

Faculty of Science

A Message from the Dean

We live in amazing times. Science and technology have extended the reach of our senses way beyond the edge of the map of human experience. We can now hear a single electron change orbit inside an atom. We can see into the outer reaches of the universe; feel movements deep inside the Earth's crust; reach back far into the ancient past; and eavesdrop on events inside a living cell. And we can meet and interact with other people in virtual communities that exist in virtual worlds.

When you study science with us at UNSW, you will be at the leading edge of this exciting revolution. You will learn how to learn, how to follow your curiosity about the world and the way it ticks, and you will acquire a tool-kit of knowledge and skills to equip you to step out into what we hope will be a lifetime of satisfying work.

This section of the Handbook covers the courses and programs available for study in science and provides a framework of the rules and regulations. Staff in the schools of the Faculty and the Science Student Centre are available to help you with administrative matters, course selection and career directions, and with any difficulties you may encounter in your studies.

We encourage you to explore the full diversity of opportunities on offer, to specialise on the one hand and yet gain an appreciation of scholarship in other areas. It is important that you learn to think creatively and critically, and to work with others in order to resolve complex problems.

We wish you every success at UNSW. We hope that the time that you spend with us, as valued members of our community, will be happy, stimulating and productive and that in future years you will look back on "the UNSW experience" as one which set you on the path to fulfilling your career and lifestyle aspirations. We believe that tomorrow's leaders will be drawn more and more from the ranks of science. We invite you to join us and let us help to make sense of this amazing world and prepare you to play your important part in a future that promises to be more amazing still.

Professor Michael Archer
Dean
Faculty of Science

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Faculty Information and Assistance

General Information

Science programs are built from the wide range of science and technology-based courses available across UNSW.

These programs are divided into two types: the general 'Science' and 'Advanced Science' programs, and a range of 'Vocational Science Programs' oriented more toward professional or industry-based careers. These programs, and the courses which they are composed of, are described in more detail under 'Program Rules and Information'. However, the information that follows in this section applies equally to both types of program.

Educational and academic activities at UNSW are organised and administered in faculties. The Faculty of Science is focused towards providing teaching and research in the sciences. Other faculties, including Engineering, Medicine, Arts and Social Sciences, and Commerce and Economics, also make a major contribution to activities in the sciences.

The basic educational building blocks in the sciences are the **courses** which students take. These courses are drawn together into **majors**, **minors**, and **study plans** providing coherent development of specific disciplines, and these programs are in turn drawn together to form **degrees or programs**. These majors, minors, and study plans are listed in the contents pages and are described in detail in this section of the Handbook.

Who Can Help?

This section of the Handbook is designed as a detailed source of information in all matters related to the Faculty of Science.

If you require advice about enrolment, degree requirements, progression within programs or any other general matters, contact the Science Student Centre, Robert Webster Building: tel: (02) 9385 6125, fax: (02) 9385 6127 or email: SSO@unsw.edu.au

The office is staffed between 9am and 5pm from Monday to Friday, but this may vary during non-session times.

For information and advice about course content and requirements, contact the appropriate schools/teaching units as indicated in the course descriptions.

The Faculty of Science Website

Please refer to the Faculty of Science website for further information: www.science.unsw.edu.au

Course Descriptions

Descriptions of courses offered in 2006 can be found in alphabetical order by the course code at the back of this Handbook or in the Online Handbook at: www.handbook.unsw.edu.au

Computing Information

Within the Faculty of Science, each of the schools manages or has access to undergraduate computing laboratories equipped with a combination of X-terminals, PCs and Macintoshes. These are connected through the campus-wide network, and are used extensively in undergraduate teaching and in providing email access to all students. This is provided through local and often specialised facilities and through access to regional and national centres. The systems accessible range from PCs to supercomputers together with the associated peripherals and support personnel. For further information on computing, please contact the school office.

Enrolment Procedures

New students will receive enrolment information with their offer of a place in their chosen program.

All students re-enrolling in 2006 should enrol via myUNSW during appointed enrolment periods. Information regarding enrolling online is available from UNSW Student Central, the Science Student Centre or via the web: <https://my.unsw.edu.au>

The course timetable for second and later years for the Science and the Advanced Science programs is available in late October/early November from the Science Student Centre, in the Robert Webster Building. All re-enrolling students should collect one of these timetables. **Students who expect to complete the requirements for their degree in 2006 or are proceeding to Honours will also need to collect form: SM2006.** This form

is to be completed and returned to the Science Student Centre by early January, after students receive their results.

Students not enrolling before the first day of Session 1 have no guarantee that a place is available in the courses offered in that year. This is particularly important for courses where laboratory space is limited. Students should be aware that some courses may require a field trip which may involve personal costs to the student. Consult individual course authorities for details. Quotas may apply to certain programs and courses and students should consult with program and course authorities for details.

Admission

For applicants applying for admission to UNSW through the Universities Admissions Centre (UAC), this section lists the UAC codes which correspond to the Science programs offered by UNSW.

For admission requirements for Science programs please refer to the appropriate entry in the current UAC Guide or refer to the UAC website: www.uac.edu.au

429000 Science

This is applicable to study in a wide range of Science areas in the Bachelor of Science program 3970, as indicated by the majors outlined in Table A under 'Plan Rules and Information'.

429003 Science (Communication)

This is applicable to study in a wide range of Science areas in conjunction with a Science Communication stream in the Bachelor of Science (Communication) program 3993. The majors available are the same as for 3970, with the exception of Philosophy, and History and Philosophy of Science.

429004 Science (Media and Communications)

This is applicable to study in a wide range of Science areas, in conjunction with a Media and Communications stream, in the Bachelor of Science (Media and Communications) program 3994. The majors available are the same as for 3970, with the exception of Philosophy, and History and Philosophy of Science.

429007 Medical Science

This is applicable to study in the Bachelor of Medical Science program 3991, as outlined in the 'Program Rules and Information' section in this Handbook.

429008 Environmental Science

This is applicable to study in the Bachelor of Environmental Science program 3988, as outlined in the 'Program Rules and Information' section in this Handbook.

429013 Advanced Science

This is applicable to study in areas of biological science, behavioural science, chemistry, mathematics and physics in the program 3972 as outlined in the Advanced Science study plan descriptions under 'Plans Rules and Information'.

This is also applicable to study in program 3986 (Mathematics and Finance) as outlined in the Study Plan description.

The number of places available each year in the Advanced Science programs is limited and this is reflected in a higher UAI. The minimum UAI for these programs is 90.

429016/429017 This is applicable to study Aviation (Flying or Management) in programs 3980/3981.

429018 This is applicable to study Biotechnology in program 3052.

429025 This is applicable to study Optometry/Science in program 3952.

429026 This is applicable to study Psychology in program 3432, leading to a Bachelor of Psychology.

429011 This is applicable to study Nanotechnology in program 3617.

425001 This is applicable to study a number of Materials Science and Engineering plans in physical and process metallurgy, ceramic and materials engineering.

Subject Areas, Programs and Study Plans in Science

Subject Area	Available in Program(s)	UAC Entry Code(s)
Advanced Mathematics	3972*	429013
Anatomy	3970, 3972, 3991	429000, 429013, 429007
Applied Mathematics	3972	429013

Aviation	3980 3981	429016 429017
Biochemistry	3970, 3972	429000, 429013
Anatomical Science	3970, 3972	429000, 429013
Biological Anthropology	3970	429000
Biomechanics	3970	429000
Biotechnology	3970, 3972 3052,	429000, 429013 429018,
Chemistry	3970, 3972	429000, 429013
Ecology	3970, 3972	429000, 429013
Environmental Sciences		
- Biology	3988	429008
- Marine	3988	429008
- Microbiology	3988	429008
- Chemistry	3988	429008
- Earth Science	3988	429008
- Geography	3988	429008
- Oceanography	3988	429008
Environmental Earth Science	3970	429000
Food Science and Nutrition	3970	429000
Food Science and Technology	3972	429013
Genetics	3970, 3972	429000, 429013
Geography(Physical and Human)	3970	429000
Geology	3970	429000
Geoscience	3972	429013
History and Philosophy of Science	3970	429000
Marine Science	3970	429000
Marine and Coastal Studies	3972	429013
Materials Science	3970, 3972, 3135, 3030 3130, 3138 3128	429000, 429013 425001
Mathematics	3970	429000
Mathematics and Finance	3986	429013
Mathematics and Computer Science	3972	429013
Medical Chemistry	3972	429013
Medical Microbiology and Immunology	3970, 3972	429000, 429013
Medical Science	3991	429007
Microbiology	3970, 3972	429000, 429013
Molecular Biology	3970, 3972	429000, 429013
Nanotechnology	3617	429011
Neuroscience	3972	429013
Optometry	3952	429025
Pathology	3991	429007
Pharmacology	3970, 3972, 3991	429000, 429013, 429007
Philosophy	3970	429000
Physical Oceanography/Meteorology	3970, 3972	429000, 429013
Physics	3970, 3972	429000, 429013
Physics and Astronomy	3972	429013
Physics with Computer Science	3972	429013
Physiology	3970, 3972, 3991	429000, 429013, 429007
Psychology	3970, 3972 3432	429000, 429013 429026
Pure Mathematics	3972	429013
Safety Science	3970	429000
Science Communication	3993	429003
Science Media and Communications	3994	429004
Spatial Information Systems	3970	429000
Statistics	3970, 3972	429000, 429013
Toxicology	3970	429000

Note: Certain majors listed above are also appropriate for combined Science degree programs. Students in these courses should consult their program advisor for details.

* Entry to the plan in Advanced Mathematics is by invitation only.

General Rules and Requirements

General Education Requirements

The University requires all students to complete a selection of General Education courses. The General Education Program is an integral part of all UNSW undergraduate programs and gives students the opportunity to

address some of the key questions they will face as individuals, citizens and professionals.

Students in the Science programs must complete General Education courses totalling 12 units of credit plus an additional 56 hours of study which fosters acceptance of professional and ethical action and social responsibility. See the 'General Education' section within this Handbook for a description of General Education course categories.

1. Mainstream courses may be substituted for General Education, but only with the approval of the Associate Dean (Student Affairs). Only 6 units of credit from mainstream courses may be substituted for General Education. Students may also only count a maximum of 6 units of credit of General Education courses from a single faculty.*
2. Students have the freedom to choose their General Education courses, according to the General Education requirements and restrictions detailed in the General Education section at the beginning of this Handbook.
3. Students enrolled in combined degrees are normally exempt from the General Education requirement.

* Please refer to the General Education section of this Handbook for further information on substitution.

Prerequisites, Corequisites and Excluded Courses

All programs are governed by basic conditions or rules that specify what a student needs to complete in order to qualify for a degree. Normally a student will study a mixture of compulsory and elective courses.

Compulsory or core courses are ones that must be studied, usually at the stage specified in the program. Often one compulsory course is a prerequisite for another that comes later.

Elective courses are ones that a student chooses in accordance with his or her own interests, subject to meeting prerequisites and corequisites, and capacity in the course. Some electives may have to be taken from a specified list.

Where a choice of courses is available in a program, students must take care to satisfy prerequisites and corequisites and not complete excluded courses.

Prerequisites are courses that must be satisfactorily completed before a student can progress to a later course. Prerequisites are specified in the course descriptions later in this Handbook and students without a necessary prerequisite for a course will be blocked from enrolment in that course.

Corequisites are courses that must either be completed successfully before, or studied concurrently with, the course for which it is prescribed.

