibniz, Berkeley and Hume; French empiricism and philosophy of language. Condillac, Kant's Copernican Revolution and principles of Kantian philosophy.
Assessment: 2 essays (50 percent); 2 seminar presentations (50 percent).

62.216U Philosophy and Methodology of Science: 1800 to the Present S2 L2T1 C6
The development of ideas concerning the nature and methods of the sciences from 1800 to the present: Herschel, Mill and Whewell (British empiricism in conflict with Kantian transcendental philosophy); Comte, Mach and 19th century positivism; Peirce, James and pragmatism; Poincare and conventionalism; Duhem and instrumentalism; Meyerson and realism; Frege, Russell and logicism; Wittgenstein and Hanson; Einstein and the new science; Bridgman and operationism; Eddington and selective subjectivism; the Vienna Circle and logical positivism; Carnap and positivist reductionism; Hesse and nostalgism; Popper and falsificationism; Lakatos and 'research programs'; Feyerabend and methodological anarchism; sociologists of knowledge.
Assessment: 2 essays (50 percent); 2 seminar presentations (50 percent).

62.217U Computers, Brains and Minds: Foundations of the Cognitive Sciences S2 L2T1 C6
Prerequisite: As for 62.201U. Excluded: 62.554, 62.564.
Introduction to contemporary discussions of the mind, thought, intelligence and consciousness. Focus on the issues which arise in connection with the so-called 'cognitive sciences' — the disciplines which include such fields as computer science, the various neuro-sciences, cognitive psychology, linguistics and the philosophy of mind. Stress on the recent revolutionary developments in the computer simulation of thought or 'artificial intelligence' and linguistics, since both these areas shed new light on traditional questions concerning the mind. Questions are: Can computers think? and Is the brain a machine? Exploration of the theories, methods and philosophical issues which arise from the 'computational' or 'information processing approach' to the mind.
Assessment: Essay (40 percent); tests (30 percent); tutorials (30 percent).

62.218U Language and Mind: The Impact of Chomsky's Revolution S1 L2T1 C6
Prerequisites: As for 62.201U. Excluded: 62.570.
Chomsky's theories of language and mind which have revolutionised linguistics, psychology and philosophy. History of linguistics and psychology, especially the Behaviourist approach of Skinner. Chomsky's impact on traditional philosophical debate between Rationalists and Empiricists concerning innate ideas.

Level III

62.300U Research Methods in Science and Technology Studies S1 T2 C6
Arts prerequisite: Completion of Arts or other approved subjects, carrying at least 72 credit points, including at least 12 credit points gained in Science and Technology Studies subjects completed with an average grade of Credit or better. Excluded: 62.105, 62.520.
Sciences prerequisite: 4 S & T subjects with an average of Credit or better or by permission of the Head of School. Excluded: 62.105, 62.520.
A weekly seminar designed to prepare students to carry out Honours level research. The historiography of science, and its relations to philosophical and social studies of science, are 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.

62.3001 Philosophical Problems in Evolutionary Biology
Arts prerequisite: Completion of Arts or other approved subjects, carrying at least 72 credit points. Co-requisite: 62.202U or 62.208U. Sciences prerequisites: Third year standing. Co-requisite: 62.202U or 62.208U.

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.

62.3005 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 Programs

62.400H Science and Technology Studies Honours.
Prerequisite: Completion of years 1-3 of program 6200, with marks that result in an average of Credit or better in the eight S & T units included in that program.

In the Honours program, candidates are required to present a thesis and to complete course work as approved by the Head of School. In certain circumstances, generally relating to the proposed Honours thesis topic, the Head of School may also require a student to complete one or more specified units offered by other Schools in the University.

Board of Studies in Science and Mathematics

68.302 Introductory Marine Science
Excluded: 25.601.

Ocean basins, sediments, properties of seawater, ocean circulation, coasts and coastal processes. Marine biology and ecology, primary and secondary productivity.

Field work in mid-year recess.

68.313 Physical Oceanography
Prerequisites: 10.001 or 10.011, 1.001.
The physical properties and motions of the oceans, and their measurement. Oceanographic instrumentation. The design of small and large scale ocean experiments. Laboratory and field work.

68.451 Biological Laboratory Computing
Prerequisites: As for 10.021B. Excluded: 1.041. Programs 6000, 6806.

Concepts and problems in biology and biology-related areas amenable to the application of computers; experience in elementary BASIC programming and data analysis using large mainframes and laboratory microcomputers: use of microcomputers for collecting data from laboratory instruments, and for controlling instruments in experiments. Includes a segment taught in common with 1.041 Laboratory Computers in Physical Sciences.

68.430 Geology and Physics Honours
An honours program combining Geology and Physics in Program 0100, made by arrangement with the Heads of the two Schools.

68.601 Genetics of Behaviour 1
Prerequisite: 17.031. Excluded: 79.402.
Introductory behaviour genetics with most examples coming from human genetics. Single gene, polygene and chromosomal genetics which illuminate normal and abnormal behaviour; mathematical treatment of data, non-human mammalian behaviour. Practical classes and limited clinical contact.

68.602 Genetics of Behaviour 2
Prerequisite: 68.601 or 79.402. Excluded: 79.403.
The topics of 68.601 at a more advanced level. Continued emphasis on human behaviour with essential consideration of microbial and invertebrate studies. Extended mathematical treatment of data. Projects involving community contact replace some of the practical sessions.

Anatomy

70.011A Histology 1
Prerequisites: 17.031, 17.041. Co-requisite: 70.011C
Elementary theory of light and electron microscopy. Cell morphology and cell ultrastructure. Introduction to simple histological techniques. Basic histology, including the morphological and functional properties of epithelial, connective, muscle and nerv-
ous 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 prosected specimens. Musculoskeletal, cardiovascular, respiratory, gastrointestinal, genitourinary and nervous systems. General topographical and surface anatomy.

70.012B Visceral Anatomy

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

Prerequisites: 70.011A, 70.011C.

Nerve cells and neuronal satellite cells, cytoarchitecture of brain and spinal cord, comparison of peripheral and central nervous systems. Functional anatomy of sensory and motor processing, and higher cerebral functions such as language and emotions. Blood supply of the central nervous system, cerebrospinal fluid and membranous coverings. Comparative anatomy of the brain.

70.013 Anatomy 4

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.

70.014 Histology 2

Prerequisites: 70.011A. Excluded: 70.304. (If 70.014 is taken after 70.304, total counts only 1 unit.)

May not be offered in 1988.


70.014 Histological and Histochemical Techniques

Prerequisites: 17.031, 17.041 and either 41.101 or 45.301 or 70.011A. Excluded: 70.304.


70.035 Neuroanatomy 2

Prerequisite: 70.021C.

In seminar format, topics in contemporary neuroanatomy, working from original papers. Includes: sensory and motor areas of the neocortex, hippocampus, cerebellum, and sense organs. Recent work on the development of the central nervous system. Recent advances in neurohistochemistry and neuroendocrinology. Students are required to undertake a substantial amount of private study.

70.036 Functional Anatomy 1

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.

70.037 Functional Anatomy 2

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.

Pathology

72.031 Basic and Applied Pathology

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

Physiology and Pharmacology

73.111 Physiology 1  
F L2T4  
Prerequisites: 17.031 & 17.041; 2.121 & 2.131, or 2.141; 10.001 or 10.011 or 10.021 B & C. Excluded: 73.121, 73.011. Co-requisite: 41.101.

Introduction to fundamental physiological principles, dealing first with basic cellular function in terms of chemical and physical principles, and, second, with the operation of the various specialized systems in the body, for example, the cardiovascular system, whose function it is to transport materials to and from the tissues of the body, the respiratory system which must maintain the exchange of oxygen and carbon dioxide between the atmosphere and the blood; the gastrointestinal system which enables food materials to be modified by digestion and absorbed into the circulation; the kidney which is involved in the regulation of body fluid and electrolyte balance and with the excretion of the waste products of metabolism; the endocrine system which releases chemical messengers, called hormones, that are carried in the blood stream to regulate a great variety of body functions, e.g. 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.

73.012A Membrane Biology  
S1 L2T4  
For entry consult Head of School of Physiology and Pharmacology.

The properties of cell membranes including permeation of ions, solutes and water across membranes, generation of electrical signals in nerve and muscle cells produced by ion movements, and transmission of information between cells. Stress on modern research techniques and on a critical examination of appropriate classical papers.

73.012B Neurophysiology  
S1 L2T4  
For entry consult Head of School of Physiology and Pharmacology. A detailed study in two broad areas, neural mechanisms in sensation and the control of posture and movement. Includes the regulation of visceral and other autonomic effector structures and the neural substrates and correlates of certain higher functions such as speech, memory and consciousness. Directed towards the experimental analysis of nervous system function, to introduce the techniques and approaches used in neurophysiological research. Sensation: an integrated lecture and experimental course is given on somatic, visual and auditory sensory mechanisms. Laboratory work: students conduct psychophysical experiments to evaluate subjective sensory capabilities. The neural mechanisms underlying these subjective abilities are examined in animals in electrophysiological experiments which involve recording the impulse patterns from individual neurones within the sensory systems. Students are required to analyze the mechanisms employed by the nervous system to code information about specific parameters of sensory stimuli.

Lectures and experiments on motor function are directed towards an understanding of the various reflex and voluntary mechanisms controlling posture and movement. The section dealing with nervous control of visceral function is concerned mainly with regulation of cardiorespiratory activity.

73.012C Organ Physiology  
S2 L4T8  
Prerequisites: for 73.012A, B, C: normally as for 73.012. For entry consult Head of School of Physiology and Pharmacology.

An advanced study dealing with major physiological systems of the body and usually includes detailed segments from: the cardiovascular and respiratory systems; endocrines, kidney, fetal physiology, gastrointestinal physiology and exercise physiology. Emphasis on the functions of individual organs as well as the overall operations of particular body systems including their neural control mechanisms. Emphasis on the approaches and techniques involved in physiological research. Students are therefore required to carry out an extensive series of experiments which usually employ mammalian (including human) preparations.

73.012F Clinical Physiology  
F T3  
Excluded: 73.012 Prerequisites: 73.111, 41.101; 41.111 or 2.002B; 70.011A; 70.011C; 80.014.

This Level III subject is only available in course 3820, and only to those students not undertaking Physiology 2. The subject is
intended to supplement the Level II, Physiology 1A course in order to provide an adequate grounding for double degree students in applied or clinical aspects of physiology before they enter Year 3 of the Medical Course.

Covers aspects of normal and disordered physiology in the following areas: cardiovascular and cardiorespiratory mechanisms; body fluid balance and kidney function; the endocrine system; central nervous system; gastrointestinal physiology.

73.022 Pharmacology  
F L2T4
Prerequisite: 73.111 or 73.121. Co-requisites: 73.012 or 41.102A & 41.102B 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.

73.111 Physiology 1  
F L2T4
Prerequisites: 17.031 & 17.041; 2.121 & 2.131, or 2.141; 10.001 or 10.011 or 10.021 B & C. Excluded: 73.121, 73.011. Co-requisite: 41.101.

Introduction to fundamental physiological principles, dealing first with basic cellular function in terms of chemical and physical principles, and, second, with the operation of the various specialized systems in the body, for example, the cardiovascular system, whose function it is to transport materials to and from the tissues of the body; the respiratory system which must maintain the exchange of oxygen and carbon dioxide between the atmosphere and the blood; the gastrointestinal system which enables food materials to be modified by digestion and absorbed into the circulation; the kidney which is involved in the regulation of body fluid and electrolyte balance and with the excretion of the waste products of metabolism; the endocrine system which releases chemical messengers, called hormones, that are carried in the bloodstream 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.

79.202 Human Genetic Analysis  
S2 L2T3
Prerequisites: one unit of genetics and one unit of statistical methods, or theory, as approved by the Head of School.