Excluded courses are ones that cannot be counted towards the degree qualification.

Credit Transfer

Students admitted to programs administered by the Faculty of Science (including the Science component of combined degrees) may be granted credit for previous studies. All applications for credit transfer are subject to the following conditions:

1. Where students transfer from another tertiary institution, they shall not in general be granted standing in the course that is superior to that which they attained at the institution from which they transferred.
2. Only courses completed within ten years from the commencement of the UNSW degree will be eligible for transfer credit.
3. The credit granted to students admitted to a program administered by the Faculty of Science based upon any completed degrees or awards held by the applicant may not exceed the amount that will permit the applicant to qualify for the degree by completing the requirements for the latter half of the degree.
4. The credit granted to students admitted to a program administered by the Faculty of Science based upon a partially completed degree or award held by the applicant may not exceed the amount that will permit the applicant to qualify for the degree by completing the requirements for the final year of the degree (excluding Honours).
5. The credit granted to students admitted to a combined degree with the Faculty of Science may not exceed the amount that will permit the applicant to qualify for the science component of the combined degree by completing the requirements for the latter half of the Science component of the degree.
6. Students who have been awarded the degree of Bachelor at Pass level may be permitted to enroll for the award of the degree at Honours level with credit for all courses completed if, during the studies for the Pass degree, they have satisfied the prerequisites for entry to the Honours program determined by the school concerned.

Applicants should note that eligibility for transfer credit in a Science program does not guarantee admission to that program.

Study Load

Students may not undertake a study load of more than 24 units of credit in any session (including General Education). This can be exceeded only in exceptional circumstances by students with an excellent academic record and requires the permission of the Associate Dean (Student Affairs). Students with external commitments, such as part-time employment in excess of ten hours per week, should take fewer courses each session. External commitments will not be taken into consideration in relation to such matters as extensions of time for submission of written work or failure to attend examinations (which may, for some courses, be scheduled on Saturday mornings). Students not on good academic standing will be notified in writing and may be required to show why they should be allowed to continue in the program or may be given a restricted program.

Students wishing to take courses additional to those required for the award should be aware that the relevant courses may attract an additional fee, payable up-front, as non award courses.

Academic Standing

A level of academic standing will be assigned to students at the end of each main session. These levels are defined as: Good Standing (the student's current progress is deemed satisfactory), Referral, Probation 1, Probation 2, Suspension, Probation 3 and Exclusion. Movement between levels is based on progress, measured by proportion of load passed. The Program Authority assigns an advisor to each student not in good standing. Continued poor progress can lead to suspension (one year with automatic readmission) or exclusion (two years without automatic readmission). For further information please see 'General University Rules & Student Information' earlier in this Handbook.

Progression through Advanced Science, Environmental Science and Medical Science programs is subject to academic performance. Students enrolled in these programs are required to attain an average of 65 or higher each session of their program.

Program and Course Quotas

Quotas are imposed on some programs and courses (usually because of class size constraints related to space). Where quotas are imposed, students' eligibility to enrol will be assessed on academic merit or on the basis of the requirements of the program of study in which the student is enrolled.

Summary of Programs

The main aims of these Science programs may be summarised as providing opportunities for students to prepare themselves for careers in research, technology, science, mathematics and education, or areas of management or public policy which involve the use of science or mathematics.

The Science programs (**3970, 3991, 3993, 3994**) lead to the award of the degree of Bachelor of Science (BSc) at Pass level on the completion of a three-stage program, taking three years of full-time study. A student who completes the program with a high standard of achievement may be permitted to continue to a fourth year in order to take an Honours degree.

The Advanced Science programs (**3972, 3986**) and the Bachelor of Environmental Science (**3988**) lead to the award of Bachelor of Science (BSc) on the completion of a four stage program, at Honours or Pass level (level of award and Honours is based on academic performance), taking four years of full-time study. Depending on their program of study, students in their fourth year undertake either a research Honours program or a program of coursework and research.

The time specified (three or four years) is the **minimum** time required for completion of each program. Students may complete program requirements over a longer period of time or as part-time candidates. Students contemplating part-time study should note that with few exceptions classes are offered in the day only. This applies even at first year level and means that it is not possible to complete studies by evening classes alone.

Science Program (3970)

The three-year Science program has been designed for students who seek a 'generalist' degree in which there is a large element of choice. A student can combine courses from two or more Science disciplines, or take courses from outside the Science disciplines.

Advanced Science Programs (3972, 3986)

This program differs from the standard Bachelor of Science program (3970) in that it includes advanced level courses, an Honours year and options tailored to an individual's aptitude and interests.

A feature of the Advanced Science program is the requirement that all students enrol in and complete a specified study plan in a particular discipline or specialisation.

Environmental Science Program (3988)

This is a four-year degree leading to a Bachelor of Environmental Science. A student must complete the core in Environmental Science plus a specialisation in one of the approved disciplines.

Bachelor of Science (Communication) Program (3993)**Bachelor of Science (Media and Communications) Program (3994)**

These are three-year Science programs in which students must complete courses in a Communication or Media Studies stream and either a major or two minors in Science. Subject to certain conditions, a student may be permitted to continue into a fourth year to complete an Honours degree.

Medical Science Program (3991)

This is a three-year degree based on structured study plans leading to a Bachelor of Medical Science. Subject to certain conditions, a student may be permitted to continue into a fourth year to complete an Honours degree.

Combined Degree Programs

In these programs, Science is combined with studies in another faculty (e.g. Engineering, Law, Arts and Social Sciences etc). The basic requirement from Science is that a student should complete at least 84 units of credit in Science including a major selected from Table A.

Courses

Typically, each program requires study of a number of prescribed core courses and elective courses at specified stages or levels to ensure a sound basis in the discipline. Each course is assigned a 'Level', which corresponds to the defined stages for each program. There are limits on the number of Level I courses that can be studied in a program (please refer to individual program descriptions). Students are not normally allowed to enrol in courses at a given level before reaching the corresponding stage of the program. Levels are:

Level I	Stage 1
Level II	Stage 2
Level II/III	Stage 2 or 3
Level III	Stage 3 (also Stage 4 in some Advanced Science programs)
Level IV	Stage 4 (or Honours year)

Program Rules and Information**3970 Bachelor of Science****BSc****Typical Duration**

3 years

Minimum UOC for Award

144 units of credit

Typical UOC per Session

24 units of credit

Program Description

The three-year Science degree has been designed for students who seek a 'generalist' degree in which there is a large element of choice. A student can combine courses from 2 or more Science disciplines, or take courses from outside the Science disciplines.

The basic rules for the degree are set out in the following sections under Program Objectives and Academic Rules. Students in the Science program need to ensure that they complete at least one Major and either a second Major or a Minor sequence. At least 84 units of credit (out of a total of 144) must be taken from Science. The remainder may be in another Faculty. Subject to certain conditions, a student may be permitted to continue into a fourth year to complete an Honours degree.

Program Objectives and Learning Outcomes

This program has been designed to:

- develop and sustain an interest in and knowledge of Science.

- develop a working knowledge of scientific methods of investigation.
- 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.
- develop an appreciation of scientific criteria and a concern for objectivity and precision.
- develop confidence and skill in formulating problems and in treating both qualitative and quantitative data.
- develop the ability and disposition to think logically, to communicate clearly by written and oral means, and to read critically and with understanding.
- develop the habit of seeking and recognising relationships between phenomena, principles, theories, conceptual frameworks and problems.
- promote understanding of the significance of science, technology, economics and social factors in modern society, and of the contributions they can make in improving material conditions.
- provide opportunities for the development of students' motivations and social maturity, and an awareness of their capabilities in relation to a choice of career which will be fruitful to themselves and to society.
- provide opportunity to study science in combination with other disciplines.

Program Structure**Majors and Minors**

For information regarding course requirements for majors and minors, please consult **Table A (Majors)** and **Table B (Minors)** under 'Plan Rules and Information' following in this Handbook, or contact the Science Student Centre for further details.

Elective Courses

Students enrolled in any Science degree may normally only take as electives any courses (subject to satisfying prerequisites) which are specified as electives for their degree, or available within a major or minor in program 3970.

Graduation and Majors

In order to graduate, students must satisfy requirements for the award by passing all the courses and requirements specified for their program. Students who complete requirements will be awarded the degree of Bachelor of Science at Pass or Honours level with a major in the area of specialisation (usually indicated by the name of the major). The award will appear on the testamur as:

Bachelor of Science in (name of major)

or

Bachelor of Science with Honours in (name of Honours specialisation)

General Education Requirements

Students in this program must also satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules**Conditions for the Award of the Degree**

1. A student must complete 144 units of credit including 12 units of General Education.
2. The degree must contain a Major sequence of study and either a second Major or a Minor sequence.
3. A student must complete at least 36 units and no more than 60 units in Level I courses from at least three schools.
4. A student must complete at least 24 units at Level I from Science Schools (defined as schools in the Science Faculty plus those in other faculties that currently provide programs under the authority of the Faculty of Science).
5. No student may commence Level II courses until 24 Level I units have been successfully completed.
6. No more than 18 Level I units of credit in any one subject area may be counted towards the completion of the degree.
7. A student must complete a minimum of 84 units of credit from Science Schools (defined as Schools in the Science Faculty plus those in other Faculties that currently provide programs under the authority of the Faculty of Science).

8. Progression to Stage 4 Honours is subject to academic performance. Students seeking to enrol in Honours are required to have the permission of the Head of School, to have completed all the requirements for Stages 1, 2 and 3 of the BSc and to have satisfied prerequisite requirements as specified. All General Education must also have been completed. Students who have not qualified for the BSc at Pass level will not be permitted to enroll in Honours.

9. A Major sequence is defined as: at least 42 units at Level II and III in a single discipline or area of study, including at least 18 units at Level III.

10. A Minor sequence is defined as: 24 units of credit at Level II or III. The Minor may either consist of courses available within but not taken as part of a Major or may be a sequence as defined in Table B.

11. Where a student does Majors in two cognate areas that have courses in common, a student may be permitted to have up to 12 units at Level II and 6 units at Level III be counted towards each Major sequence.

3972 Advanced Science

Bachelor of Science BSc

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

The Bachelor of Science (Advanced Science) program is designed to cater for the specific abilities and interests of talented students with a UAI (Universities Admissions Index) above 90.00.

A feature of the design of the Advanced Science programs is the requirement that all students enrol in a specific study plan on commencement of the program.

Each study plan is designed to link courses in such a way that a coherent pattern of study is achieved in a specific discipline or specialisation.

A wide choice of study plans, designed to meet specific aims and objectives, is available. Most study plans are identified with a particular school or discipline (e.g. Anatomy, Chemistry), but some are multidisciplinary (e.g. Mathematics and Computer Science).

Note: Some courses and plans are only available in the Advanced Science programs. e.g. Mathematics and Finance, Neuroscience, Physics and Astronomy, etc.

This program differs from the standard Bachelor of Science program (3970) as it includes advanced level courses, an Honours year and options tailored to an individual's aptitude and interests.

Program Objectives and Learning Outcomes

This program aims to provide students with a working knowledge of areas of scientific investigation in order to place them at the forefront of research and discovery in the many rapidly developing areas of science.

Program Structure

Conditions for the Completion of the Advanced Science Program

- A student must complete 144 units of credit including 12 units of General Education in Stages 1-3 and a 48 unit Honours sequence at Stage 4.
- The degree must contain a study plan as specified for each Advanced Science program in this section of the Handbook
- A student must complete at least 36 units of credit and no more than 48 units of credit in Level I courses except where specified in a particular program.
- A student must complete before the end of Stage 3 at least two 3 units of credit courses taken from 'Table X', given below.
- No student may normally commence Level II courses until 24 Level I units have been successfully completed unless approved by the Program Authority.
- Progression to Stages 3 and 4 is subject to academic performance. A student will be required to have attained an average of 65 or higher in courses relevant to the major area and cognate subjects in each prior stage.
- Progression to Stage 4 Honours is subject to academic performance. Students seeking to enrol in Honours are required to have the permission of the Head of School, to have completed all the

requirements for Stages 1, 2 and 3 of the BSc (Adv Sci) and to have satisfied prerequisite requirements as specified. Students who have not met the Stages 1, 2 and 3 requirements will not be permitted to enrol in Honours.

Study Plans Available in Advanced Science

Advanced Mathematics (*by invitation only*)

Anatomy
Applied Mathematics
Biochemistry
Biological Science
Biotechnology
Chemistry
Ecology
Food Science and Technology
Genetics
Geosciences
Marine and Coastal Studies
Materials Science
Mathematics and Computer Science
Mathematics and Finance (program 3986)
Medical Chemistry
Medical Microbiology and Immunology
Microbiology
Molecular Biology
Neuroscience
Pharmacology
Physical Oceanography/Meteorology
Physics
Physics and Astronomy
Physics and Computing
Physiology
Psychology
Pure Mathematics
Statistics

For information regarding course requirements for study plans, please consult **Study Plans in Advanced Science** under 'Plan Rules and Information' section following in this Handbook, or contact the Science Student Office for further details.

Table X

CHEM1000
LIFE1001
MATH1000
PHYS1000
LIFE2001

General Education Requirements

Students in this program must also satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

See also 'Conditions for the Completion of the Advanced Science Program' above.

Rules on Progression and Transfer in the Advanced Science Programs

1. Transferring Study Plans

Students must apply in writing to transfer between study plans within each of the Advanced Science programs. Applications are assessed on academic performance and approval is subject to places being available in the nominated study plan.

2. Accelerated Progression in Advanced Science Programs

There is provision for exceptionally talented students to take higher level courses in Stage 1. Contact the Science Student Centre for details.

3. Progression to Stage 4 Honours in Advanced Science

Progression to Stage 4 is subject to academic performance. Students seeking to enrol in a Stage 4 Honours are required to have the approval of the Head of School and normally will be required:

- to have completed the requirements for Stages 1, 2 and 3 of the specific study plan and to have satisfied prerequisite requirements as specified in that study plan. All General Education also must have been completed;
- to have attained an average of 65 or higher in each stage of the program.

Students should also seek the guidance of the appropriate Head of School at an early stage of study to ensure that the study plan being followed is best suited to lead to the Year 4 Honours.

In addition, admission to a particular Stage 4 Honours is subject to appropriate research and supervision resources being available. Quotas may be imposed for entry in any year, in which case admission will be determined on academic merit.

Students who do not attain an average of 65 or higher in Stage 3 of their program are normally required to transfer to the Science program (3970) and take out the BSc award at Pass level.

4. Transfers from Advanced Science to the Science Program

Students enrolled in the Advanced Science programs (program codes 3972, 3986) who wish to take out the BSc award at Pass level and without proceeding to Stage 4 are required to transfer to the Science program (3970).

Applications to transfer should be lodged no later than the census date for the session in which the student expects to satisfy requirements. Students applying after that date may not be able to graduate in the next round of graduation ceremonies. The application should state the 3970 major in which the student wishes to be enrolled.

Students must satisfy all requirements for the designated Science (3970) major in order to qualify for the award of the BSc. Further information regarding the transfer from the Advanced Science program to majors that are available in the Science program is available through the Science Student Centre.

Students entering Year 3 or Stage 4 of a combined degree program will need to consult with the Science Student Centre.

5. Elective Courses

Students enrolled in any Science program may normally only take as electives any courses (subject to satisfying prerequisites) which are specified as electives for their degree, or available within a major or minor in program 3970.

6. Graduation and Study Plans

In order to graduate, students must satisfy requirements for the award by passing all courses and the requirements specified for their program. Students who complete requirements will be awarded the degree of Bachelor of Science at Honours or Pass level with a major in the area of specialisation (usually indicated by the name of the major or study plan, except that for some Honours candidates the name of the Honours specialisation will appear).

Students who successfully complete Stage 4 of their program will be considered for the award of Honours. The following scale generally applies to Honours gradings and, depending on the structure of the program, is based either on performance in the Stage 4 Honours or on performance over the whole 4 stages of the program:

Honours Class 1 - mark or weighted average of 85 or greater

Honours Class 2 Division 1 - mark or weighted average from 75 to 84

Honours Class 2 Division 2 - mark or weighted average from 65 to 74

Honours Class 3 or Pass - mark or weighted average below 65

The award will appear on the testamur as:

Bachelor of Science with Honours in (name of specialisation)

3973 Advanced Science in Medical Physics

Bachelor of Science BSc

Note: Not available to commencing students in 2006

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

This Bachelor of Science (Advanced Science) degree program has a specialisation in Medical Physics.

Medical Physics is the application of physics to diagnosis, treatment and prevention of human disease and disability. There is a continuing demand for professional physicists in this area as new physical techniques are rapidly translated into new medical instruments. There is an increasing demand for health physicists in industry and the public service to

monitor environmental and occupational sources of radiation and other hazards.

Program Objectives and Learning Outcomes

This program aims to provide an essential strong background in conventional physics including electronics and computing, a general background in the biological sciences and some specialised knowledge in biophysics and medical physics.

Program Structure

Please refer to program entry for 3972 Advanced Science for 'Conditions for Completion of the Advanced Science Program'.

For information regarding program requirements for Medical Physics 3973 please refer to the 'Plan Rules and Information' section following in this Handbook.

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Honours

Honours may be awarded in this program. The basis is a suitably weighted performance over the last three stages of this four-year advanced science degree.

Academic Rules

For academic rules relating to this program, please refer to the program entry for 3972 Advanced Science.

3986 Advanced Science in Mathematics and Finance

Bachelor of Science BSc

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

This Bachelor of Science (Advanced Science) degree program has a specialisation in Mathematics and Finance.

The Mathematics and Finance plan is a four-year plan in which Honours may be awarded on the basis of a weighted average mark of all courses studied in the plan.

Note: Students applying through UAC should choose Advanced Science in their preferences. On admission, students will be transferred to this program on request.

Program Structure

Please refer to program entry for 3972 Advanced Science for 'Conditions for Completion of the Advanced Science Program'.

For information regarding program requirements for the Mathematics and Finance 3986 please refer to the 'Plan Rules and Information' section following in this Handbook.

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

For academic rules relating to this program, please refer to the program entry for 3972 Advanced Science.

3988 Bachelor of Environmental Science

BEnvSc

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

The Environmental Science program contains a core sequence of compulsory courses and a choice of disciplinary specialisations. The specialisations include: Biology, Chemistry, Geography, Earth Science, Marine Biology, Microbiology and Oceanography. Students will need to select a specialisation early in their programs.

Program Objectives and Learning Outcomes

The aim of the program is to provide a strong education in the skills and knowledge necessary to work or carry out research as an environmental scientist. In their final year, students carry out a major independent research project and may also do advanced coursework.

The BEnvSc is designed as a four-year (full-time) program. There is also an opportunity for students to combine the BEnvSc with a Bachelor of Arts by taking a five-year program. Students who are unable to complete the BEnvSc may transfer to the three-year Bachelor of Science and graduate with a BSc with a major in one of the environmental areas.

Program Structure**Stage 1**

BIOS1101	Evolutionary and Functional Biology	(6 UOC)
CHEM1011	Fundamentals of Chemistry 1A	(6 UOC)
ENVS1011	Environmental Science 1	(6 UOC)
GEOS1211	Environmental Earth Science	(6 UOC)
GEOS1701	Environmental Systems and Processes	(6 UOC)
MATH1041	Statistics for Life and Social Sciences*	(6 UOC)

And 12 units of credit in one or more of the discipline specialisations

**Note: Students who choose the Oceanography specialisation take MATH1231, NOT MATH1041.*

Stage 2

ECON1107	Elements of Environmental Economics	(6 UOC)
ENVS2030	The Human Environment	(6 UOC)
ENVS2801	Aspects of Environmental Policy and Law	(6 UOC)

And ONE of the following courses:

BEES2041	Data Analysis for Life and Earth Sciences	(6 UOC)
MATH2301	Mathematical Computing	(6 UOC)
MATH2841	Statistics SS	(6 UOC)
Plus General Education courses		(6 UOC)

18 units of credit in Level 2 courses of the discipline specialisation.

Stage 3

BIOS3071	Conservation Biology and Biodiversity	(6 UOC)
CHEM3901	Environmental Toxicology	(6 UOC)
GEOH3911	Environmental Impact Assessment	(6 UOC)
Plus General Education courses		(6 UOC)

24 units of credit in Level 3 courses of the discipline specialisation.

Stage 4

Environmental Honours stream relevant to discipline specialisation.

For entry to Honours, a student must have the permission of the relevant Head of School.

Disciplinary Specialisations**Biology**

Level 1	BIOS1201
Level 2	BIOS2011, BEES2041, plus at least 6 units of credit from: BIOS2031, BIOS2051, BIOS2061
Level 3	BIOS3061, BIOS3111 plus a further 6 units of credit of Level 3 BIOS

Chemistry

Level 1	CHEM1021 or CHEM1041, MATH1031
Level 2	CHEM2041, plus 12 units of credit from CHEM2011, CHEM2021, CHEM2031
Level 3	CHEM3041, CHEM3311, plus 6 units of credit from CHEM3011, CHEM3021, CHEM3031 plus 6 UOC of Level 2 Chemistry

Note: Students in the Chemistry specialisation take CHEM3311, NOT CHEM3901

Earth Science (formerly Geology)

Level 1	GEOS1111
Level 2	18 units of credit from GEOS2171, GEOS2181, GEOS2291, GEOS2071, GEOS2721
Level 3	GEOS3131, GEOS3281, plus a further 6 units of credit of Level 3 GEOS

Geography

Level 1	GEOH1601
Level 2	GEOS2711, GEOS2721 plus a further 6 units of credit of Geography
Level 3	GEOS3761 plus a further 12 units of credit of Level 3 Geography

Marine Biology

Level 1	BIOS1201
Level 2	BIOS2011, BIOS2031, BEES2041, MSCI2001
Level 3	BIOS3071, BIOS3081, BIOS3091 plus 6 units of credit of Level 3 Marine Science

Microbiology

Level 1	BIOS1201, CHEM1021
Level 2	BIOC2201, BIOS2011, MICR2011, MICR2201
Level 3	BIOT3081, MICR3071 plus 6 units of credit of Level 3 Microbiology

Oceanography

Level 1	MATH1231*, PHYS1121, PHYS1221
Level 2	MATH2841, MATH2011, MATH2120, MATH2240, PHYS2810
Level 3	MATH2301, MATH3121, MATH3241, MATH3261

Note: In all specialisations students may take more advanced versions of courses where these exist.

General Education Requirements

Students in this program must also satisfy the General Education requirements. This is 12 UOC, usually taken in second and third year studies, as indicated in the Program Structure.