Principles and methods of human genetics: design of surveys, including twin and family studies; estimation and applications of genic and genotypic frequencies, selective values, mutation and migration rates, coefficients of kinship, inbreeding and assortative mating, effective population sizes, recombination fractions and heritabilities; segregation analysis; risks of recurrence of disease; genetical consequences of human intervention; computer methods.

79.302 Biochemical Genetics of Man  
S1 L2T4
Prerequisites: 41.101, 43.101.

Inherited variation of blood group antigens, serum proteins and red-cell enzymes, their possible selective roles, and their application to the study of differences between and within populations. Application of statistical techniques to analyzing population data.

Faculty of Medicine

80.014 Human Behaviour  
F L3
Prerequisites: No formal prerequisites. Students may take the subject in Year 2 or Year 3 of Course 3820.

As for 80.012. See Undergraduate Study: 3800 Medicine Course, earlier in this handbook.
Graduate Study:
Faculty of Biological Sciences
Faculty of Science
Faculty of Biological Sciences and Faculty of Science Enrolment Procedures

All students re-enrolling in 1988 or enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1988* available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

Faculty of Biological Sciences

Facilities are available in each of the Schools for research leading to the degrees of Master of Science and Doctor of Philosophy. The School of Biotechnology offers a graduate diploma course in Biochemical Engineering, a graduate diploma in Biotechnology and a Master's course in Biotechnology by formal study, and the School of Psychology offers Master of Psychology and Master of Science (Psychology) degree courses.

Higher Degree Qualifying Program

Students without a BSc Honours degree wishing to register as higher degree candidates must usually complete a qualifying program, admission to which is subject to the approval of the Faculty Higher Degree Committee.

Applicants must normally have a degree or diploma in an appropriate field of study from an approved university or institution, and in the case of a diploma, appropriate professional experience.

Undergraduate of this University may be admitted to the full-time or part-time Honours undergraduate course. Other applicants may be admitted to a full-time, part-time or external qualifying program. The duration of the qualifying program is a minimum of one year for full-time and two years for part-time or external students.

Content of Qualifying Program

The qualifying program consists of the whole of the usual program for the final Honours year of the undergraduate course, the following being the prescribed Level IV subjects:

- 41.103 Biochemistry Honours
- 42.103 Biotechnology Honours
- 43.103 Botany Honours
- 44.103 Microbiology Honours
- 12.403 Psychology 4 (Thesis)
- 45.103 Zoology Honours

The qualifying program is graded in the usual way, and in appropriate cases the results are expressed as a grading equivalent to Honours.

Alternative Qualifying Program

Applicants who cannot attend the University regularly for the above programs may be admitted as external qualifying students to a program similar to a standard Honours year. The following are the alternative qualifying subjects:

- 41.999G Biochemistry
- 42.999G Biotechnology
- 43.999G Botany
- 44.999G Microbiology
- 12.999G Psychology
- 45.999G Zoology
The results in alternative qualifying subjects are graded Pass or Fail only.

Fees
Candidates enrolled in the Alternative Qualifying Program are exempt from student service fees.

Biotechnology

5014 Biochemical Engineering Graduate Diploma Course

Graduate Diploma GradDip

The Department of Biotechnology, conjointly with the School of Chemical Engineering and Chemical Technology, offers a course in biochemical engineering which leads to the award of a graduate diploma (GradDip). The course is open to graduates in the biological sciences, chemistry, chemical engineering or agriculture, and can be completed in one year of full-time or over a longer period by part-time study. It contains a component of graduate level ‘bridging’ subjects, designed to facilitate the introduction of graduates with a variety of backgrounds to the current practice of biochemical engineering.

The normal entrance requirement is an appropriate degree or equivalent qualification in biological sciences, chemistry, chemical engineering or agriculture. Intending students are referred to the conditions for the award of Graduate Diplomas set out later in this handbook.

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td><strong>Session 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41.211G Principles of Biology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>42.212G Principles of Biochemistry</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>44.101 Introductory Microbiology</td>
<td>6</td>
<td>0</td>
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<tr>
<td>48.282G Thermodynamics</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>48.284G Mass Heat and Momentum Transfer</td>
<td>4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Session 2</strong></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>42.213G Biochemical Methods</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>42.214G Biotechnology</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>48.283G Process Dynamics and Biochemical Engineering Design</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

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 corequisite.

Under normal circumstances, students whose previous training has included a substantial component of biotechnology will not be admitted to the course.

The course comprises study of undergraduate and graduate formal subjects, plus extensive laboratory training in biotechnology.

The diploma is awarded after one year’s full-time study, consisting of an average of 19 hours per week, or two years part-time study, consisting of an average of 9½ hours per week. The program includes the listed obligatory subjects plus sufficient of the listed elective subjects to meet the hours of study required. The electives include subjects necessary for students without previous tuition in biochemistry and/or microbiology, as well as alternatives for those with previous tuition in these disciplines.

The choice of electives in each individual case is subject to approval by the Head of School.

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td><strong>Obligatory Subjects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Year</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Session 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.102A Biotechnology A</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Elective Subjects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Year</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>42.104G Graduate Seminars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.111G Reading List in Biotechnology (Microbiology)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>42.112G Reading List in Biotechnology (Biochemistry)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>42.305G Case Studies</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

| Session 1 |    |    |
| 44.101 Introductory Microbiology | 6  |    |
| 42.212G Principles of Biochemistry | 3  |    |

| Session 2 |    |    |
| 42.101 Introduction to Biotechnology | 6  |    |
| 42.102B Biotechnology B | 6  |    |
| 44.121 Microbiology 1 | 6  |    |

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.

Master of Science (Biotechnology)

The Department also offers a formal graduate course at the master’s level (Master of Science (Biotechnology)). The course includes advanced treatments of all areas of biotechnology. It is open to graduates with a four-year degree in biotechnology or a related discipline, or who have, in the opinion of the Higher Degree Committee, acquired equivalent qualifications or experience. Intending students are referred to Conditions for the Award of Graduate Degrees set out later in this handbook.
The course consists of lectures, tutorials, practical sessions, case history studies and a 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.

8041
Master of Science (Biotechnology) Graduate Course
Master of Science (Biotechnology)
MSc(Biotech)

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Year</td>
<td></td>
<td></td>
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<tr>
<td>42.306G Project</td>
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<td>7</td>
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<tr>
<td>Session 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.303G Biochemical Process Control</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>42.304G Biodeterioration and Biodegradation</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Session 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.301G Microorganism Productivity</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>42.302G Enzyme Technology</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>42.305G Case Studies</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>19</td>
</tr>
</tbody>
</table>

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.

A student who does not satisfy the above requirements may be permitted to undertake a qualifying course prescribed by the Head of School, satisfactory completion of which will be accepted as meeting entrance requirements.

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. An application to register for the degree of Master of Psychology must be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the academic 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.

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 250 hours of supervised clinical practice must be completed in the first year, and a further 430 hours in the second year.

Assessment of student performance is by sessional examinations, class tests, seminar papers and a research thesis.

It should be noted that the course extends over two calendar years and not just four academic sessions with vacation breaks.
Master of Science (Psychology)

The degree is available only to students who hold the degree of Doctor of Philosophy in an approved area of psychology. In combination with the PhD, the degree is designed to train candidates for academic positions in clinical psychology and to provide the background necessary for advancement to senior posts in applied fields.

The minimum period of full-time registration for the degree is three sessions, and the minimum period of part-time registration is six sessions. Students with advanced standing may have the minimum period reduced by up to one-third of the program.

Assessment of student performance is by sessional examinations, class tests and seminar papers.

8255
Master of Science (Psychology) Graduate Course —
Full-time

Master of Science (Psychology)
MSc(Psychol)

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>12.230G Development Disabilities and Disorders</td>
<td>3</td>
</tr>
<tr>
<td>12.231G Professional Practice: 250 hours</td>
<td></td>
</tr>
<tr>
<td>12.237G Biological and Environmental Bases of Behavioural Disturbance</td>
<td>2</td>
</tr>
<tr>
<td>12.239G Research and Evaluation Methods</td>
<td>2</td>
</tr>
<tr>
<td>12.240G Graduate and Clinical Seminars</td>
<td>2</td>
</tr>
<tr>
<td>12.241G Graduate Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>12.243G Experimental Clinical Psychology</td>
<td>4</td>
</tr>
<tr>
<td>12.244G Psychological Assessment 2</td>
<td>2</td>
</tr>
</tbody>
</table>

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.
Graduate Study: Faculty of Science

5530
Physical Oceanography Graduate Diploma Course

Graduate Diploma in Physical Oceanography Grad Dip

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 Science with major studies in mathematics or physics.

The program, requiring 28 credits for completion, consists of a major project (67.001 G) worth 50% of the total accreditation for the program, the remaining 50% being comprised as indicated below.

1. Compulsory Subjects
   67.001G Experimental Project 14 credits
   67.002G Geophysical Fluid Dynamics 4 credits
   67.003G Instrumentation 1 credit
   67.004G Applied Data Analysis 2 credits

2. Elective Subjects
   6.580G Image Analysis in Remote Sensing 3 credits
   6.581G Microwave Remote Sensing 3 credits
   8.863G Estuarine Hydraulics 3 credits
   27.043G Remote Sensing Applications 3 credits
   67.005G Theoretical Project 7 credits

   Appropriate existing subjects within mathematics, physics or engineering chosen on the basis of individual background

Here 1 credit is defined as being 1 hour per week for one session. The course may be taken over one year (full-time) or two years (part-time).

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8770
Master of Chemistry Graduate Course

Master of Chemistry MChem

Three programs are available, emphasizing different areas of chemistry. Each program consists of a number of lecture courses (each separately examinable), laboratory instruction and visits to laboratories. In addition each student undertakes a short research project, with a research report assessed by two examiners. The student may also be required to undergo an oral examination.

Program 2.581G Advanced Analytical Chemistry and 2.583G Analytical Science (Chemistry) are available only on a full-time basis; however, the qualifying program may be taken part-time.

Program 2.582G Food and Drug Chemistry may be taken either full-time or part-time.

Details of the programs are:

2.581G Advanced Analytical Chemistry

This program should be of interest to chemistry graduates who are involved in the practice or teaching of analytical chemistry.

1. 2.581G Advanced Analytical Chemistry Lecture Courses

Students are required to take all of the following nine core courses of lectures:

(1) Analytical flame spectroscopy;
(2) Advanced electrochemical analysis;
(3) Chromatography;
(4) Analytical chemistry of pollutants;
(5) Emission, IR, Mass and XRF spectroscopy;
(6) Calculations and statistics in analytical chemistry;
(7) Chemical analysis of organic and biological materials;
(8) Operations and applications of minicomputers in chemistry;
(9) Chemical microscopy.

The lecture time for the whole course is a minimum of 140 hours.

2. Laboratory Instruction and Visits to Laboratories

An additional minimum of 150 hours is spent by students in selected areas of laboratory practice, instruction and visits to laboratories.

3. Research Project

A short research project (with report) of approximately 4 months' duration full-time (400 hours laboratory work) is selected in relation to the combined interests of the student and the supervisor.

2.582G Food and Drug Chemistry

This program involves an advanced study of the chemistry, stability, mode of action (where applicable) and analysis of food constituents, food additives and selected drugs. Entry to this program is excluded in the case of applicants who have completed the Graduate Diploma in Food and Drug Analysis (course 5510).
1. Food and Drug Chemistry Lecture/Laboratory Courses
(1) Food and Drugs 1
(2) Treatment of Analytical Data
(3) Instrumental Techniques in Food and Drug Analysis
(4) Food and Drugs 2
(5) Toxicology, Occupational and Public Health
(6) Introductory Microbiology

The lecture time for the whole course is 160 hours. An additional 392 hours is spent by students in formal laboratory work. Students who have not previously taken an approved course in microbiology are required to complete unit 44.101 Introductory Microbiology (84 hours) in addition to the above program.

2. Research project
A short research project (with report) of approximately 4 months’ duration full-time (400 hours laboratory work) is selected in relation to the combined interests of the student and the supervisor.

2.583G Analytical Science (Chemistry)
This program provides a more broadly based training in methods of chemical analysis than 2.581G.

1. Formal course work
Students are required to complete all of the following courses of lectures and associated laboratory work.

(1) Classical methods of chemical analysis
(2) Instrumental analysis
(3) Toxicology, occupational and public health
(4) Special instrumental analysis methods

The lecture time for the whole course is 98 hours. An additional 196 hours is spent in formal laboratory sessions.

2. Project
A short project (with report) requiring 400 hours of laboratory work, which may be either original research work or development work. The field of work will be selected considering the combined interests of the student and supervisor.

5510 Food and Drug Analysis Graduate Diploma Course
Diploma in Food and Drug Analysis DipFDA
According to demand the course may be available on a full-time basis over one year or on a part-time basis over two years.

The course in food and drug analysis is designed to provide systematic training at an advanced level for chemists who wish to extend their acquaintance with analytical techniques, and thus is suitable for those who may wish to practice as public analysts. It is also suitable for those who wish to work in the food or pharmaceutical industry. The prime aim is to present discussions of the principles and design of analytical methods which are therefore presented on a comparative basis.

It is considered that the techniques involved in the handling of foods and drugs together with those discussed in the ancillary subjects of the course provide a firm basis of approach to many other fields.

Intending students are referred to the conditions for the award of graduate diplomas set out later in this handbook.

Year 1

<table>
<thead>
<tr>
<th>Part-time**</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.231G Food and Drugs 1</td>
<td>4</td>
</tr>
<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></td>
<td>9</td>
</tr>
</tbody>
</table>

Year 2

| 2.242G Food and Drugs 2 | 4 |
| 2.251G Toxicology, Occupational and Public Health | 4 |
| 44.101 Introductory Microbiology | 3† |
| | 11 |

†Offered in Session 1 only, at 6 hpw
**Full-time students take Years 1 and 2 in the one year.

Science and Technology Studies

Head of School
Professor W.R. Albury

The School offers a graduate program of coursework and research leading to the award of the degree of Master of Science and Society. The course is designed for graduates in the natural sciences, the applied sciences, technology and the social sciences or other relevant disciplines, who have a special interest in contemporary relationships between science and society, government and politics. The conditions for the award of the degree are set out later in this handbook.

8780 Master of Science and Society Graduate Course

Master of Science and Society MScSoc

The MScSoc pass program comprises 8 units of the course, which should normally be completed over 4 sessions of part-time (evening) study. A unit of the course requires 28 hours of seminar classwork and additional private study.

The following core units are common to the programs of all candidates:

62.716G Science and Society in the Twentieth Century*
62.713G Project*

Candidates may select 4 further units from the following list:
this approval a student may substitute for at most two of these courses.
The duration of each being two hours per week for one session.

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

Elective Subjects

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10.382G Experimental Design 2</td>
</tr>
<tr>
<td>2</td>
<td>10.384G Time Series</td>
</tr>
<tr>
<td>2</td>
<td>10.386G Multivariate Analysis 2</td>
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<td>2</td>
<td>10.387G Sample Survey Design</td>
</tr>
<tr>
<td>2</td>
<td>10.388G Sequential Analysis</td>
</tr>
<tr>
<td>2</td>
<td>10.389G Non-Parametric Methods</td>
</tr>
<tr>
<td>2</td>
<td>10.391G Special Topic* A</td>
</tr>
<tr>
<td>2</td>
<td>10.393G Special Topic* B</td>
</tr>
<tr>
<td>2</td>
<td>10.394G Discrete Distributions</td>
</tr>
<tr>
<td>2</td>
<td>10.212M Optimal Control Theory or</td>
</tr>
<tr>
<td>3</td>
<td>10.222M Higher Optimal Control Theory</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>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>8.403G Theory of Land Use/Transport Interaction</td>
</tr>
<tr>
<td>2</td>
<td>8.405G Urban Transport Planning Practice</td>
</tr>
<tr>
<td>4</td>
<td>8.417G Transport and Traffic Flow Theory</td>
</tr>
<tr>
<td>3</td>
<td>10.212L Optimization Methods or</td>
</tr>
<tr>
<td>3</td>
<td>10.222L Higher Optimization Methods</td>
</tr>
<tr>
<td>2</td>
<td>15.423 Econometrics B</td>
</tr>
<tr>
<td>2</td>
<td>18.711G Simulation in Operations Research</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 full-time study, or (to meet the needs of practising optometrists) in two or three years of part-time study. The course provides advanced training in clinical and theoretical aspects of Optometry, with opportunities for specialization in fields such as contact lenses, occupational optometry, and orthoptics.

Conditions for admission and for the award of the degree of Master of Optometry are set out later in this handbook.

8760
Master of Optometry Graduate Course

Master of Optometry
MOptom

<table>
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<tr>
<th>Hours per week</th>
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<tbody>
<tr>
<td>31.701G Advanced Clinical Optometry 4</td>
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<tr>
<td>Three elective graduate subjects chosen 12 from the list below (each 4 hours)</td>
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<tr>
<td>31.799G Project 8</td>
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<td>24</td>
</tr>
</tbody>
</table>

Elective Graduate Subjects

31.702G Advanced Physiological Optics 4
31.703G Pleorthoptics and Binocular Vision 4
31.704G Advanced Contact Lens Studies 4
31.705G Advanced Contact Lens Practice 4
31.706G Occupational Optometry 4
31.707G Clinical Photography 4

The six elective graduate subjects offered are quite independent, and any three of them are suitable for a student seeking advanced professional training of a general nature. If clinical specialization is aimed at, the student would be advised to elect the graduate subjects shown below:

Specialization Graduate Subjects
Contact Lenses
1. Advanced Contact Lens Studies
2. Advanced Contact Lens Practice
3. Clinical Photography

Occupational Optometry
1. Occupational Optometry
2. Pleorthoptics and Binocular Vision
3. Advanced Physiological Optics

Orthoptics
1. Pleorthoptics and Binocular Vision

ALD36160
2. Clinical Photography

Physics

Head of School
Associate Professor J. C. Kelly

Executive Assistant to Head of School
Dr J. R. Hanscomb

Administrative Officer
Mrs P. Shaw

8730
Master of Physics Graduate Course

Master of Physics
MPhysics

The School offers a graduate course leading to the award of the Master of Physics degree (MPhysics).

The Master of Physics degree course is intended for honours graduates in physics. Others may be admitted if they have submitted evidence of such academic and professional attainments as may be approved by the Faculty of Science on the recommendation of its Higher Degree Committee. Applicants with other qualifications may be admitted after completing a qualifying examination approved by the Faculty of Science.

The subject matter of the course provides an advanced training in a branch of physics, the topic of which is determined during the year preceding that in which it is offered.

Students undertaking the masters course by formal study must enrol in one of the following subjects:

1.801G Energy Alternatives
1.802G Astrophysics
1.803G Acoustics
1.804G Biophysics
1.805G Applied Physics

Enrolment in any one of the above subjects normally involves at least five units of lecture material, a literature survey, and small research project.
A subject is defined by the Professorial Board as 'a unit of instruction approved by the University as being a discrete part of the requirements for a course offered by the University'.

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

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

1. The authority offering the subject, normally a School of the University, is indicated by the number before the decimal point.
2. Each subject number is unique and is not used for more than one subject title.
3. Subject numbers which have not been used for some time are not used for new subject titles.
4. Graduate subjects are indicated by a suffix ‘G’ to a number with three digits after the decimal point. In other subjects three or four digits are used after the decimal point.

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

The identifying numerical prefix/es for each subject authority are set out on the following page.

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

HSC Exam Prerequisites

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

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

Information Key

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

S1 Session 1, S2 Session 2
F Session 1 plus Session 2, ie full year
S1 or S2 Session 1 or Session 2, ie choice of either session
SS single session, but which session taught is not known at time of publication
CCH class contact hours
L Lecture, followed by hours per week
T Laboratory/Tutorial, followed by hours per week
hpw hours per week
C Credit point value
CR Credit
DN Distinction
HD High Distinction
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<tr>
<th>School, Department etc</th>
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<tbody>
<tr>
<td>1 School of Physics</td>
<td>Science</td>
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<tr>
<td>2 School of Chemistry</td>
<td>Science</td>
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<tr>
<td>3 School of Chemical and Industrial Engineering (New Course)</td>
<td>Applied Science</td>
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<tr>
<td>4 School of Materials</td>
<td>Applied Science</td>
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<tr>
<td>5 School of Mechanical and Industrial Engineering</td>
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<tr>
<td>6 School of Electrical Engineering and Computer Science</td>
<td>Engineering</td>
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<tr>
<td>7 School of Mines (Mineral Processing and Extractive Metallurgy and Mining Engineering)</td>
<td>Applied Science</td>
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<tr>
<td>8 School of Civil Engineering</td>
<td>Engineering</td>
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<tr>
<td>9 School of Fibre Science and Technology (Wool Science)</td>
<td>Applied Science</td>
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<tr>
<td>10 School of Mathematics</td>
<td>Science</td>
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<tr>
<td>11 School of Architecture</td>
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<td>12 School of Psychology</td>
<td>Biological Sciences</td>
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<tr>
<td>13 School of Fibre Science and Technology (Textile Technology)</td>
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<tr>
<td>14 School of Accountancy</td>
<td>Commerce</td>
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<tr>
<td>15 School of Economics*</td>
<td>Commerce</td>
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<tr>
<td>16 School of Health Administration</td>
<td>Professional Studies</td>
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<tr>
<td>17 Faculty of Biological and Behavioural Sciences</td>
<td>Biological Sciences</td>
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<tr>
<td>18 School of Mechanical and Industrial Engineering (Industrial Engineering)</td>
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<tr>
<td>19 Department of Industrial Arts</td>
<td>Architecture</td>
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<tr>
<td>20 School of Mines (Applied Geology)</td>
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<tr>
<td>21 Department of General Studies</td>
<td>Board of Studies in General Education</td>
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<td>22 School Geography</td>
<td>Applied Science</td>
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<tr>
<td>23 School of Marketing</td>
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<td>24 School of Surveying</td>
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<tr>
<td>25 School of Optometry</td>
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<tr>
<td>26 Centre for Biomedical Engineering</td>
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<tr>
<td>27 Faculty of Arts</td>
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<td>28 School of Building</td>
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<td>29 School of Town Planning</td>
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<td>30 School of Landscape Architecture</td>
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<tr>
<td>31 Graduate School of the Built Environment</td>
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<tr>
<td>32 School of Biological Technologies (Food Science)</td>
<td>Applied Science</td>
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<tr>
<td>33 School of Biochemistry</td>
<td>Biological and Behavioural Sciences</td>
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*Subjects also offered for courses in this handbook

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<tr>
<th>School, Department etc</th>
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<td>44 School of Microbiology</td>
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<td>45 School of Biological Science</td>
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<tr>
<td>46 Faculty of Applied Science</td>
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<td>47 Centre for Safety Science</td>
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<tr>
<td>48 School of Chemical Engineering and Industrial Chemistry* (Old course)</td>
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<td>66 Subjects Available from Other Universities</td>
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<td>83 Faculty of Engineering</td>
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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.
A study of energy alternatives: solar thermal and solar electric energy; energy from fossil fuels; conversions, hydrogen, nuclear fusion and fission, wind, ocean and geothermal sources of energy; political and sociological aspects of energy alternatives.

1.805G Applied Physics

For MPhysics degree course students.
A study of advanced physical instruments, data handling and control, measurement technology and materials science with special reference to physics in industry.