For further information, please refer to the General Education section in this Handbook. Students in Environmental Science need to be aware that there are a number of General Education courses which they are excluded from taking, and are advised to consult the BEES Student Office.

Academic Rules**Conditions for the Award of the Environmental Science Degree**

- A student must complete 144 units of credit including 12 units of General Education in Stages 1-3 and 48 unit Honours sequence at Stage 4.
- The degree must contain the core in Environmental Science plus a specialisation in one discipline.
- A student must complete at least 36 units of credit and no more than 60 units of credit in Level 1 courses.
- No student may normally commence Level 2 courses until 24 units of credit Level 1 have been successfully completed unless approved by the program adviser or Associate Dean.
- Progression to Stages 3 and 4 is subject to academic performance. A student will be required to have attained an average of 65 or higher in courses relevant to the major area and cognate subjects in each prior stage.
- Progression to Stage 4 Honours is subject to academic performance. Students seeking to enrol in Honours are required to have the permission of the Head of School, to have completed all the requirements for Stages 1, 2 and 3 of the BEnvSc and to have satisfied prerequisite requirements as specified. All General Education must also have been completed. Students who have not qualified for the BEnvSc at Pass level will not be permitted to enrol in Honours.

3993 Bachelor of Science (Communication)**BSc(Comm)****Typical Duration**

3 years

Minimum UOC for Award

144 units of credit

Typical UOC per Session

24 units of credit

Program Description

Science Communication is designed to serve students interested in a career in the human and social aspects of science, from entrepreneurship in biotechnology to science journalism and from advising on environmental policy to teaching science to the public. Offered for the first time in 2000, the program leads to a three-year Pass or four-year Honours degree. It provides students with a strong grounding in science together with conceptual insights and practical skills in communication. Students address large scale issues, like the role of science in society, as they impact on small scale interactions, such as a conversation between a patient and her doctor. This scope of concerns makes the degree a highly interdisciplinary undertaking for the student who likes to marry theory with practice.

Program Objectives and Learning Outcomes

Please visit the Science Communication website for information on Program Objectives and the Learning Outcomes: www.scom.unsw.edu.au

Program Structure

Science Communication electives consist of SCOM courses that are not part of the degree program's core as well as selected courses outside SCOM that address key aspects of human, organisational, and mass communication. They can be from Psychology, Marketing, Sociology, Media and Communication, Geography, Safety Science, or like fields, but they may not be from a student's major or minor area of study. A SCOM elective must be approved by the Science Communication Program Office.

Stage 1

SCOM1011	Science, Technology and Society	(6 UOC)
SCOM1021	Introduction to Science Communication	(6 UOC)
24 units of credit from two Science schools		
Electives totalling 12 units of credit		

Stage 2

SCOM2021	Professional Science Communication	(6 UOC)
And ONE of the following courses:		
HPSC2400	Knowledge and Power	(6UOC)
HPSC2500	Environment, Technology and Politics	(6UOC)
HPSC2850	Information Technology, Politics and the Media	(6UOC) (not offered in 2006)

Electives in Communication totalling 6 units of credit

18-24 units of credit in a Science Major or 2 Minors (as required by Major or Minors)

Further electives to give a total of 42 units of credit for Stage 2
Plus General Education (6 UOC)

Stage 3

SCOM3011	Communicating Science: Theory and Practice	(6 UOC)
SCOM3021	Science Communication Internship	(6 UOC)
Electives in Communication totalling 6 units of credit		
24 units of credit in a Science Major or Minors (continued from Stage 2)		
Plus General Education (6 UOC)		

Honours

Please contact the Faculty of Science for information on Honours studies.

Academic Rules

1. A student must complete 144 units of credit including 12 units of credit of General Education.
2. The degree must contain a Communication major sequence and either a second major drawn from those approved with the BSc (excluding those from the Schools of Philosophy and History and Philosophy of Science) or two approved minor sequences.
3. A student must complete at least 36 and no more than 60 units of credit in Level I courses from at least three schools.
4. A student must complete at least 24 units of credit at Level I from Science Schools (as defined in the rules attached to the conditions for the award of the BSc excluding the Schools of Philosophy and History and Philosophy of Science).
5. No student may commence Level II courses until 24 Level I units of credit have been successfully completed.

6. A student must complete a minimum of 84 units of credit from Science schools (see 4 above).

7. Progression to Stage 4 Honours is subject to academic performance. Students seeking to enrol in Honours are required to have the permission of the Head of School, to have completed all the requirements for Stages 1, 2 and 3 of the BSc (Comm) and to have satisfied prerequisite requirements as specified. All General Education must also have been completed. Students who have not qualified for the BSc (Comm) at Pass level will not be permitted to enrol in Honours.

3994 Bachelor of Science (Media & Communications)**BSc(Media)****Typical Duration**

3 years

Minimum UOC for Award

144 units of credit

Typical UOC per Session

24 units of credit

Program Description

The Science Media and Communications program leads to a three-year Pass or four-year Honours degree. It is aimed at producing students who have a strong grounding in science together with conceptual and practical skills in media and communication studies. Students gain creative, practical experience with digital media in the production of audiovisual and multimedia works in an advanced multimedia laboratory, together with an understanding of the history and social impacts of media technologies. This focus is combined with a Major or two Minors in Science.

Program Objectives and Learning Outcomes

Please visit the website of the School of Media, Film and Theatre in the Faculty of Arts and Social Sciences for information regarding the Program Objectives and Learning Outcomes, as they teach the core program of multimedia courses - <http://media.arts.unsw.edu.au/media/index.html>

Program Structure**Stage 1**

MDCM1000	New Media Technologies A	(6 UOC)
MDCM1001	New Media Technologies B	(6 UOC)
24 units of credit from two Science Schools		
Electives totalling 12 units of credit		

Stage 2

MDCM2000	Researching and Writing for New Media	(6 UOC)
MDCM2002	Media Production	(6 UOC)
MDCM2003	Multimedia Production	(6 UOC)
18-24 units of credit in a Science Major or 2 Minors (as required by Major or Minors)		
Further electives to give a total of 42 units of credit for Stage 2		
Plus General Education (6 UOC)		

Stage 3

MDCM3000	Media Forms	(6 UOC)
MDCM3002	Advanced Media Production	(6 UOC)
MDCM3003	Multimedia Production in Industry Contexts	(6 UOC)
24 units of credit in a Science Major or Minors (continued from Stage 2)		
Plus General Education (6 UOC)		

General Education Requirements

Students in this program must also satisfy the General Education requirements. This is usually 12 UOC taken in second and third year studies.

For further information, please refer to the General Education section in this Handbook.

Honours

Please contact the Faculty of Science for information on Honours studies.

Academic Rules

1. A student must complete 144 units of credit including 12 units of credit of General Education.

2. The degree must contain a Media and Communications major sequence and either a second major drawn from those approved within the BSc (excluding those from the Schools of Philosophy and History and Philosophy of Science) or two approved minor sequences.

3. A student must complete at least 36 units of credit and no more than 60 units of credit in Level 1 courses from at least three Schools.

4. A student must complete at least 24 units of credit at Level 1 from Science schools (as defined in the conditions for the award of the BSc excluding the Schools of Philosophy and History and Philosophy of Science).

5. No student may commence Level 2 courses until 24 Level 1 units of credit have been successfully completed.

6. A student must complete a minimum of 84 units of credit from Science schools (see 4 above).

7. Progression to Stage 4 Honours is subject to academic performance. Students seeking to enrol in Honours are required to have the permission of the Head of School, to have completed all the requirements for Stages 1, 2 and 3 of the BSc (Media) and to have satisfied prerequisite requirements as specified. All General Education must also have been completed. Students who have not qualified for the BSc (Media) at Pass level will not be permitted to enrol in Honours.

3991 Bachelor of Medical Science

BMedSc

Typical Duration

3 years

Minimum UOC for Award

144 units of credit

Typical UOC per Session

24 units of credit

Program Description

This three-year degree program will provide the basis for a career in biomedical research and is an appropriate first degree for students planning to enter graduate medical or paramedical programs.

Medical science is the area of science which underpins the practice of medicine. It incorporates study of the structure and function of the human body (anatomy and physiology) as well as the way in which our form and function is inherited (genetics) and then develops from the fertilised ovum (embryology). It deals with the chemistry of living organisms (biochemistry) with particular reference to man, the role of bacteria, viruses and other microorganisms in disease (microbiology) as well as drugs which are used to cure human diseases (pharmacology), the natural defenses of the body (immunology), and the general process leading to disease (pathology).

Students enrolled in this program may have the opportunity to undertake a fourth year that involves a research program leading to an Honours degree.

Program Objectives and Learning Outcomes

Students enrolled in this program will have the opportunity to gain a broad perspective of the biomedical sciences, as well as to specialise in one or more of the above disciplines.

Program Structure

Stage 1

BIOS1101	Evolutionary and Functional Biology	(6 UOC)
BIOS1201	Molecules, Cells and Genes	(6 UOC)
CHEM1011	Fundamentals of Chemistry 1A	(6 UOC)
or		
CHEM1031	Higher Chemistry 1C	(6 UOC)
CHEM1021	Fundamentals of Chemistry 1B	(6 UOC)
or		
CHEM1041	Higher Chemistry 1D	(6 UOC)
PLUS 6 units of credit from:		
MATH1031	Mathematics for Life Sciences	(6 UOC)
MATH1041	Statistics for Life and Social Sciences	(6 UOC)
MATH1131	Mathematics 1A	(6 UOC)
MATH1141	Higher Mathematics 1A	(6 UOC)
SCIF1110	Perspectives in Medical Science 1	(3 UOC)

One General Education course totalling 3 units of credit.

Elective courses totalling 12 units of credit offered by the following Schools: Computer Science, Mathematics, Physics, History and Philosophy of Science, Psychology

Stage 2

SCIF2220 Perspectives in Medical Science 2 (3UOC)

Courses totalling **at least 36 units of credit** from the following: ANAT2111, ANAT2241, ANAT2341, ANAT2601, ANAT2611, BIOC2101* or BIOC2181, BIOC2201* or BIOC2291, MICR2011**, MICR2201, PHPH2101, PHPH2201, PHPH2011, PATH2201, BIOS2621 or BIOS2021

One General Education course totalling 3 units of credit.

Elective courses totalling **6** units of credit from the above courses or from the following areas: Biological Science, Chemistry, Computing, Mathematics, Physics, Psychology, History and Philosophy of Science.

**Students are encouraged to enrol in the more advanced biochemistry courses, and should note that BIOC2101 and BIOC2201 are prerequisites in many Stage 3 courses*

***Students taking MICR2011 are encouraged enrol in BIOS2021 (or BIOS2621). The prerequisite course, MICR2201 maybe waived with the permission of the course authority.*

Note: Students anticipating doing fourth year Honours program should contact the relevant head of school for advice.

Stage 3

Courses totalling **42** units of credit from the following subject areas: Anatomy, Biochemistry and Molecular Biology, Genetics, Microbiology, Immunology, Pathology, Physiology & Pharmacology, Psychology, Biotechnology. Students must nominate a major discipline by taking at least 18 units of credit at level 3 in one of these subject areas and fulfilling other course requirements specified for that major.

General Education courses totalling **6** units of credit

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Honours

Stage 4

Honours may be taken in the major discipline, subject to progress at credit level through the program. Intending Honours students should consult the Head or Honours Coordinator of the appropriate School. Students who successfully complete Stage 4 of their program will be considered for the award of Honours.