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 food-stuffs, such as: Foods: Origin, general introduction to analytical methods, relation to likely adulterations and impurities, groups of constituents; carbohydrates, sugars, by physical and chemical methods, jams and preserves, pectin, agar, alginates, oils and fats; protein foods, meat, gelatin, fish products; dairy products, milk, cream, cheese, etc; fermented liquids, beer, wine, spirits, minor constituents. Principles of food processing, dehydration, quick freezing, canning; cereal products; beverages and flavouring essences; nutritional aspects, vitamins in detail; preservatives and food additives; radiation chemistry of food products. Drugs: Elements of pharmacology chemotherapy and modes of action, galenicals, identification tests for alkaloids, etc. Analytical chemistry of analgesics, sedatives, hypnotics, steroid hormones, antihistamines, etc. Antibiotics, penicillin, streptomycin, aureomycin, sulphonamides. Activity of enzyme preparations; antiseptics and disinfectants; soaps and detergents.

2.251G Toxicology, Occupational and Public Health

Important classes of toxic materials found in the environment; treatment of pesticide residues, industrial chemicals of various types, toxic gases, mould metabolites and bacterial toxins occurring in food, carcinogenic substances, toxic metals, etc. Effects of these substances on living organisms, particularly man. Practical work: pesticide residue analysis, blood and urine analysis, gas sampling and analysis, trace metal determination and experiments on the animal metabolism of toxic substances.

2.271G Chemistry and Analysis of Foods

Illustrates the bases and application of analytical techniques as applied to foods. Emphasis is placed on the design of methods, on the preparation of material for instrumental analysis and on the interpretation of data. Includes: proteins and flesh foods, carbohydrates and saccharine foods, fats and oils, dairy and fermentation products, vitamins, food additives — preservatives and colouring matters, pesticide residues, metal contaminants — food microscopy.
2.281G Instrumental Techniques in Food and Drug Analysis  
F L1T3
Principles involved in modern instrumental techniques; detailed application and interpretation of results. UV, IR, NMR, and ESR, emission and atomic adsorption spectroscopy, polarography, X-ray methods, fluorescence spectroscopy and gas chromatography. Services 2.231G, 2.242G and 2.251G but is also suitable as a single subject for those wishing to familiarize themselves with modern techniques.

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  

Mathematics

10.194G Advanced Mathematics Lecture Courses  
Each year a selection of courses is offered in the following areas:
Algebraic geometry; algebraic topology; categorical and homological algebra: commutative algebra: group theory; Lie groups and algebras; representation theory; group theory and its physical applications; advanced quantum mechanics; differential geometry; differential equations; optimal control theory; functional analysis: applied functional analysis; operator theory; harmonic analysis; advances numerical analysis; theory of functions; finite mathematics: number theory; logic; theoretical astrophysics: history of mathematics; recent advances in mathematics; mathematical economics; optimization and control.

10.302G Regression Analysis and Experimental Design  
S1 L1½T½
Prerequisite: First course in Statistics.
A revision of linear regression with extension to multiple and stepwise linear regression. Analysis of block designs, Latin squares, factorial designs, variance component and mixed model analyses. Bioassay, logic models. Contingency tables.

10.303G Applied Stochastic Processes  
S2 L1½T½
Prerequisite: First course in Statistics.

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.

10.394D 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

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.

10.061G Advanced Mathematics for Electrical Engineers C3
Boundary value problems in partial differential equations. Selected topics from complex variable analysis, integral transforms, and orthogonal functions and polynomials.

10.361G Statistics C3
Probability theory, a survey of random processes with engineering applications — processes in discrete and continuous time. Markov processes, ergodicity, stationarity, auto-correlation, power spectra, estimation of auto-correlation and power spectra.

10.371G Statistics C3
Revision of probability and distribution theory, including estimation of hypothesis testing. Extension of this to include topics such as more complex probabilistic modelling, analyses of modified data (censored, truncated and missing observations), general statistical inference (decision theory), acceptance testing, and reliability analysis (hazard functions).

32.012G Biomedical Statistics SS L2½T1½ C4
Statistical assessment of normal and diseased states. Statistical relationships between multiple variables used to assess disease; analysis of variance, regression, factor analysis, discriminant analysis. Progression of diseases over time. Diagnosis and assessment of treatments. Experimental design and sampling. Computation methods.

32.101G Mathematical Modelling for Biomedical Engineers S1 L3T1 C4
Model formulation and validation of ordinary and partial differential equations by analytical and numerical techniques.
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.

### 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 check lists 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 the clinical field; measurement and scaling; analysis of change, including sequential analysis, and the application of the experimental methods to the individual cases. Design and evaluation of community programs.

12.240G Graduate and Clinical Seminars
A series of seminars on topics of particular relevance to the practice of clinical psychology, eg the organization and regulation of psychology as a profession; ethical standards in relation to clients, members of other professions, and the public; legal aspects of psychological practice. Additional topics dealing with contemporary issues in clinical psychology are chosen in consultation with students undertaking the seminars.

12.241G Graduate Colloquium
Participation in the staff-graduate student colloquium.

12.242G Research Thesis
A research thesis involving an investigation into some aspect of clinical or community psychology.

12.243G Experimental Clinical Psychology
The theoretical basis of clinical practice in individual, group, institutional, and community settings. The application of the principles of experimental psychology to the analysis of both adaptive and maladaptive patterns of behaviour. The study of a wide range of techniques of behavioural intervention.

12.244G Psychological Assessment 2
Prerequisite: 12.250G.
The application of the principles of experimental psychology to problems of behavioural assessment in a wide variety of situations, eg lifestyle change; the management of behavioural disorders; institutional behaviour 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
Description, assessment and treatment of child psychopathol-

12.250G Psychological Assessment
A theoretical basis, background information and practical skills in methods of assessment typically used in clinical psychology. Theory and research on interviewing, introduction to DSM III, clinical assessment interviewing, assessment of intellectual functioning (including in children), test access and use and computerised testing, neuropsychological and organicity assessment, personality assessment and its clinical 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.

Organizational Behaviour

30.960G Technological Change and Organizational Participation S1 and S2 L3
Prerequisite: 30.942G or 14.956G.

The complex relationships between technological change and organizational participation in societies using advanced technology, with particular reference to Australia, California, Japan, Germany and the Nordic nations. Key issues include: the relationship between technological change and sociotechnical systems, skill formation, organizational learning, industrial relations, humanization of work, organizational equity, participation, and power.

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 L2T2

31.703G Pleoroptics and Binocular Vision F L2T2
An integrated subject, in which binocular vision and pleoroptics 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 astologies, measurement, and treatment of strabismus, anomalous correspondence, eccentric fixation and amblyopia.

31.704G Advanced Contact Lens Studies F L1T3

31.705G Advanced Contact Lens Practice F L1T3
The examination, evaluation and aftercare of contact lens patients.
31.706G Occupational Optometry  F L2T2

31.707G Clinical Photography  F L2T2
Introduction to clinical photography, cameras and lens systems, colour films, black-and-white films and filters, apparatus and accessories. Patient preparation and positioning, backgrounds and foregrounds, lighting, the 'safe-set' method. Copying, slide making, macrophotography, microphotography. 'Invisible light' photography (ultra-violet and infra-red), photofluorography, speedlight techniques, fundus photography. Dark-room techniques, portable dark-rooms. Quantitative photographic data analysis.

31.799G Project

Biotechnology

42.104G Graduate Seminars

42.111G Reading List in Biotechnology (Microbiology)

42.112G Reading List in Biotechnology (Biochemistry)

42.211G Principles of Biology  SS L3
A study of the characteristics of living systems, including a functional treatment of cytology, metabolism, bioenergetics; structure, function and characteristics of single and multicellular systems; growth; cell division; reproduction; heredity and evolution.

42.212G Principles of Biochemistry  SS L3
A condensed treatment of biochemistry comprising the following aspects: the elemental and molecular composition of living organisms; the chemistry and roles of the biological elements and molecules; the thermodynamics and enzymatic catalysis of metabolism; catabolic, anabolic, amphibolic and anaplerotic processes, with emphasis on hydrolysis and synthesis of polymers, glycolysis and gluconeogenesis of glucose. O-oxidation and synthesis of fatty acids, deamination and decarboxylation of amino acids, the tricarboxylic acid cycle, electron transport and oxidative phosphorylation; metabolic regulation and integration.

42.213G Biochemical Methods  SS T3
A laboratory program in practical biochemistry. The basic instrumentation and methodology of the biochemist will be introduced by practical exercises and demonstrations. A comprehensive treatment of the relevance and applicability of biochemical techniques is covered in tutorials.

42.214G Biotechnology  SS L2T1
The selection, maintenance and genetics of industrial organisms; metabolic control of microbial synthesis; fermentation kinetics and models of growth; batch and continuous culture; problems of scale-up and fermentor design; control of the microbial environment; computer/fermentor interactions. Industrial examples will be selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial leaching. Tutorial/practical sessions include: problem solving, instrumentation, continuous culture techniques, and mathematical modelling and simulation of industrial processes.

42.215G Practical Biotechnology  F T7
Illustration, demonstration and operation of laboratory-scale and pilot-scale equipment. Visits to appropriate industries. Experimental project or critical review.

42.301G Micro-organism Productivity  SS L2T3
Mechanisms of metabolic control; induction, repression and forms of activation and inhibition; microbial genetics, mutation, selection, genetic transfer and manipulation; environmental parameters; oxygen tension, pH, temperature, energy source etc. as are relevant to productivity in industrially important microorganisms.

Detailed studies: choice of substrate, screening and isolation of microorganisms, systematic application of techniques of genetic and physiological manipulation required to optimize product formation (products include amino acids, nucleotides, enzymes and other macromolecules, antibiotics and other physiologically active compounds), potential strain improvement of micro-organisms involved in other industrial processes (for example, mineral leaching, single cell protein production, detoxification and waste disposal).

Laboratory component includes current techniques of micro-organism isolation and maintenance, genetic manipulation and physiological manipulation.
42.302G Enzyme Technology SS L2T3
Enzymes in vivo; properties; roles; sources; optimization of enzyme concentration, for example by nutritional control, environmental control and by genetic manipulation. Isolation of enzymes: methods of extraction and purification; stabilizing safeguards; assay procedures; kinetics of isolated enzymes. Immobilization of enzymes: entrapment in insoluble matrices; adsorption on high molecular weight inert carriers; ionic binding to ion-exchange materials; covalent enzyme-enzyme linkage via a low molecular weight bifunctional reagent; covalent linkage to a high molecular weight support; changes in kinetic parameters and stability after immobilization; advantages and disadvantages of immobilization. Enzyme Reactor Engineering: design of batch and continuous systems, including open and closed plug flow and stirred reactors; comparison of kinetics in various designs; scale-up. Enzyme application: analysis; fabric, food and biochemical industries; medical treatment; medical diagnosis. Occupational hazards: allergic responses to enzymes; infection from pathological samples.

Methods of isolation, immobilization and application of enzymes for analytical, industrial and medical purposes will be illustrated by laboratory exercises and short projects. Practical comparison of various reactor designs will also be made.

42.303G Biochemical Process Control SS L2T3
Biochemical reactors; range of basic designs; range of biocatalysts, from microbial conglomerates to free enzymes; heat and mass transfer; design; scale-up; sterility; economic considerations. Techniques for efficient operation and control of batch, single-stage continuous and multi-stage continuous processes.

Use of computers: aids to understanding the effects of operating variables for process optimization and control. Detailed examples: microbial processes such as production of antibiotics, organic acids, amino acids and enzymes; enzymic processes.

Practical illustration of: sample processes such as yeast and antibiotic production; mathematical simulation by analog computation; computer control of biochemical processes.

42.304G Biodeterioration and Biodegradation SS L2T3
Basic mechanisms of biodeterioration and biodegradation; direct and indirect attack mechanisms; co-metabolism and mixed population phenomena; factors controlling rates of degradation and recalcitrance of materials to biological attack; biological accelerators.