Academic Rules

Conditions for the Award of the Medical Science Degree

- A student must complete 144 units of credit including 12 units of General Education in Stages 1-3.
- Honours is available to suitably qualified students and consists of a 48 unit of credit Honours sequence at Stage 4.
- The degree must contain a sequence of study as specified in the program description
- A student must complete at least 36 units and no more than 48 units in Level 1 courses
- A student must complete before the end of Stage 3 the two 3 unit courses SCIF1110 and SCIF2220.
- No student may normally commence Level 2 courses until 24 Level 1 units have been successfully completed unless approved by the Head of School.
- Progression to Stages 3 and 4 is subject to academic performance. A student will be required to have attained an average of 65 or higher in courses relevant to the major area and cognate subjects in each prior stage.
- Progression to Stage 4 Honours is subject to academic performance. Students seeking to enrol in Honours are required to have the permission of the Head of School, to have completed all the requirements for Stages 1, 2 and 3 of the BMedSc and to have satisfied prerequisite requirements as specified. All General Education must also have been completed. Students who have not qualified for the BMedSci at Pass level will not be permitted to enrol in Honours.

Specialist Degrees

3980 Bachelor of Aviation (*Flying stream*)

BAv

Typical Duration

3 years

Minimum UOC for Award

144 units of credit

Typical UOC per Session

24 units of credit

Program Description

The degree of Bachelor of Aviation is offered by the Faculty of Science with input from the Faculty of Engineering.

The aim of this program is to provide an opportunity for students to prepare for a career in the aviation industry. Program 3980 is a Flying stream which allows students the opportunity for flight training. A Management stream is also offered which prepares students more specifically for careers in the managerial sector of the aviation industry - for this Management stream, please refer to program entry for 3981 Bachelor of Aviation (Management stream).

Both streams consist of a core courses selected from the faculties offering the program together with a range of options. The Flying stream additionally includes flight training to a minimum level of Commercial Pilots Licence (CPL) with additional flight training options available dependent upon student progress and requirements. It should be noted that due to the block training nature of the flight training program, teaching periods might not correspond to standard academic sessions.

Program Objectives and Learning Outcomes

This program aims to prepare students for a career in flying, as a pilot.

Program Structure

Stage 1

AVEN1310	Basic Mechanics	(3 UOC)
AVEN1910	Introduction to Aircraft Engineering	(3 UOC)
AVIA1002	Flying Training 1	(12 UOC)
AVIA1321	Fundamentals of Aviation	(6 UOC)
AVIA1700	Aviation Safety Management 1	(3 UOC)
AVIA1900	Aviation Economics	(3 UOC)
MATH1031	Mathematics for Life Sciences	(6 UOC)
PHYS1149	Physics 1A (Aviation)	(6 UOC)
PHYS1249	Environmental Physics (Aviation)	(3 UOC)
SESC1580	Risk Management 1	(3 UOC)

Stage 2

AVEN2920	Aviation Technologies 2	(3 UOC)
AVIA2003	Flying Training 2	(18 UOC)
AVIA2210	Aviation Human Factors 2	(3 UOC)
MATH1041	Statistics for Life and Social Sciences	(6 UOC)
General Education		(6 UOC)

Plus 12 units of credit from:

AVEN2220	Aviation Engineering Experimentation 1	(3 UOC)
AVEN2910	Aviation Technologies 1	(3 UOC)
AVEN2930	Aviation Technologies 3	(3 UOC)
AVIA2800	Management of General Aviation	(3 UOC)
SESC2580	Risk Management 2	(3 UOC)

Plus further electives (totalling 6 UOC)

Stage 3

AVEN3220	Aviation Engineering Experimentation 2	(3 UOC)
AVIA3201	Airline Resource Management	(6 UOC)
AVIA3300	Air Traffic Management	(3 UOC)
AVIA3710	Aviation Safety Management 2	(6 UOC)

Plus **one** of the following AVIA courses:

AVIA3004	Advanced Flying Training	(24 UOC)
AVIA3101	Airline Management	(6 UOC)

General Education

(6 UOC)

Additional UOC for a Stage 3 total of 48 from:

AVEN3230	Aviation Systems and Avionics	(3 UOC)
AVEN3420	Aircraft Maintenance	(3 UOC)
AVEN3610	Aerodynamics, Stability and Control	(3 UOC)
AVEN3710	Aircraft Propulsion	(3 UOC)
AVIA3800	Management of Regional Airlines	(3 UOC)

AVIA3851	Airport Management 2	(6 UOC)
PHYS2810	Atmospheric Physics	(3 UOC)

Stage 4 (Honours)

One of the following:

AVIA4001	Aviation Honours - Full Time	(24 UOC)
AVIA4002	Aviation Honours - Part Time	(48 UOC)

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

A total of 144 units of credit including 12 units of credit of General Education (see above) are required for the completion of the Bachelor of Aviation (3 year degree).

3981 Bachelor of Aviation (*Management stream*)

BAv

Typical Duration

3 years

Minimum UOC for Award

144 units of credit

Typical UOC per Session

24 units of credit

Program Description

The degree of Bachelor of Aviation is offered by the Faculty of Science with input from the Faculty of Engineering.

The aim of this program is to provide an opportunity for students to prepare for a career in the aviation industry. Program 3981 is a Managerial stream which prepares students more specifically for careers in the managerial sector of the aviation industry. A Flying stream, which incorporates flight training, is also available - please refer to program 3980 in this Online Handbook.

Both streams consist of core courses selected from the Faculties offering the program together with a range of options. The Managerial stream offers a selection of courses designed to provide students with a broad base of knowledge in managing the operational aspects of the aviation industry.

Program Objectives and Learning Outcomes

This program aims to prepare students for a career in the managerial sector of the aviation industry.

Program Structure

Stage 1

AVEN1310	Basic Mechanics	(3 UOC)
AVEN1910	Introduction to Aircraft Engineering	(3 UOC)
AVIA1321	Fundamentals of Aviation	(6 UOC)
AVIA1810	Aviation Security	(3 UOC)
AVIA1850	Airport Management 1	(3 UOC)
AVIA1900	Aviation Economics	(3 UOC)
MATH1031	Mathematics for Life Sciences	(6 UOC)
MATH1041	Statistics for Life and Social Sciences	(6 UOC)
SESC1580	Risk Management 1	(3 UOC)

Plus 6 UOC from:

ECON1101	Microeconomics 1	(6 UOC)
PHYS1149	Physics 1A (Aviation)	(6 UOC)
PHYS1211	Energy and Environmental Physics	(6 UOC)

Stage 2

AVEN2920	Aviation Technologies 2	(3 UOC)
AVIA1700	Aviation Safety Management 1	(3 UOC)
AVIA2110	Aviation Human Factors 1	(3 UOC)
AVIA2210	Aviation Human Factors 2	(3 UOC)
AVIA2400	Aviation Regulations 1	(3 UOC)
General Education		(6 UOC)
Elective courses		(6 UOC)

Plus 21 UOC from:

AVEN2220	Aviation Engineering Experimentation 1	(3 UOC)
AVEN2910	Aviation Technologies 1	(3 UOC)

AVEN2930	Aviation Technologies 3	(3 UOC)
AVIA2500	Airline Marketing	(3 UOC)
AVIA2800	Management of General Aviation	(3 UOC)
AVIA3600	Simulations Applications	(3 UOC)
MGMT2721	Managing People	(6 UOC)
PHYS2850	Environmental Acoustics	(3 UOC)
SESC2580	Risk Management 2	(3 UOC)

Stage 3

AVEN3220	Aviation Engineering Experimentation 2	(3 UOC)
AVIA3101	Airline Management	(6 UOC)
AVIA3201	Airline Resource Management	(6 UOC)
AVIA3710	Aviation Safety Management 2	(6 UOC)

General Education

Electives

Plus 18 UOC from:

AVEN3230	Aviation Systems and Avionics	(3 UOC)
AVEN3420	Aircraft Maintenance	(3 UOC)
AVEN3610	Aerodynamics, Stability and Control	(3 UOC)
AVEN3710	Aircraft Propulsion	(3 UOC)
AVEN3930	Aircraft Evaluation and Design Appraisal	(3 UOC)
AVIA3300	Air Traffic Management	(3 UOC)
AVIA3400	Aviation Regulations 2	(3 UOC)
AVIA3800	Management of Regional Airlines	(3 UOC)
AVIA3851	Airport Management 2	(6 UOC)
PHYS2810	Atmospheric Physics	(3 UOC)

Stage 4 (Honours)

Choose one of the following:

AVIA4001	Aviation Honours - Full Time	(48 UOC)
(24 UOC per session over two sessions)		
AVIA4002	Aviation Honours - Part Time	(48 UOC)

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

A total of 144 units of credit including 12 units of credit of General Education (see below) are required for the completion of the Bachelor of Aviation (3 year degree).

3052 Biotechnology**Bachelor of Science BSc****Typical Duration**

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

Biotechnology can be defined as the use of various biological processes to make products and perform services. In biotechnology, living cells and biochemical macromolecules such as proteins, DNA and RNA are applied in a rapidly expanding range of activities of direct benefit to society. Biotechnology is used for the production of pharmaceuticals, food and industrial chemicals, in the development of improved crops and livestock for farming, for environmental clean-up, and in forensics. Modern biotechnology makes practical use of the most recent scientific advances in areas such as molecular genetics and molecular cell biology.

The development of recombinant DNA technology has resulted in the ability to create, modify and improve industrial organisms and to produce large quantities of any useful protein. Based on this technology, biopharmaceuticals including hormones, vaccines, anti-hypertensive agents, anti-inflammatory agents and new therapies for the treatment of cancer are being developed with the potential to revolutionise medicine. The sequencing of the human genome and the rapid emergence of high-throughput genomic and proteomic techniques is resulting in a surge of new drug targets. Translation of this advanced knowledge into useful therapies and improved medical practices requires the application of biotechnology.

Microorganisms and viruses are being modified for use in controlling plant and animal diseases and pests. Diagnostic kits are being developed for

use in forensic science and in product identification and quality control. Genetic improvements in agriculture, plants and animals are becoming a reality, as is the control of inborn genetic disorders in humans. The ability to treat diseased and injured organs with replacement cells and tissues generated outside of the body is advancing rapidly.

Bioprocesses are also used for environmental remediation, for the extraction of minerals from low-grade ores, and for the development of novel processes to treat waste and degrade recalcitrant molecules. Environmental biotechnology is an area of vital importance for our increasingly polluted planet.

The future for expansion in all the above areas is immense. Our ability to cope with many medical, environmental, agricultural and manufacturing problems in the 21st century will depend heavily on advances in biotechnology.

This program leads to the award of a Bachelor of Science Degree over four years full-time study, with Honours for students who perform with merit.

Program Objectives and Learning Outcomes

The Biotechnology program aims to provide a comprehensive education in all aspects of modern biotechnology.

Program Structure**Stage 1**

BIOS1201	Molecules, Cells and Genes	(6 UOC)
BIOT1011	Introductory Biotechnology	(6 UOC)
CHEM1011	Fundamentals of Chemistry 1A	(6 UOC)
CHEM1021	Fundamentals of Chemistry 1B	(6 UOC)
MATH1031	Mathematics for Life Sciences	(6 UOC)
MATH1041	Statistics for Life and Social Sciences	(6 UOC)

Electives courses totalling 12 UOC recommended.