Detailed treatment of: biological corrosion of metals and alloys; biodeterioration of fuels, petrochemical products, synthetic materials, timber and cellulosic products, building materials etc.; degradation of rocks and minerals; biological leaching of ores and mineral processing residues.

The laboratory component includes assessment of biodegradability of common industrial materials (detergents, surface coatings, fuels, biocides etc); evaluation of protective methods; determination of biological leachability of minerals and mineral processing residues.

42.305G Case Studies SS T2
Critical evaluation of industrial processes and research and development procedures. Includes: study of isolated and selected areas of biotechnology, detailed study and evaluation of all aspects of an industrial process from the isolation of the appropriate organism or other biological starting material to the production and use of the final products, critical evaluation of techniques arising from current research and development programs.

42.306G Project F T7
An experimental or technical investigation or design project in the general field of biotechnology.

42.407G Biological Principles S1 L3

42.408G Bioengineering Principles S1 L3
Steady state and differential balances as a basis for quantification of complex real systems. Concepts in rate processes and kinetic analysis with application to biological systems. Experimental determination of rate data. Correlation of simple lumped rate processes and simultaneous distributed processes and the concepts involved in dimensionless numbers.

Lamina and turbulent flow. The structure of homogeneous and boundary layer turbulence flow in pipes and channels. Mixing theory. Process vessel (reactor) models.

Fluid viscosity, Newtonian and non-Newtonian fluids, convective and molecular transport processes. Heat and mass transport, film coefficients. Film, boundary layer, penetration and surface renewal theories (descriptive only).

Quantification of complex systems. Empirical and mechanistic models in biological systems.

42.999G Alternative Higher Degree Qualifying Program
Training similar in content and standard to 42.103 Biotechnology (Honours), but designed specifically for students who cannot regularly attend the University.
Microbiology

44.999G Alternative Higher Degree Qualifying Program

Similar in standard to 44.103 Microbiology Honours, but designed for students who cannot regularly attend the University.

Zoology

45.900G Ecological Studies in Arid Lands Management

Prerequisite: Degree with background in bioscience or equivalent.

Techniques in ecological studies of animal communities. Adaptations to an arid environment — environmental and social determinants. Behaviour, diet and condition of native and feral animals. Competition between native and introduced herbivores. Strategies in the management of arid zone wildlife. Concurrent studies in relevant units in the School of Botany are prescribed to cover aspects of vegetation description and plant/environment interactions.

Economics

15.114G Economics A

Prerequisite: Nil.

Microeconomic theory and applications including consumer behaviour and the theory of demand; costs, production and the theory of the firm price determination under competition, monopolistic and oligopolistic markets; investment and technology; wages, and the distribution of income; welfare, economic efficiency and public policy.

15.125G Economics B

Prerequisite: 15.114G.

Overview of the macroeconomy; determination of aggregate income, interest rate and employment in closed and open economies; theories of inflation; inflation and unemployment policy; monetarist and Keynesian controversies.

Organizational Behaviour

30.960G Technological Change and Organizational Participation

Pre requisite: 30.942G or 14.956G.

The complex relationships between technological transfers change and organizational participation in societies using advanced technology, with particular reference to Australia, California, Japan, Germany and the Nordic nations. Key issues include: the relationship between technological change and sociotechnical systems, skill formation, organizational learning, industrial relations, humanization of work, organizational equity, participation, and power.

Chemical Engineering and Industrial Chemistry

48.283G

48.284G

Sociology

53.309G Social and Technological Forecasting

Sol Encel

The interaction between science, technology and society, and the role of science and technology in social change and their potential contribution to the future shape of social existence; the potential contribution of science and technology to the solution of social problems and the relationship of forecasting to fundamental views about history and society; the nature of various contemporary approaches to social and technological forecasting; and the uses to which forecasting has been put by industry and government.

53.571G Technology and Working Life

Technology as a social and political phenomenon. Responses to technology both in the present (eg the microprocessor, nuclear
energy debates) and in the past (eg Luddism). The way particular schools of social theory have conceived of technology: Marx, Weber, Frankfurt school and other relevant theoretical perspectives. Other topics include: micro-electronic technology and the labour process; nuclear energy; technology and sexism; weapon technology; and alternative technology.

Science and Technology Studies

62.709G The Scientific Community
A sociological analysis of the pure science community, which establishes the characteristics of this subgroup of society by examining its internal and external social relations. The internal relations refer to cognitive and behavioural factors within the community itself that promote (or retard) the advancement of science. The external relations refer to the political, ideological, economic and bureaucratic forces in society that shape and control the scientific community and the knowledge it produces.

62.710G Science, Philosophy and Social Values
Exposition and appraisal of some of the classical ethical theories. Examination of the claims of science to be able to provide a basis for moral judgements. Attempted establishment of an ethical framework which may serve as a basis for decision-making when problems of an ethical nature arise in science. Selected case studies, in which decisions as to the most appropriate form of action are evaluated in the light of the ethical framework previously established. The social responsibility in science movement and its problems.

62.713G

62.714G Knowledge, Power and Public-Policy
An introduction to the relationship between science and politics in the 20th century; the nature and consequences of government support for research and development; the freedom vs planning debate in science policy, decision-making frameworks and the attempts to establish criteria of choice in a no-growth situation; science and technology policy — international perspectives.

62.716G

62.718G Science in National Cultures: Comparative Historical Perspectives
Historical and contemporary aspects of the comparative development of scientific institutions and research styles in different national contexts. Other themes: the modes of interaction and mutual perceptions of scientific communities in Western industrializing nations from the 19th century, the question of convergence in systems of scientific organization in East and West.

62.719G Science Policy: The International Dimension
A detailed consideration of the justification for, and the arguments against government intervention in systems of research and development. Theoretical discussions of this problem are given concrete focus by appraisals of the policy machinery evolved in various developed countries, including the United States, Great Britain, Australia, Canada, France, West Germany, Holland and Israel.

62.720G Philosophy of Science and the Sociology of Knowledge
Recent philosophical and sociological theories concerning the nature of scientific knowledge and the role which social conditions play in its production and acceptance. Topics include: post-Kuhnian philosophies of science; neo-Marxist theories of science and ideology; the ‘strong program’ for the sociology of knowledge; ‘field’ theories and the analysis of power relations in science; and epistemological problems raised by commercial and governmental direction of scientific research.
Graduate Study

Conditions for the Award of Higher Degrees

First Degrees

Rules regulations and conditions for the award of first degrees are set out in the appropriate Faculty Handbooks.

For the list of undergraduate courses and degrees offered see Disciplines of the University: Faculty (Undergraduate Study) in the Calendar.

Higher Degrees

The following is the list of higher degrees and graduate diplomas of the University, together with the publication in which the conditions for the award appear.

For the list of graduate degrees by research and course work, arranged in faculty order, see Disciplines of the University: Table of Courses (by faculty): Graduate Study in the Calendar.

For the statements Preparation and Submission of Project Reports and Theses for Higher Degrees and Policy with respect to the Use of Higher Degree Theses see the Calendar.

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Higher Degrees

### Higher Degrees (continued)

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### Graduate Diplomas

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*Faculty of Science
*Faculty of Biological Sciences

Higher Degrees

### Doctor of Philosophy (PhD)

1. The degree of Doctor of Philosophy may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty or board (hereinafter referred to as the Committee) to a candidate who has made an original and significant contribution to knowledge.

### Qualification

2. (1) A candidate for the degree shall have been awarded an appropriate degree of Bachelor with Honours from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Committee.

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment as a candidate for the degree.

### Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Register at least one calendar month before the commencement of the session in which enrolment is to begin.
(2) In every case, before permitting a candidate to enrol, the head of the school* in which the candidate intends to enrol shall be satisfied that adequate supervision and facilities are available.

(3) An approved candidate shall be enrolled in one of the following categories:
(a) full-time attendance at the University;
(b) part-time attendance at the University.

(4) A full-time candidate shall be fully engaged in advanced study and research except that the candidate may undertake not more than five hours per week or a total of 240 hours per year on work which is not related to the advanced study and research.

(5) Before permitting a part-time candidate to enrol, the Committee shall be satisfied that the candidate can devote at least 20 hours each week to advanced study and research for the degree which (subject to (8)) shall include regular attendance at the school* on an average of at least one day per week for 48 weeks each year.

(6) A candidate shall be required to undertake an original investigation on an approved topic. The candidate may also be required to undergo such assessment and perform such other work as may be prescribed by the Committee.

(7) The work shall be carried out under the direction of a supervisor appointed from the full-time academic members of the University staff.

(8) The work, other than field work, shall be carried out in a school* of the University except that the Committee:
(a) may permit a candidate to spend not more than one calendar year of the program in advanced study and research at another institution provided the work can be supervised in a manner satisfactory to the Committee;
(b) may permit a candidate to conduct the work at other places where special facilities not possessed by the University may be available provided the direction of the work remains wholly under the control of the supervisor;
(c) may permit a full-time candidate, who has been enrolled as a full-time candidate for at least six academic sessions, who has completed the research work and who is writing the thesis, to transfer to part-time candidature provided the candidate devotes at least 20 hours each week to work for the degree and maintains adequate contact with the supervisor.

(9) The progress of a candidate shall be reviewed annually by the Committee following a report by the candidate, the supervisor and the head of the school* in which the candidate is enrolled and as a result of such review the Committee may cancel enrolment or take such other action as it considers appropriate.

(10) No candidate shall be awarded the degree until the lapse of six academic sessions from the date of enrolment in the case of a full-time candidate or eight academic sessions in the case of a part-time candidate. In the case of a candidate who has had previous research experience the committee may approve remission of up to two sessions for a full-time candidate and four sessions for a part-time candidate.

(11) A full-time candidate for the degree shall present for examination not later than ten academic sessions from the date of enrolment. A part-time candidate for the degree shall present for examination not later than twelve academic sessions from the date of enrolment. In special cases an extension of these times may be granted by the Committee.

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

(2) The candidate shall give in writing to the Registrar two months notice of intention to submit the thesis.

(3) The thesis shall comply with the following requirements:
(a) it must be an original and significant contribution to knowledge of the subject;
(b) the greater proportion of the work described must have been completed subsequent to enrolment for the degree;
(c) it must be written in English except that a candidate in the Faculty of Arts may be required by the Committee to write a thesis in an appropriate foreign language;
(d) it must reach a satisfactory standard of expression and presentation;

*Or department where a department is not within a school.
(e) it must consist of an account of the candidate’s own research but in special cases work done conjointly with other persons may be accepted provided the Committee is satisfied about the extent of the candidate’s part in the joint research.

(4) The candidate may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or other similar award but may submit any work previously published whether or not such work is related to the thesis.

(5) Four copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of theses for higher degrees.

(6) It shall be understood that the University retains the four copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

Examination

5. (1) There shall be not fewer than three examiners of the thesis, appointed by the Professorial 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.

Fees

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

Master of Chemistry (MChem), Master of Mathematics (MMath), Master of Optometry (MOptom) and Master of Physics (MPhysics) Qualifications

1. The degree of Master of Chemistry or Master of Mathematics or Master of Optometry or Master of Physics by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

2. (1) A candidate for the degree shall have been awarded an appropriate four-year degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar two calendar months before the commencement of the session in which enrolment is to begin.

*Or department where a department is not within a school.
(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 two academic sessions from the date of enrolment in the case of a full-time candidate or four sessions in the case of a part-time candidate. The maximum period of a candidature shall be four academic sessions from the date of enrolment for a full-time candidate and eight sessions for a part-time candidate. In special cases an extension of these time may be granted by the Committee.

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

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 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.

*Or department where a department is not within a school.
Thesis 4. (1) On completing the program of study a candidate shall submit a thesis embodying the results of the original investigation.

(2) The candidate shall give in writing two months notice of intention to submit the thesis.

(3) The thesis shall present an account of the candidate’s own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate’s part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses.

(6) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

Examination 5. (1) There shall be not fewer than two examiners of the thesis, appointed by the Professorial Board on the recommendation of the Committee, at least one of whom shall be external to the University unless the Committee is satisfied that this is not practicable.

(2) At the conclusion of the examination each examiner shall submit to the Committee a concise report on the merits of the thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree without further examination; or

(b) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*; or

(c) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or

(d) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(3) If the performance at the further examination recommended under (2)(c) above is not to the satisfaction of the Committee, the Committee may permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by it but not exceeding eighteen months.

(4) The Committee shall, after consideration of the examiners’ reports and the reports of any oral or written or practical examination, recommend whether or not the candidate may be awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate may resubmit the thesis after a further period of study and/or research.

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

Master of Engineering (ME), Master of Science (MSc) and Master of Surveying (MSurv) without supervision

1. The degree of Master of Engineering or Master of Science or Master of Surveying without supervision may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

2. A candidate for the degree shall have been awarded an appropriate degree of Bachelor from the University of New South Wales with at least three years relevant standing in the case of Honours graduates and four years relevant standing in the case of Pass graduates, and at a level acceptable to the Committee.

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

(2) The candidate shall give in writing to the Registrar two months notice of intention to submit the thesis.

(3) The thesis shall present an account on the candidate's own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate's part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of theses for higher degrees.

(6) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

5. (1) There shall be not fewer than two examiners of the thesis, appointed by the Professorial 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.

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

See Master of Chemistry above.

*Or department where a department is not within a school.
Master of Optometry (MOptom)
See Master of Chemistry above.

Master of Physics (MPhysics)
See Master of Chemistry above.

Master of Psychology (MPsychol)
1. The degree of Master of Psychology by formal course work 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.

Qualifications
2. (1) A candidate for the degree shall have been awarded a degree of Bachelor with Honours in psychology from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution, at a level acceptable to the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression
3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two calendar months before the commencement of the academic year.

(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. The maximum period of candidature shall be six academic sessions from the date of enrolment for a full-time candidate and ten sessions for a part-time candidate. In special cases an extensions of these times may be granted by the Committee.

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

Master of Science (MSc)
See Master of Engineering above.

Master of Science (MSc) without supervision
See Master of Engineering above.
1. The degree of Master of Science (Biotechnology) by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

2. (1) A candidate for the degree shall have been awarded an appropriate 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 Higher Degree Committee of the Faculty of Biological Science (hereinafter referred to as the Committee).

   (2) In exceptional cases an applicant who submits evidence of such other academic and/or 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 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 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 eight 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.

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1. The degree of Master of Science (Psychology) 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 the degree of Doctor of Philosophy from the University of South Wales or a qualification considered equivalent from another university or tertiary institution, in an area of psychology acceptable to the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee).

   (2) 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 Registrar at least two calendar months before the commencement of the academic year.

   (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 three 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 third. The maximum period of candidature shall be four academic sessions from the date of enrolment for a full-time candidate and eight sessions for a part-time candidate. In special cases an extension of these 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. The degree of Master of Science and Society at Honours level may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Science (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. The degree shall be awarded with the grade of Honours Class 1 or with grade of Honours Class 2.

2. (1) A candidate for the degree shall

(a) 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, and

(b) have completed the requirements for the award of the degree at Pass level.

(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 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 of History and Philosophy of Science (hereinafter referred to as the head of the school) 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 assessment 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 academic 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 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 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 academic sessions in the case of a part-time or external candidate. 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 sessions 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 four academic sessions from the date of enrolment. A part-time or external candidate for the degree shall present for examination not later than eight academic sessions from the date of enrolment. In special cases an extension of these times may be granted by the Committee.

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

(2) The candidate shall give in writing to the Registrar two months notice of intention to submit the thesis.

(3) The thesis shall present an account of the candidate’s own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate’s part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of theses for higher degrees.
Graduate Study: Conditions for the Award of Higher Degrees

(6) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

5. (1) There shall be not fewer than two examiners of the thesis, appointed by the Professorial 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 thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree either with Honours Class 1 or with Honours Class 2 without further examination; or

(b) the candidate be awarded the degree either with Honours Class 1 or with Honours Class 2 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 either with Honour Class 1 or with Honours Class 2 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 a 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 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.

1. The degree of Master of Science and Society at Pass level may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

2. (1) A candidate for the degree shall have been awarded an appropriate 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 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 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. The maximum period of candidature shall be eight academic sessions from the date of enrolment. In special cases an extension of time may be granted by the Committee.

4. A candidate shall pay such fees as may be determined from time to time by the Council.
Master of Statistics (MStats)

Qualifications

1. The degree of Master of Statistics by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advance study.

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.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar 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.

Fees

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

Graduate Diploma

Graduate Diploma (GradDip or DipFDA)

Qualification

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.

Enrolment and Progression

3. (1) An application to enrol as a candidate for diploma shall be made on the prescribed form which shall be lodged with the 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.
Graduate Study: Conditions for the Award of Higher Degrees

(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.

Fees
Scholarships and Prizes

The scholarships and prizes listed below are available to students whose courses are listed in this handbook. Each faculty handbook contains in its Scholarships and Prizes section the scholarships and prizes available with that faculty. The General Information section of the Calendar contains a comprehensive list of scholarships and prizes offered throughout the University.

Scholarships

Undergraduate Scholarships

Listed below is an outline only of a number of scholarships available to students. Full information may be obtained from Room G20, located on the Ground Floor of the Chancellery.

Unless otherwise indicated in footnotes, applications for the following scholarships should be made to the Registrar by 14 January each year. Please note that not all of these awards are available every year.

<table>
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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</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>
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<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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*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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<td><strong>General (continued)</strong></td>
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<tr>
<td>Girls Realm Guild</td>
<td>Up to $1500 pa</td>
<td>1 year renewable</td>
<td>Available only to female students under 35 years of age who are permanent</td>
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<tr>
<td></td>
<td></td>
<td>need</td>
<td></td>
</tr>
<tr>
<td>W.S. and L.B. Robinson**</td>
<td>Up to $4200 pa</td>
<td>1 year renewable</td>
<td>Available only to students who have completed their schooling in Broken</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for the duration</td>
<td>Hill or whose parents reside in Broken Hill; for a course related to the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of the course</td>
<td>mining industry. Includes courses in mining engineering, geology, electrical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>subject to</td>
<td>and mechanical engineering, metallurgical process engineering, chemical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>satisfactory</td>
<td>engineering and science.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>progress</td>
<td></td>
</tr>
<tr>
<td>Universities Credit Union</td>
<td>$500 pa</td>
<td>1 year with the</td>
<td>Prior completion of at least 1 year of any undergraduate degree course.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>possibility of</td>
<td>Eligibility limited to members of the Universities Credit Union Ltd of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>renewal</td>
<td>more than one year's standing of members of the family of such members.</td>
</tr>
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</tr>
<tr>
<td><strong>Science</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chemistry</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>John Ragnar Anderson Memorial</td>
<td>Up to $1500 pa</td>
<td>1 year renewable</td>
<td>Permanent residence in Australia and eligibility for admission to a full-time</td>
</tr>
<tr>
<td>Bequest</td>
<td></td>
<td>for the duration</td>
<td>degree course in Chemistry.</td>
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<tr>
<td></td>
<td></td>
<td>of the course</td>
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<td></td>
<td></td>
<td>subject to</td>
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<tr>
<td></td>
<td></td>
<td>satisfactory</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>George Szekeres Award</td>
<td>$200 pa</td>
<td>1 year</td>
<td>Open to students entering the final year of the honours degree course in</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pure Mathematics.</td>
</tr>
<tr>
<td>Olivetti Australia Pty Ltd</td>
<td>Up to $600 pa</td>
<td>2 years subject</td>
<td>Eligibility for admission to the third year of an honours program in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to satisfactory</td>
<td>School of Mathematics in Pure/Applied Mathematics, Theoretical Mechanics or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>progress</td>
<td>Statistics and leading to the award of the degree of Bachelor of Arts,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bachelor of Science, or Bachelor of Science Diploma in Education.</td>
</tr>
<tr>
<td><strong>Optometry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gibb and Beeman</td>
<td>Up to $750 pa</td>
<td>1 year renewable</td>
<td>Available to students under 21 years of age who are permanent residents of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for the duration</td>
<td>Australia enrolling in Year 1 of the full-time degree course in Optometry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of the course</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>subject to</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>satisfactory</td>
<td></td>
</tr>
</tbody>
</table>

**Applications close 30 September each year.**
Graduate Scholarships

Application forms and further information are available from the Student Enquiry Counter, located on the Ground Floor of the Chancellery unless an alternative contact address is provided. Information is also available on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.


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.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of New South Wales Postgraduate Scholarships</td>
<td>Living allowance of $7000 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>Living allowance of $8882 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 Registrar by 31 October.</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Course Awards</td>
<td></td>
<td></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 Registrar by 30 September.</td>
</tr>
<tr>
<td>Australian American Educational Foundation Travel Grant (Fulbright)*</td>
<td></td>
<td></td>
<td>Applicants must be graduates, senior scholars or post-doctoral Fellows. Applications close 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. Applications close with Registrar in September or October each year.</td>
</tr>
</tbody>
</table>

*Available for reference in the University Library.

*Application forms are available from The Secretary, Department of Employment Education and Training, AAEF Travel Grants, PO Box 826, Woden, ACT 2606.
### Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<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.</td>
</tr>
<tr>
<td>Frank Knox Memorial Fellowships tenable at Harvard University</td>
<td>Stipend of US$7000 pa plus tuition fees</td>
<td>1, sometimes 2 years</td>
<td>Applicants must be British subjects and Australian citizens, who are graduates or near graduates of an Australian university. Applications close with the Registrar mid-October.</td>
</tr>
<tr>
<td>Robert Gordon Menzies Scholarship* to Harvard</td>
<td>Up to $US 15,000</td>
<td>1 year</td>
<td>Tenable at Harvard University. Applicants must be Australian citizens and graduates of an Australian tertiary institution. Applications close 31 December.</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 Registrar by 31 October.</td>
</tr>
<tr>
<td>Harkness Fellowships of the Commonwealth Fund of New York**</td>
<td>Living and travel allowances, tuition and research expenses, health insurance, book and equipment and other allowances for travel and study in the USA</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.</td>
</tr>
<tr>
<td>The Packer, Shell and Barclays Scholarships to Cambridge***</td>
<td>Living and travel allowances, tuition expenses.</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.</td>
</tr>
<tr>
<td>The Rhodes Scholarship§</td>
<td>Approximately L3600 stg pa</td>
<td>2 years, may be extended for a third year</td>
<td>Unmarried male and female Australian citizens aged between 19 and 25 who have been domiciled in Australia at least 5 years and have completed at least 2 years of an approved university course. Applications close in mid-September each year.</td>
</tr>
<tr>
<td>Rothmans Fellowships Award††</td>
<td>$25000 pa plus up to $3500 for equipment and fees</td>
<td>1 year, renewable up to 3 years</td>
<td>Tenable at any Australian university. Applicants must have at least 3 years graduate experience in research and be under 28 years of age. Applications close in July.</td>
</tr>
</tbody>
</table>

* Application forms are available from The Registrar, A.N.U. GPO Box 4 Canberra.

** Application forms must be obtained from the Australian representative of the Fund, Mr J. T. Larkin, Department of Trade, Edmund Barton Building, Kings Avenue, Barton, ACT 2600. These must be submitted to the Registrar by 15 August.

*** Application forms are available from The Secretary, Cambridge Commonwealth Trust, PO Box 252, Cambridge CB2 ITZ U.K.

§Applications to The Honorary Secretary of the NSW Committee, University of Sydney, NSW 2006.