Note: One of the following courses/combinations may be substituted for MATH1031 and MATH1041

MATH1011	General Mathematics 1B	(6 UOC)
or		
MATH1131	Mathematics 1A	(6 UOC)
MATH1231	Mathematics 1B	(6 UOC)
or		
MATH1141	Higher Mathematics 1A	(6 UOC)
MATH1241	Higher Mathematics 1B	(6 UOC)

Stage 2

BIOC2101	Principles of Biochemistry (Advanced)	(6 UOC)
BIOC2201	Principles of Molecular Biology (Advanced)	(6 UOC)
BIOS2021	Genetics	(6 UOC)
or		
BIOS2621	Genetics (Advanced Level)	(6 UOC)
MICR2011	Microbiology 1	(6 UOC)
MICR2201	Fundamentals of Microbiology and Immunology	(6 UOC)
General Education courses		(6 UOC)

PLUS 12 UOC from:

BIOS2011	Evolutionary and Physiological Ecology	(6 UOC)
CHEM2021	Organic Chemistry	(6 UOC)
CHEM2041	Chemical and Spectroscopic Analysis	(6 UOC)
PHPH2101	Physiology 1A	(6 UOC)

Stage 3

BIOC3121	Molecular Biology of Nucleic Acids	(6 UOC)
BIOT3011	Biotechnology A	(6 UOC)
BIOT3021	Biotechnology B	(6 UOC)
BIOT3061	Biopharmaceuticals	(6 UOC)
General Education courses		(6 UOC)

PLUS one of the following MICR courses:

MICR3041	Immunology 1	(6 UOC)
MICR3641	Immunology 1 (Advanced)	(6 UOC)

PLUS an additional 12 UOC to be selected from the following:

BIOC3111	Molecular Biology of Proteins	(6 UOC)
BIOC3271	Molecular Cell Biology	(6 UOC)
BIOC3281	Recombinant DNA Techniques and Eukaryotic Molecular Biology	(6 UOC)
BIOT3081	Environmental Biotechnology	(6 UOC)
MICR3021	Microbial Genetics*	(6 UOC)

MICR3051	Immunology 2	(6 UOC)
MICR3071	Environmental Microbiology	(6 UOC)

***Note:** MICR3621 Microbial Genetics (Advanced) may be substituted for MICR3021.

Stage 4

BIOT3071	Commercial Biotechnology	(6 UOC)
BIOT3091	Professional Issues in Biotechnology	(6 UOC)
BIOT4053	Research Project - Biotechnology	(36 UOC)

(18 UOC per session over two sessions)

Note: Enrol in BIOT4053 for both sessions through the School Office.

General Education Requirements

The University requires all students to complete a coherent sequence of General Education courses. The General Education Program is an integral part of the BSc Biotechnology course and gives students the opportunity to address some of the key questions they will face as individuals, citizens and professionals. A total of 12 units of credit in General Education course(s) is required.

For further information, please refer to the General Education section in this Handbook.

Academic Rules

Progression and Exclusion

Students whose performance is unsatisfactory will be notified in writing and asked to show at the end of the academic year why they should remain in their course of study. Any student who fails a course twice, or is deemed to be making unsatisfactory progress, will be considered as having poor academic standing.

Unsatisfactory progress may include:

- failure to achieve an average of 65 or higher in courses attempted in an academic year;
- failing to pass courses totalling at least 24 units of credit in one year;
- failing to complete the requirements for Stage 1 of the program in the first two years of study.

Students not on good academic standing will be notified by the University or Faculty in writing. Notified students will be assessed in accordance with the University's procedures. Failure to respond accordingly can result in exclusion from a course, the program, or transfer to the Science and Mathematics program (3970), provided that the progression requirements in that course have been met. Also see the section on progression and exclusion ('Restrictions on Students Re-enrolling') in the Student Guide.

Progression to Stage 4 Honours

Progression to Stage 4 is subject to academic performance. Students seeking to enrol in a Stage 4 Honours program are required to have the approval of the Head of School and normally will be required:

- to have completed the requirements for Stages 1, 2 and 3 of the program and to have completed all General Education courses
- to have attained an average of 65 or higher in each Stage of the program.

Students who do not attain an average of 65 or higher in Stage 3 of the program are normally required to transfer to the Science and Mathematics program (3970) and take out the BSc award at Pass level.

Note: Please refer to Program Structure above for rules relating to program requirements

Career Outcomes

Graduates in Biotechnology will be able to find employment in industries and other organisations involved with drug development, biopharmaceutical production, food processing as well as agricultural and environmental biotechnology.

3135 Materials Science and Engineering

Bachelor of Engineering BE

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

The field of Materials Science and Engineering offers unlimited possibilities for innovation and development. Attention is being focused on developing and processing metals, ceramics, polymers and composites with improved properties.

The activities of the materials engineer range from materials production, including their extraction from ores and their refining, to the design, development, processing and recycling of materials for use in aerospace, transportation, electronics, energy conversion and biomedical systems.

Advanced materials can provide a major competitive advantage in virtually every part of a country's manufacturing industry. Because Australia is a country rich in minerals, materials science has been designated as a priority area for research and development. Examples of recent and significant developments include the emergence of environmentally friendly and economical metal processing methods, advanced surface coatings, biomedical materials, electrical ceramics, engineering polymers, and advanced composites.

The School of Materials Science and Engineering provides education and training for students to prepare them for a significant and important career in the materials and other industries.

The School of Materials Science and Engineering is in a good position to provide the increased numbers of graduates necessary for development of these new initiatives in materials. It is the only school in Australia that offers professional courses in ceramic engineering, metallurgical engineering and materials engineering as well as providing postgraduate specialisation in these fields.

The School is extremely well equipped with a wide range of advanced computing, thermal analysis, mechanical testing, X-ray and optical and electron microscopy facilities.

The School offers a four-year full-time BE program (3135) with four different plans, and related five-year full-time combined degree program leading to BE/MBiomedE (3138). In addition, six year part-time BSc(Tech) programs are also offered in Ceramics (3030) and Metallurgy (3130).

Program Structure

Plans under program 3135 all of which lead to the award of Bachelor of Engineering (BE) provide appropriate preparation for a professional Physical Metallurgical Engineer (plan MATSE13135), Process Metallurgical Engineer (plan MATSG13135), Materials Engineer (plan MATSH13135) and Ceramic Engineer (plan MATSJ13135). The first two years of all plans are identical and the third and fourth years contain a number of common courses. Students can change their selection among the study plans up to the end of Session 1 of the third year.

Each study plan provides a range of electives in the particular study specialisation concerned. In addition, a limited number of electives can be chosen from other plans.

Concurrent programs are also available with Bachelor of Engineering/Masters programs in either Commerce (3128) or Biomedical Engineering (3138). To enter program 3128, students start in BE program 3135 and study their academic plan to the end of third year. They then transfer in year 4 to BE Program 3128 and in their 5th year, study under the Master of Commerce program 8400 to obtain the award of Bachelor of Engineering/Master of Commerce (BEMCom). Similarly, in program 3138, students can study an academic plan within the Bachelor of Engineering program 3135 and then, in the 5th year, study under the Master of Biomedical Engineering Program 3749 to obtain the award of Bachelor of Engineering/Master of Biomedical Engineering (BE/MBiomedE).

The following structure is applicable to all plans within the Bachelor of Engineering Single Degree Program

Plan **MATSE13135** BE in **Physical Metallurgy**
 Plan **MATSG13135** BE in **Process Metallurgy**
 Plan **MATSH13135** BE in **Materials Engineering**
 Plan **MATSJ13135** BE in **Ceramic Engineering**

Stage 1 of all plans

CHEM1011	Fundamentals of Chemistry 1A	(6 UOC)
CHEM1021	Fundamentals of Chemistry 1B	(6 UOC)
MATH1131	Mathematics 1A	(6 UOC)
MATH1231	Mathematics 1B	(6 UOC)
MATS1021	Computing in Materials Science	(3 UOC)
MATS1111	Materials Science 1	(3 UOC)
MECH0130	Engineering Drawing and Solid Modelling	(3 UOC)
MECH0440	Engineering Statics	(3 UOC)
PHYS1121	Physics 1A	(6 UOC)
PHYS1221	Physics 1B	(6 UOC)

Stage 2 of all plans

CHEM2718	Physical Chemistry for Materials Science and Engineering	(3 UOC)
MATH2049	Mathematics and Statistics for Materials Science A	(3 UOC)
MATH2059	Mathematics for Materials Science B	(3 UOC)
MATS1002	Microstructure Analysis	(3 UOC)
MATS1092	Materials and Design 1	(3 UOC)
MATS1112	Phase Equilibria	(3 UOC)
MATS1142	Crystallography and X-Ray Diffraction	(3 UOC)
MATS1152	Materials Engineering 1B	(6 UOC)
MATS1172	Physical Properties of Materials	(3 UOC)
MATS1232	Materials Engineering 1A	(3 UOC)
MATS1262	Mechanical Properties of Materials	(6 UOC)
MATS1282	Thermodynamic Materials	(6 UOC)
General Education course		(3 UOC)

Stage 3 of all plans

MATS1013	Diffusion and Kinetics	(3 UOC)
MATS1244	Materials Industry Management A	(6 UOC)
MATS2013	Ceramic Materials	(3 UOC)
MATS3443	Polymer Science and Engineering	(3 UOC)
MATS4013	Physical Metallurgy	(3 UOC)
MATS5013	Materials Processing	(6 UOC)
MATS5113	Materials Engineering Laboratory	(3 UOC)
MATS5323	Modelling in Materials Engineering 1	(3 UOC)
Plus Professional Electives totalling		12 UOC
General Education courses		(6 UOC)

Stage 4 of all plans

MATS1343	Materials Industry Management B	(3 UOC)
MATS1354	Design Project	(3 UOC)
MATS1464	Professional Communication and Presentation	(3 UOC)
MATS3624	Materials Engineering Project	(18 UOC)
(9 UOC per session over two sessions)		
Plus Professional Electives totalling		18 UOC
or		
MATS3724	Materials Engineering Project	(24 UOC)
(12 UOC per session over two sessions)		
Plus Professional Electives totalling		12 UOC
General Education courses		(3 UOC)

Elective Components (Stage 4)

The following courses have particular objectives, but specific topics are chosen by students for study and research.

MATS1244	Materials Industry Management A	(6 UOC)
MATS1354	Design Project	(3 UOC)
MATS1464	Professional Communication and Presentation	(3 UOC)
MATS3624	Materials Engineering Project	(18 UOC)
(9 UOC per session over two sessions)		
MATS3724	Materials Engineering Projects	(24 UOC)
(12 UOC per session over two sessions)		

Physical Metallurgy - Plan MATSE13135

The Physical Metallurgy plan is designed to produce graduates with training appropriate to both the metal and product manufacturing industries. The profession is very broad and includes careers in metal manufacturing companies, product manufacturing companies (e.g. white goods, automotive, aircraft), utilities, airline overhaul and maintenance operations, consulting companies and research organisations. Graduates may be employed in production, technical control and development, quality assurance, technical marketing and management. Physical Metallurgy is introduced comprehensively in Stages 3 and 4 by a number of professional electives. Students also undertake a materials design project and a substantial thesis project. Students may complete the first one or two years of their degree at their local university engineering school and then transfer with advanced standing to UNSW.