††Applications to the Secretary, Rothmans University Endowment Fund, University of Sydney, NSW 2006.
<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biological Sciences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Clark Memorial Award in Psychology</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.</td>
</tr>
<tr>
<td>Science Research Scholarship of the Royal Commission of the</td>
<td>See under Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhibition of 1851</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Heart Foundation</td>
<td>See under Medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The National Health and Medical Research Council</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Science</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Telecommunications and Electronics Research Board</td>
<td>$11,500 pa if only scholarship held or $5000 if additional to another scholarship</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 late September.</td>
</tr>
<tr>
<td>Australian Institute of Nuclear Science and Engineering Studentships</td>
<td>See under Engineering.</td>
<td></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>Contact Lens Society of Australia</td>
<td>$2000 pa</td>
<td></td>
<td>To enable a research degree in Theoretical Physics. May be held concurrently with another award.</td>
</tr>
<tr>
<td>Gordon Godfrey Scholarship in Theoretical Physics</td>
<td>$1500 pa</td>
<td>1-3 years</td>
<td>To enable a suitable graduate to undertake a research degree in Theoretical Physics. May be held concurrently with another award.</td>
</tr>
<tr>
<td>The Rutherford Scholarship</td>
<td>Travel, fees, etc. A stipend which, if held in the UK, is approx. £4610 stg pa</td>
<td>3 years</td>
<td>To enable graduates under 26 years of age to undertake experimental research in a branch of natural science. It is tenable at a British Commonwealth University other than the country in which the applicant graduated. Applications close mid-February with the Registrar.</td>
</tr>
<tr>
<td>Science Research Scholarship of the Royal Commission for the</td>
<td>£4560 stg pa</td>
<td>Normally tenable</td>
<td>To enable graduates under 26 years of age to undertake research in some branch of pure or applied science, or engineering, at an overseas university. Applicants must be British Commonwealth citizens or citizens of the Republics of Ireland, Pakistan or South Africa. Applications close mid-February with the Registrar.</td>
</tr>
<tr>
<td>Exhibition of 1851</td>
<td></td>
<td>3 years</td>
<td></td>
</tr>
</tbody>
</table>

*Tenure may be varied in exceptional circumstances.*
## 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>Shell Scholarship in Science or Engineering</strong></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.</td>
</tr>
</tbody>
</table>

**Applications to the Personnel Manager, Shell Australia, 140 Phillip Street, Sydney 2000.**

## Prizes

### Undergraduate University Prizes

The following table summarizes the undergraduate prizes awarded by the University. Prizes which are not specific to any School are listed under General. All other prizes are listed under the Faculty or Schools in which they are awarded.

Information regarding the establishment of new prizes may be obtained from the Examinations Section located on the Ground Floor of the Chancellery.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
</table>
| **General**
Sydney Technical College Union Award | 300.00 | Leadership in the development of student affairs, and academic proficiency throughout the course |
University of New South Wales Alumni Association | Statuette | Achievement for community benefit — students in their final or graduating year |

| **Faculties of Applied Science and Engineering**
Institution of Engineers, Australia | Medal and 200.00 | The most proficient final year (or last 2 years part-time) student in the Bachelor of Engineering (or Bachelor of Science (Engineering)) degree courses offered by the following Schools: Civil Engineering Electrical Engineering and Computer Science Mechanical and Industrial Engineering Chemical Engineering and Industrial Chemistry Mining Engineering Textile Technology (Engineering option only) |

| **Board of Studies in Science and Mathematics**
Logica Pty Limited | 1000.00 | Best performance by a graduand in the Computer Science Honours degree 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 Biological Technologies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Department of Biotechnology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mauri Foods</td>
<td>175.00</td>
<td>Best result in 42.101 Introduction to Biotechnology</td>
</tr>
<tr>
<td></td>
<td>175.00</td>
<td>Best result in one of the Level 3 Biotechnology subjects</td>
</tr>
<tr>
<td></td>
<td>175.00</td>
<td>Best result in the Biotechnology honours degree program</td>
</tr>
<tr>
<td><strong>Department of Food Science and Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cottees General Foods</td>
<td>120.00</td>
<td>38.141 Food Regulation and Control</td>
</tr>
<tr>
<td>Nestle Australia Pty Ltd</td>
<td>200.00</td>
<td>Best performance in 38.140 Food Technology project in the Bachelor of Science degree course in Food Technology</td>
</tr>
<tr>
<td>Wilfred B.S. Bishop</td>
<td>75.00</td>
<td>General proficiency throughout Bachelor of Science degree course in Food Technology by a student who has made a significant contribution to staff and student activities</td>
</tr>
<tr>
<td><strong>School of Chemical Engineering and Industrial Chemistry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abbott Laboratories Pty Ltd</td>
<td>150.00</td>
<td>Bachelor of Engineering degree course in Chemical Engineering — Year 4</td>
</tr>
<tr>
<td>Australasian Corrosion Association (NSW Branch)</td>
<td>150.00</td>
<td>Best performance in 48.121 Corrosion in the Chemical Industry</td>
</tr>
<tr>
<td></td>
<td>and one year's membership of the Association</td>
<td></td>
</tr>
<tr>
<td>AGL Sydney Limited — in Chemical Engineering</td>
<td>200.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Australian Paper Manufacturers Ltd</td>
<td>100.00</td>
<td>48.163 Instrumentation and Process Control in Industrial Chemistry</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>48.163 Instrumentation and Process Control in Chemical Engineering</td>
</tr>
<tr>
<td>Chemical Technology Society</td>
<td>25.00</td>
<td>Best graduate in Bachelor of Science degree in Industrial Chemistry</td>
</tr>
<tr>
<td></td>
<td>25.00</td>
<td>Best graduate in Bachelor of Science degree course in Industrial Chemistry, Years 1 and 2 or Stages 1 to 4</td>
</tr>
<tr>
<td>CSR Limited</td>
<td>50.00</td>
<td>Subject within the discipline of Industrial Chemistry, selected by Head of School</td>
</tr>
<tr>
<td>Esso Australia Ltd</td>
<td>200.00</td>
<td>Best performance in Year 2 Chemical Engineering</td>
</tr>
<tr>
<td>Institution of Chemical Engineers</td>
<td>100.00</td>
<td>Best result for the thesis in the final year, or equivalent part time stage, of the Bachelor of Engineering degree course</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 Chemical Engineering and Industrial Chemistry (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shell</td>
<td>100.00</td>
<td>General proficiency in Year 2 or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>General proficiency in Year 3 or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>General proficiency in Year 4 or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>For a student who, in the opinion of the Head of School, has performed some meritorious activity of note either inside or outside the University</td>
</tr>
<tr>
<td>Simon-Carves Australia</td>
<td>21.00</td>
<td>48.135 Thermodynamics</td>
</tr>
<tr>
<td>Stauffer Australia Limited</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>150.00</td>
<td>48.036 Chemical Engineering Laboratory 1</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
<td>48.044 Chemical Engineering Laboratory 2</td>
</tr>
<tr>
<td><strong>Department of Fuel Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Institute of Energy</td>
<td>50.00</td>
<td>For a fuel subject or allied subject project</td>
</tr>
<tr>
<td>Fuel Technology Staff</td>
<td>200.00</td>
<td>Best performance in Year 3 or 4 Fuel Technology subject in the Bachelor of Engineering degree course in Chemical Engineering</td>
</tr>
<tr>
<td>Shell</td>
<td>200.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td><strong>School of Chemistry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACI Australia Limited</td>
<td>60.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Inglis Hudson Bequest</td>
<td>15.00</td>
<td>2.002B Organic Chemistry I</td>
</tr>
<tr>
<td>Jeffery Bequest</td>
<td>100.00</td>
<td>2.043L Chemistry and Enzymology of Foods</td>
</tr>
<tr>
<td>Merck Sharp &amp; Dohme (Aust) Pty Ltd</td>
<td>52.50</td>
<td>Chemistry — Level II subjects in the Science and Mathematics Course</td>
</tr>
<tr>
<td></td>
<td>52.50</td>
<td>Chemistry — Level III subjects in the Science and Mathematics Course</td>
</tr>
<tr>
<td>RACI Analytical Chemistry Group</td>
<td>150.00</td>
<td>2.013D Advanced Analytical Chemistry</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 Chemistry (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNSW Chemical Society Parke-Pope</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>UNSW Chemical Society George Wright</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td>June Griffith Memorial</td>
<td>60.00</td>
<td>Best performance in 2.121 and 2.131 Year 1 Chemistry</td>
</tr>
<tr>
<td><strong>School of Electrical Engineering and Computer Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austral Crane</td>
<td>37.50</td>
<td>Bachelor of Engineering degree course in Electrical Engineering, Year 3</td>
</tr>
<tr>
<td></td>
<td>37.50</td>
<td>Power or Control elective</td>
</tr>
<tr>
<td>Electricity Supply Engineers Association of New South Wales</td>
<td>100.00</td>
<td>Overall performance including proficiency in Electric Power Distribution in Year 3 full-time or equivalent part-time degree course</td>
</tr>
<tr>
<td>IBM</td>
<td>150.00</td>
<td>Best performance in 6.611 Computing 1</td>
</tr>
<tr>
<td>Institution of Electrical Engineers</td>
<td>100.00</td>
<td>Best performance in Year 3 Electrical Engineering</td>
</tr>
<tr>
<td>J. Douglas Maclurcan</td>
<td>60.00</td>
<td>Outstanding performance in the field of control systems</td>
</tr>
<tr>
<td>Lionel Singer Corporation — in Computer Science</td>
<td>1500.00</td>
<td>Best performance in core subjects in Year 3 leading to Honours degree</td>
</tr>
<tr>
<td><strong>School of Fibre Science and Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department of Textile Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. B. Speakman</td>
<td>50.00</td>
<td>Undergraduate thesis</td>
</tr>
<tr>
<td>Textile Institute</td>
<td>Two years' membership of the Institute</td>
<td>Best performance in 13.113 Textile Technology 3 in the Bachelor of Science in Textile Technology degree course</td>
</tr>
<tr>
<td>R. J. Webster</td>
<td>250.00</td>
<td>General proficiency throughout the Bachelor of Science degree course in Textile Technology</td>
</tr>
<tr>
<td>Donor/Name of Prize</td>
<td>Value ($)</td>
<td>Awarded for</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>School of Geography</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jack Mabbutt Medal</td>
<td>Medal</td>
<td>Best performance in Fourth Year Project in Applied Geography by a student proceeding to Bachelor of Science</td>
</tr>
<tr>
<td>Jack Mabbutt Prize</td>
<td>150.00</td>
<td>Best performance by a third year student proceeding to Honours in Geography</td>
</tr>
<tr>
<td><strong>School of Mathematics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amatll Limited</td>
<td>200.00</td>
<td>Best performance in Theory of Statistics 3 or Higher Theory of Statistics 3</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>50.00</td>
<td>Excellence in Level III Applied Mathematics subjects</td>
</tr>
<tr>
<td>C. H. Peck</td>
<td>50.00</td>
<td>Best performance in Year 2 Mathematics proceeding to Year 3 in the School of Mathematics</td>
</tr>
<tr>
<td>Head of School's</td>
<td>50.00</td>
<td>Excellence in 4 or more Mathematics units in Year 2</td>
</tr>
<tr>
<td>IBM</td>
<td>200.00</td>
<td>Final year of an honours degree course</td>
</tr>
<tr>
<td>ICI Theory of Statistics IV</td>
<td>100.00</td>
<td>Best performance in 10.323 Theory of Statistics 4</td>
</tr>
<tr>
<td>I. P. Sharp Associates</td>
<td>75.00</td>
<td>Excellence in Higher Theory of Statistics 2</td>
</tr>
<tr>
<td>J. R. Holmes</td>
<td>75.00</td>
<td>Excellent performance in at least 4 pass-level (up to 1 pass-level unit may be replaced by a higher-level unit) Pure Mathematics Level III units taken over no more than two consecutive years</td>
</tr>
<tr>
<td>Michael Mihailavitch Erihman</td>
<td>750.00</td>
<td>Best performance by a student enrolled in a Mathematics Program, in examinations conducted by the School of Mathematics in any one year</td>
</tr>
<tr>
<td>Pure Mathematics</td>
<td>50.00</td>
<td>Best performance in Level III Pure Mathematics subjects</td>
</tr>
<tr>
<td>School of Mathematics</td>
<td>50.00</td>
<td>Best performance in 10.011 Higher Mathematics 1</td>
</tr>
<tr>
<td></td>
<td>50.00</td>
<td>Best performance in basic Year 2 Higher Mathematics units</td>
</tr>
<tr>
<td></td>
<td>50.00</td>
<td>Excellence in 4 or more Mathematics units in Year 2</td>
</tr>
<tr>
<td>Statistical Society of Australia (New South Wales (Branch))</td>
<td>100.00</td>
<td>General proficiency — Theory of Statistics subjects</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 Optometry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Optometrical Association</td>
<td>200.00</td>
<td>Best performance in Year 3 of the Optometry degree course</td>
</tr>
<tr>
<td>Bausch &amp; Lomb Soflens</td>
<td></td>
<td>Diagnostic set of contact lenses valued at 700.00</td>
</tr>
<tr>
<td>Contavue</td>
<td></td>
<td>Trial fitting set of contact lenses</td>
</tr>
<tr>
<td>G. Nissel &amp; Co Aust Pty Ltd</td>
<td></td>
<td>Trial fitting set of contact lenses</td>
</tr>
<tr>
<td>Hoya Lens Australia Pty Ltd</td>
<td>250.00</td>
<td>Highest academic record in the Optometry degree course</td>
</tr>
<tr>
<td>Hydron (Australia) Pty Ltd</td>
<td>100.00</td>
<td>31.871 Optometry B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optometry Year 4</td>
</tr>
<tr>
<td>The Keith Woodland Memorial</td>
<td>100.00</td>
<td>Binocular vision component of 31.871 Optometry B and 31.841 Clinical Optometry — Contact Lenses sections</td>
</tr>
<tr>
<td>Martin Wells Pty Ltd</td>
<td>200.00</td>
<td>31.821 Anatomy and Physiology of the Eye and Visual System</td>
</tr>
<tr>
<td></td>
<td>200.00</td>
<td>31.862 Diagnosis and Management of Ocular Disease</td>
</tr>
<tr>
<td></td>
<td>200.00</td>
<td>Final Year Essay</td>
</tr>
<tr>
<td>Optical Products Pty Ltd</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Optometric Vision Research Foundation</td>
<td>100.00</td>
<td>Research project in the final year</td>
</tr>
<tr>
<td>Optometrists’ Association of NSW</td>
<td>50.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Optyl (Australia) Pty Ltd</td>
<td>100.00</td>
<td>31.864 Clinical Methods practical work</td>
</tr>
<tr>
<td>Safilo Australia</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Theo Kannis</td>
<td>250.00</td>
<td>31.841 Clinical Optometry</td>
</tr>
<tr>
<td><strong>School of Physics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Institute of Physics</td>
<td>100.00</td>
<td>Highest aggregate in any 3 units chosen from 1.0133 Quantum Mechanics, 1.0143 Nuclear Physics, 1.023 Statistical Mechanics and Solid State Physics, 1.0333 Electromagnetism, 1.0343 Advanced Optics, and 1.043 Experimental Physics A in the Bachelor of Science</td>
</tr>
</tbody>
</table>