Physical Metallurgy Professional Electives:

MATS1214	Welding and Other Joining Processes	(3 UOC)
MATS1414	Surface Treatment and Wear	(3 UOC)
MATS3064	Composite Materials	(3 UOC)
MATS4064	Thermomechanical Processing	(3 UOC)
MATS4084	Specialty Alloys	(3 UOC)
MATS5424	Modelling in Materials Engineering 2	(3 UOC)
NANO3420	Fabrication of Nanostructured Devices	(3 UOC)

Process Metallurgy - Plan MATSG13135

The Process Metallurgy plan is designed to produce graduates with training appropriate to the primary metallurgy industry. The profession is very broad and affords opportunities for involvement in many specialist

activities in production, technical control or development, in metal or mineral producing industries.

Process Metallurgical Engineering is introduced in Stages 3 and 4 by a number of professional electives and a thesis project. During the program, visits are made to various metallurgical works and students are required to submit reports on some of these. Students may complete the first one or two years of their degree at their local university engineering school and then transfer with advanced standing to UNSW.

Process Metallurgy Professional Electives:

FUEL0040	Fuel Engineering for Materials Processing	(3 UOC)
INDC3070	Instrumentation and Process Control	(3 UOC)
MATS5394	Pollution Control in Materials Processing	(3 UOC)
MATS5424	Modelling in Materials Engineering 2	(3 UOC)
MATS5524	Pyrometallurgy 2 – Casting	(3 UOC)
MINE3800	Mineral Processing	(3 UOC)

Materials Engineering - Plan MATSH13135

The Materials Engineering plan provides a versatile, comprehensive coverage of areas involving: a) the conception and application of properties of materials for use in engineering, structural and specialty needs necessary in the design and development of specific components, b) supervision of manufacturing, c) evaluation and certification of specifications and characteristics, d) production of new, novel and value-added products, e) research, and f) general engineering and project management. The range of Professional Electives and selection of Technical Electives in Years 3 and 4 provide a direction appropriate to the needs of the Australian industry, and to the specific interests of students, together with a degree of flexibility if required. Typical fields which may be encompassed by the plan include steel and non-ferrous metals/alloys production, polymers and composites industry, building materials, civil engineering applications, transport, electrical/electronic industry, biomaterials/biodevices, Australian defence needs: Army, Navy, Airforce, plus the national research laboratories. Due emphasis is placed on collaborating with other appropriate fields of engineering and science disciplines.

Materials Engineering Professional Electives:

MATS1414	Surface Treatment and Wear	(3 UOC)
MATS2294	Mech. And Thermal Properties of Ceramics	(3 UOC)
MATS2314	Glass-Based Ceramics	(3 UOC)
MATS3064	Composite Materials	(3 UOC)
MATS3574	Polymer Engineering 2	(3 UOC)
MATS5424	Modelling in Materials Engineering 2	(3 UOC)
NANO3420	Fabrication of Nanostructured Devices	(3 UOC)

Ceramic Engineering - Plan MATSJ13135

UNSW offers the only degree specialisation in Ceramic Engineering in Australia. The Ceramic Engineering plan is designed to produce graduates with expertise appropriate to the ceramic manufacturing industries, which include structural ceramics, advanced engineering ceramics, electrical ceramics, whitewares, glass manufacturing and refractories. Graduates are employed in a diverse range of areas including production, research and technical development, quality assurance, technical marketing, consulting and management. In addition to recognition of the degree by the Institution of Engineers Australia, graduates in Ceramic Engineering are also eligible for membership of the Institute of Ceramics of Great Britain, the Royal Australian Chemical Institute and the National Institute of Ceramic Engineers USA.

Ceramic Engineering is introduced comprehensively in Stages 3 and 4 of the program by a number of professional electives which include visits to various ceramic manufacturing plants, a design project and a thesis research project. Students may complete the first one or two years of their degree at their local university engineering school and then transfer with advanced standing to UNSW.

Ceramic Engineering Professional Electives:

FUEL0040	Fuel Engineering for Materials Processing	(3 UOC)
MATS2203	Physico-Chemical Ceramics Laboratory	(3 UOC)
MATS2263	Sintering of Ceramics	(3 UOC)
MATS2294	Mech. And Thermal Properties of Ceramics	(3 UOC)
MATS2314	Glass-Based Ceramics	(3 UOC)
MATS5394	Pollution Control in Materials Processing	(3 UOC)
MATS5424	Modelling in Materials Engineering 2	(3 UOC)
NANO3420	Fabrication of Nanostructured Devices	(3 UOC)

General Education Requirements

Students in this program must also satisfy the General Education requirements. This is 12 UOC, usually taken in second and third year studies.

For further information, please refer to the General Education section in this Handbook.

Academic Rules

Please refer to Program Structure and the School of Materials Science & Engineering for the academic requirements relating to this program.

Industrial Experience Requirement

All students are required to have gained at least 12 weeks of approved industrial experience before graduation and to have submitted satisfactory reports on such work. Industrial experience is usually obtained during a long vacation at the end of stages 2 and 3.

Professional Recognition

The Institution of Engineers Australia recognises the degree of BE in any of the 4 undergraduate plans as meeting the examination requirements for admission to graduate and corporate membership. Similarly, substantial or complete recognition is accorded to the BE degree programs by overseas engineering institutions.

Graduates in Ceramic Engineering are also eligible for membership of the Institute of Ceramics of Great Britain, the Royal Australian Chemical Institute and the National Institute of Ceramic Engineers USA.

3030 Ceramics

Bachelor of Science (Technology) BSc(Tech)

Typical Duration

6 years part-time

Minimum UOC for Award

144 units of credit

Typical UOC per Session

18 units of credit

Program Description

Please note: This program is currently under review. For confirmation of program details, please contact the School of Materials Science.

Program 3030 is designed for students who are employed in the ceramics industry. It extends over six part-time years of study. The courses in Stages 3, 4, 5 and 6 normally are available only at daytime classes and one day or more of release from industry per week may be required.

The program leads to the Bachelor of Science (Technology) award. It covers the same courses as the first three years of the corresponding full-time BE program 3135. The first four years of study correspond to the first two years of program 3135. Stages 5 and 6 are the same as the third year of the 3135 program ceramic engineering plan.

Students are required to complete an approved program of industrial training of not less than twelve months prior to the award of the degree. Industrial training normally should be completed concurrently with attendance of the program, but with approval of the Head of School may be completed after completion of the prescribed course of study.

Program Objectives and Learning Outcomes

On completion of this program, students will have attained a sound knowledge base in the field of Ceramics.

Program Structure

Stage 1

MATH1131	Mathematics 1A
MATH1231	Mathematics 1B
PHYS1121	Physics 1A
PHYS1221	Physics 1B
Total	24 UOC

Stage 2

CHEM1011	Fundamentals of Chemistry 1A
CHEM1021	Fundamentals of Chemistry 1B
MATS1111	Materials Science 1
MATS1021	Computing in Materials Science
MECH0130	Engineering Drawing & Solid Modelling
MECH0440	Engineering Statics
Total	24 UOC

Stage 3

CHEM2718	Physical Chemistry for Materials Science and Engineering
MATH2049	Mathematics and Statistics for Materials Science A

MATH2059	Mathematics for Materials Science B
MATS1092	Materials and Design 1
MATS1172	Physical Properties of Materials
MATS1282	Thermodynamic Materials
General Education (3 UOC)	
Total	24 UOC

Stage 4

MATS1152	Materials Engineering 1B
MATS1232	Materials Engineering 1A
MATS1002	Microstructure Analysis
MATS1142	Crystallography and X-Ray Diffraction
MATS1262	Mechanical Properties of Materials
General Education (3 UOC)	
Total	24 UOC

Stage 5

MATS1013	Diffusion and Kinetics
MATS1112	Phase Equilibria
MATS2013	Ceramic Materials
MATS3443	Polymer Science and Engineering
Professional Electives (9 UOC)*	
General Education (3 UOC)	
Total	24 UOC

Stage 6

MATS4013	Physical Metallurgy
MATS5013	Materials Processing
MATS5323	Modelling in Materials Engineering 1
Professional Electives (9 UOC)*	
General Education (3 UOC)	
Total	24 UOC

* Professional electives as listed for program 3135 Ceramic Engineering plan

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

Please refer to Program Structure and contact the School of Materials Science & Engineering for the Academic Requirements relating to this program.

3130 Metallurgy

Bachelor of Science (Technology) BSc(Tech)

Typical Duration

6 years part-time

Minimum UOC for Award

144 units of credit

Typical UOC per Session

18 units of credit

Program Description

Please note: This program is currently under review. For confirmation of program requirements and availability, please contact the School of Materials Science.

Program 3130 is designed for students who are employed in the metallurgical industry.

The program extends over six part-time years of study. The courses in Stages 3, 4, 5 and 6 normally are available only at daytime classes and one day or more of release from industry per week may be required.

Students are required to complete an approved program of industrial training of not less than twelve months prior to the award of the degree. Industrial training normally should be completed concurrently with attendance of the program, but with approval of the Head of School may be completed after completion of the prescribed course of study.

Program Structure

Stage 1

MATH1131	Mathematics 1A
MATH1231	Mathematics 1B
PHYS1121	Physics 1A
PHYS1221	Physics 1B
Total	24 UOC

Stage 2

CHEM1011	Fundamentals of Chemistry 1A
CHEM1021	Fundamentals of Chemistry 1B

MATS1021	Computing in Materials Science
MATS1111	Materials Science 1
MECH0130	Engineering Drawing & Solid Modelling
MECH0440	Engineering Statics
Total	24 UOC

Stage 3

CHEM2718	Physical Chemistry for Materials Science and Engineering
MATH2049	Mathematics and Statistics for Materials Science A
MATH2059	Mathematics for Materials Science B
MATS1092	Materials and Design 1
MATS1172	Physical Properties of Materials
MATS1282	Thermodynamic Materials
General Education (3 UOC)	
Total	24 UOC

Stage 4

MATS1152	Materials Engineering 1B
MATS1232	Materials Engineering 1A
MATS1002	Microstructure Analysis
MATS1142	Crystallography and X-Ray Diffraction
MATS1262	Mechanical Properties of Materials
General Education (3 UOC)	
Total	24 UOC

Stage 5

MATS1013	Diffusion and Kinetics
MATS1112	Phase Equilibria
MATS2013	Ceramic Materials
MATS3443	Polymer Science and Engineering
Professional Electives (9 UOC)**	
General Education (3 UOC)	
Total	24 UOC

Stage 6

MATS4013	Physical Metallurgy
MATS5013	Materials Processing
MATS5323	Modelling in Materials Engineering 1
Professional Electives (9 UOC)**	
General Education (3 UOC)	
Total	24 UOC

**Professional electives as listed for program 3135, either in the Physical Metallurgy plan, or in the Process Metallurgy plan.

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

Please refer to Program Structure and contact the School of Materials Science & Engineering for the academic requirements relating to this program.

3138 Materials Science and Engineering/ Master of Biomedical Engineering

Bachelor of Engineering Master of Biomedical Engineering BE MBIomedE

Typical Duration

5 years

Minimum UOC for Award

240 units of credit

Typical UOC per Session

24 units of credit

Program Description

Please note: This program is currently under review. For confirmation of program requirements and availability, please contact the School of Materials Science.

An increasing number of materials engineers in Australia and overseas are involved in the development, processing, and application of materials used in many areas of biomedical engineering including orthopaedics, dental and maxillofacial implants, artificial vascular materials, controlled drug delivery, prosthetics and orthotics, and device housings. In many

areas of medical technology, a concurrent study of materials and biomedical engineering form a logical and useful training. The objectives of the concurrent degree program will prepare materials engineers to work in these areas of biomedical technology like many of their overseas counterparts.