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### 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 Physics (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETP-Oxford</td>
<td>200.00</td>
<td>Most meritorious design study of an optical system in the subject 1.713 Advanced Laser and Optical Applications</td>
</tr>
<tr>
<td>Gordon and Mabel Godfrey in Theoretical Physics 3</td>
<td>100.00</td>
<td>Best performance in selection of Year 3 Theoretical Physics subjects chosen from 1.5133, 1.5233, 1.5333, 1.5433 and 1.5533</td>
</tr>
<tr>
<td>Gordon and Mabel Godfrey in Theoretical Physics 4</td>
<td>100.00</td>
<td>Excellence in the subject 1.504 Theoretical Physics 4 in the Bachelor of Science degree course with Honours in Physics</td>
</tr>
<tr>
<td>Gordon and Mabel Godfrey</td>
<td>300.00</td>
<td>Best performance by a student who has completed third year and is entering the final year of the Honours Degree course in Theoretical Physics</td>
</tr>
<tr>
<td>Head of School's in Physics</td>
<td>50.00</td>
<td>Best Year 4 Honours Thesis in Physics in the Bachelor of Science degree course</td>
</tr>
<tr>
<td>Laser Electronics</td>
<td>200.00</td>
<td>Excellence in the laboratory work of 1.763 Laser and Optical Technology Laboratory 1</td>
</tr>
<tr>
<td>Physics Staff for Physics 1</td>
<td>100.00</td>
<td>Best performance in 1.001 Physics 1</td>
</tr>
<tr>
<td>Physics Staff for Physics 2</td>
<td>100.00</td>
<td>Highest aggregate in 1.002 Mechanics, Waves and Optics, 1.012 Electromagnetism and Thermal Physics, 1.022 Physics and 1.032 Modern Laboratory in the Bachelor of Science degree course</td>
</tr>
<tr>
<td>Physics Staff for Physics Honours</td>
<td>100.00</td>
<td>Best performance in the Physics Honours Year of the Bachelor of Science degree course</td>
</tr>
<tr>
<td>The Bodal</td>
<td>100.00</td>
<td>Best performance in a competition based on the use of microcomputers in 1.061 Computer Applications in Experimental Science 1</td>
</tr>
<tr>
<td>The Laser Dynamics</td>
<td>200.00</td>
<td>Excellence in the subject 1.713 Advanced Laser and Optical Applications</td>
</tr>
<tr>
<td>The Parameters</td>
<td>200.00</td>
<td>Excellence in 1.133 Electronics, or, if no student of sufficient merit 1.043 Experimental Physics A and 1.763 Laser and Optical Technology Laboratory 1</td>
</tr>
</tbody>
</table>

### School of Psychology

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Psychological Society</td>
<td>100.00</td>
<td>A Year 4 Psychology subject selected by Head of School</td>
</tr>
<tr>
<td>Milon Buneta</td>
<td>50.00</td>
<td>Best Psychology Year 2 performance by a student in the Bachelor of Science degree course in Psychology</td>
</tr>
<tr>
<td>Psychology Staff</td>
<td>80.00</td>
<td>Psychology Year 2</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</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Biological Technologies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mauri Foods</td>
<td>175.00</td>
<td>Best overall performance in the Master of Science (Biotechnology) degree course</td>
</tr>
<tr>
<td><strong>School of Chemistry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith Kline and French</td>
<td>175.00</td>
<td>Best performance in the Food and Drug Analysis graduate diploma course</td>
</tr>
<tr>
<td><strong>School of Mathematics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. R. Holmes</td>
<td>50.00</td>
<td>Master of Arts pass degree course in Mathematics</td>
</tr>
<tr>
<td><strong>School of Optometry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydron Contact Lens</td>
<td>A trial fitting set of contact lens</td>
<td>31.705G Advanced Contact Lens Theory and Practice</td>
</tr>
<tr>
<td>Theo Kannis</td>
<td>250.00</td>
<td>31.701G Advanced Clinical Optometry</td>
</tr>
</tbody>
</table>
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 Theatrette K14
Mathews Theatres D23
Parade Theatre E3
Science Theatre F13
Sir John Clancy Auditorium C24

Buildings
Affiliated Residential Colleges
New (Anglican) L6
Shalom (Jewish) N9
Warrane M7
Applied Science F10
Architecture H14
Arts (Morven Brown) C20
Banks F22
Barker Street Gatehouse N11
Basser College C18
Biological Sciences D26
Central Store B13
Chancellery C22
Chemistry Dalton F12
Robert Heffron E12
Civil Engineering H20
Commerce (John Goodsell) F20
Dalton (Chemistry) F12
Electrical Engineering G17
Geography and Surveying K17
Goldstein College D18
Golf House A27
Gymnasium B5
House at Pooh Corner N8
International House C6
Io Myers Studio D9
John Goodsell (Commerce) F20
Kanga's House O14
Kensington Colleges C17 (Office)
Basser C18
Goldstein D16
Philip Baxter D14
Main Building K15
Maintenance Workshop B13
Mathews F23
Mechanical and Industrial Engineering J17
Medicine (Administration) B27
Menzies Library E21
Metallurgy E8
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
Wool Science B8

General
Academic Staff Office C22
Accountancy F20
Admissions C22
Adviser for Prospective Students F15
Graduate and Alumni E4
Anatomy C27
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
Biochemistry D26
Biological Sciences (Faculty Office) D26
Biomedical Library F23
Biotechnology D26
Bookshop G17
Botany D26
Building H14
Careers and Employment F15
Cashier's Office C22
Centre for Biomedical Engineering A28
Centre for Medical Education Research and Development C27
Centre for Remote Sensing K17
Chaplains E15a
Chemical Engineering and Industrial Chemistry F10
Chemistry E12
Child Care Centres N8, O14
Continuing Education Support Unit F23
Economics F20
Education G2
Education Testing Centre E15d
Electrical Engineering and Computer Science G17
Energy Research, Development and Information Centre F10
Engineering (Faculty Office) K17
English C20
Examinations C22
Fees Office C22
Food Science and Technology F10
French C20
General Staff Office C22
General Studies C20
Geography K17
German Studies C20
Graduate School of the Built Environment H14
Health Administration C22
History C20
History and Philosophy of Science C20
Industrial Arts H14
Industrial Engineering J17
Institute of Rural Technology B8b
Japanese Economic Management Studies Centre G14
Kanga's House O14
Kindergarten (House at Pooh Corner) N8
Landscape Architecture K15
Law (Faculty Office) F21
Library F21
Librarianship F23
Library E21
Lost Property C22
Marketing F20
Mathematics F23
Mechanical Engineering J17
Medicine (Faculty Office) B27
Metallurgy E8
Microbiology D26
Mining Engineering K15
Music B11b
National Institute of Dramatic Art D2
Off-campus Housing C22
Optometry J12
Organizational Behaviour F20
Pathology C27
Patrol and Cleaning Services C22
Petroleum Engineering D11
Philosophy C20
Physics K15
Physiology and Pharmacology C27
Political Science C20
Printing Unit B22
Psychology F23
Public Affairs Unit C22
Publications Section B22
Regional Teacher Training Centre C27
Russian C20
Science and Mathematics Course Office F23
Social Work G2
Sociology C20
Spanish and Latin American Studies C20
Sport and Recreation Centre B6
Student Counselling and Research F15
Student Health E15b
Student Records C22
Students' Union E4 and C21
Surveying K17
Tertiary Education Research Centre E15d
Textile Technology G14
Theatre Studies B10
Town Planning K15
Union Shop (Upper Campus) D19
University Archives E21
University Press A28
University Union (Blockhouse) G6
Wool Science B8a
Zoology D26
This Calendar has been specifically designed as a summary volume of the University’s academic and administrative procedures.

It contains detailed information about the University — its organization, staff membership, description of disciplines, scholarships and prizes.

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, Engineering, Law, Medicine, Professional Studies, Science (including Biological Sciences and the Board of Studies in Science and Mathematics), the Australian Graduate School of Management (AGSM).

The Calendar and Handbooks are available from the Cashier’s Office.

The Calendar costs $6.00 (plus postage $1.40, interstate $1.80).

The Handbooks vary in cost: Applied Science, Architecture, Arts, Commerce, Engineering, Professional Studies, and Sciences are $4.00. Postage is $1.40 in each case ($1.80 interstate). Law, Medicine and AGSM are $3.00. Postage is $1.00 in each case ($1.10 interstate).

A set of books is $43.00. Postage is $3.00 ($7.00 interstate).