The five-year concurrent degree program consisting of a Bachelor of Engineering (in Process Metallurgy, Physical Metallurgy, Ceramic Engineering or Materials Science) and a Master of Biomedical Engineering (BE MBIomedE) is specifically designed to cater for students wishing to pursue a career in biomedical engineering through the technical base of materials science and engineering. The concurrent BE/MBIomedE program is 240 units of credit (5 years full-time) by allowing 18 units of credit of graduate level MBIomedE courses to substitute for elective courses in the BE and one undergraduate BE elective to substitute for a MBIomedE elective. This overlap arrangement is only available to students who complete the BE MBIomedE program. Students who discontinue the BE MBIomedE program to complete the BE program only will have to complete the normal 192 units of credit BE program but may be given credit for some of the BIOM courses completed. All students are required to have gained at least 12 weeks of approved industrial experience before graduation and to have submitted satisfactory reports on such work. Industrial experience is usually obtained during a long vacation at the end of years 2 and 3.

The Institution of Engineers, Australia recognises the Bachelor of Engineering components of the BE MBIomedE programs as meeting the examination requirements for admission to graduate and corporate membership. Furthermore, examination requirements are met for the membership of the Institution's College of Biomedical Engineering. The degree is accorded substantial or complete recognition by overseas engineering institutions.

Program Structure

The Bachelor of Engineering component of the program requires students to undertake study in one of the following four plans:

Ceramic Engineering - plan code **MATSJ13138**

Materials Engineering - plan code **MATSH13138**

Physical Metallurgy - plan code **MATSE13138**

Process Metallurgy - plan code **MATSG13138**

In addition, a number of electives can be chosen from other plans. The first year of study is common to all plans. Specialisation occurs in the later years of study, though some courses are still common to all plans. Only the courses that are common to every plan are set out below. A student's plan would determine the composition of the rest of each stage of their program - i.e. their Technical Electives and Professional Electives.

Academic Plans

The professional and technical electives that define the Physical Metallurgy, Process Metallurgy, Materials Engineering and Ceramic Engineering academic plans in the BE/MBIomedE program are the same as those specified for the corresponding academic plans in BE program 3135.

Students can change their selection of study plans up to the end of Session 1 of the third year. Courses pertaining to the MBIomedE component of the program are done in each of the 5 stages of the program.

(Note: 'Year 1, 2, 3' etc represents Stage 1, 2, 3 etc of the program, as it would be taken in a normal course of full-time study)

Stage 1 all plans

BIOM1001	Professional Biomedical Studies	(3 UOC)
BIOM9010	Biomedical Engineering Practice	(3 UOC)
CHEM1011	Fundamentals of Chemistry 1A	(6 UOC)
CHEM1021	Fundamentals of Chemistry 1B	(6 UOC)
MATH1131	Mathematics 1A	(6 UOC)
MATH1231	Mathematics 1B	(6 UOC)
MATS1021	Computing in Materials Science	(3 UOC)
MATS1111	Materials Science 1	(3 UOC)
PHYS1121	Physics 1A	(6 UOC)
PHYS1221	Physics 1B	(6 UOC)

Stage 2 all plans

BIOM9420	Clinical Laboratory Science	(6 UOC)
CHEM2718	Physical Chemistry for Materials Sci and Engineering	(3 UOC)
MATH2049	Mathematics and Statistics for Materials Science A	(3 UOC)
MATH2059	Mathematics for Materials Science B	(3 UOC)
MATS1112	Phase Equilibria	(3 UOC)
MATS1142	Crystallography and X-Ray Diffraction	(3 UOC)

MATS1152	Materials Engineering 1B	(6 UOC)
MATS1232	Materials Engineering 1A	(3 UOC)
MATS1262	Mechanical Properties of Materials	(6 UOC)
MATS1282	Thermodynamics of Materials	(6 UOC)
MECH0130	Engineering Drawing and Solid Modelling	(3 UOC)
MECH0440	Engineering Statics	(3 UOC)

Stage 3

ANAT2511	Fundamentals of Anatomy	(6 UOC)
MATS1002	Microstructure Analysis	(3 UOC)
MATS1013	Diffusion and Kinetics	(3 UOC)
MATS1172	Physical Properties of Materials	(3 UOC)
MATS2013	Ceramic Materials	(3 UOC)
MATS3443	Polymer Science and Engineering	(3 UOC)
MATS4013	Physical Metallurgy	(3 UOC)
MATS5013	Materials Processing	(6 UOC)
MATS5113	Materials Engineering Laboratory	(3 UOC)
MATS5323	Modelling in Materials Engineering 1	(3 UOC)
Professional Electives		(9 UOC)
Technical Electives		(3 UOC)

Stage 4

MATS3524	Materials Engineering Project (12 UOC)	(6 UOC per session over two sessions)
<i>or</i>		
BIOM5910	Thesis Part A	(6 UOC)
<i>and</i>		
BIOM5911	Thesis Part B	(6 UOC)
MATS1092	Materials and Design 1	(3 UOC)
MATS1354	Design Project	(3 UOC)
MATS1464	Professional Communication and Presentation	(3 UOC)
PHPH2121	Principles of Physiology A	(6 UOC)
PHPH2221	Principles of Physiology B	(6 UOC)
Professional Electives		(9 UOC)
General Education Courses		(3 UOC)

Elective Components

The following components have particular objectives, but specific topics are chosen by students for study and research.

MATS1354	Design Project	(3 UOC)
MATS1464	Professional Communication and Presentation	(3 UOC)

Stage 5

BIOM9332	Biocompatibility	(6 UOC)
BIOM9410	Regulatory Requirements of Biomedical Technology	(6 UOC)
BIOM9913	Project Report	(12 UOC)
MATS1343	Materials Industry Management B	(3 UOC)
Biomedical Engineering Electives		(18 UOC)

Elective Components

The following course has particular objectives, but specific topics are chosen by students for study and research.

MATS1244	Materials Industry Management A	(6 UOC)
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General Education Requirements

Students in this program must also satisfy the General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

Please refer to Program Structure and contact the School of Materials Science & Engineering for the academic requirements relating to this program.

3617 Nanotechnology**Bachelor of Science BSc****Typical Duration**

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

This program in Nanotechnology offers a comprehensive education in this emerging field, which represents an important development in the

evolution of scientific understanding, with profound implications for the new economy.

Nanotechnology provides the potential to create new manufacturing sectors from our ability to observe, characterise and manipulate the atomic and molecular structure of materials which form the basis of the bio-, communications, information and environmental technologies.

This program will lead to the award of a Bachelor of Science in Nanotechnology over four years of full-time study, with Honours for students who perform with merit. At present, the principal entry point into this degree will be at first year level. Students will normally be expected to complete each stage before proceeding to the next stage. A total of 192 units of credit must be completed for the award of this degree.

Program Objectives and Learning Outcomes

On completion of this program, students will have attained a comprehensive knowledge base in the field of nanotechnology.

Program Structure**Stage 1**

BIOS1201	Molecules, Cells and Genes	(6 UOC)
MATS9520	Engineering Materials	(3 UOC)
NANO1001	Nanotechnology 1	(3 UOC)

AND one of the following courses:

CHEM1011	Fundamentals of Chemistry 1A	(6 UOC)
CHEM1031	Higher Chemistry 1C	(6 UOC)

AND one of the following courses:

CHEM1021	Fundamentals of Chemistry 1B	(6 UOC)
CHEM1041	Higher Chemistry 1D	(6 UOC)

AND one of the following courses:

MATH1131	Mathematics 1A	(6 UOC)
MATH1141	Higher Mathematics 1A	(6 UOC)

AND one of the following courses:

MATH1231	Mathematics 1B	(6 UOC)
MATH1241	Higher Mathematics 1B	(6 UOC)

AND one of the following courses:

PHYS1121	Physics 1A	(6 UOC)
PHYS1131	Higher Physics 1A	(6 UOC)

AND one of the following courses:

PHYS1221	Physics 1B	(6 UOC)
PHYS1231	Higher Physics 1B	(6 UOC)

Stage 2

CHEM2041	Chemical and Spectroscopic Analysis	(6 UOC)
CHEM2828	Organic and Inorganic Chemistry for Nanotechnology	(6 UOC)
MATS1112	Phase Equilibria	(3 UOC)
MATS1142	Crystallography and X-Ray Diffraction	(3 UOC)
NANO2002	Nanotechnology 2	(3 UOC)
PHYS2020	Computational Physics	(3 UOC)
PHYS2030	Laboratory A	(3 UOC)
PHYS2040	Quantum Physics	(3 UOC)
PHYS2410	Biophysics 1	(3 UOC)
PHYS3310	Physics of Solid State Devices	(3 UOC)
General Education		(6 UOC)

AND one of the following courses:

BIOC2201	Principles of Molecular Biology (Advanced)	(6 UOC)
BIOC2291	Fundamentals of Molecular Biology	(6 UOC)

Stage 3

BIOC3121	Molecular Biology of Nucleic Acids	(6 UOC)
NANO3003	Nanotechnology 3	(3 UOC)
NANO3410	Chemistry of Surfaces	(3 UOC)
NANO3420	Fabrication of Nanostructured Devices	(3 UOC)
PHYS3080	Solid State Physics	(3 UOC)
General Education		(6 UOC)
PLUS electives totalling 24 UOC		

Recommended electives are as follows:

BIOC3111	Molecular Biology of Proteins	(6 UOC)
CHEM3011	Physical Chemistry	(6 UOC)
CHEM3041	Analytical Chemistry	(6 UOC)
CHEM3101	Project Laboratory in Chemistry	(6 UOC)
MATS1002	Microstructure Analysis	(3 UOC)
MATS1013	Diffusion and Kinetics	(3 UOC)
MATS1262	Mechanical Properties of Materials	(6 UOC)

MATS1343	Materials Industry Management B	(3 UOC)
MATS4023	Phase Transformations	(3 UOC)
MATS4133	Deformation and Strengthening Mechanisms	(3 UOC)
MATS4333	Fracture Mechanics	(3 UOC)
MICR2201	Fundamentals of Microbiology and Immunology	(6 UOC)
NANO3440	Biosensors and Biodevices for Nanotechnology	(3 UOC)
PHYS2630	Electronics	(3 UOC)
PHYS3040	Experimental Physics A1	(3 UOC)
PHYS3320	Topics in Condensed Matter Physics	(3 UOC)
PHYS3410	Biophysics 2	(3 UOC)
POLY3011	Polymer Science - Theory	(3 UOC)
POLY3012	Polymer Science - Practice	(3 UOC)

Stage 4

MATS1464	Professional Communication and Presentation	(3 UOC)
NANO4004	Nanotechnology Project	(18 UOC)
PLUS electives totalling 9 UOC		

Recommended electives are as follows:

BIOC3111	Molecular Biology of Proteins	(6 UOC)
CHEM3011	Physical Chemistry	(6 UOC)
CHEM3041	Analytical Chemistry	(6 UOC)
CHEM3101	Project Laboratory in Chemistry	(6 UOC)
MATS1002	Microstructure Analysis	(3 UOC)
MATS1013	Diffusion and Kinetics	(3 UOC)
MATS1262	Mechanical Properties of Materials	(6 UOC)
MATS1343	Materials Industry Management B	(3 UOC)
MATS4023	Phase Transformations	(3 UOC)
MATS4133	Deformation and Strengthening Mechanisms	(3 UOC)
MATS4333	Fracture Mechanics	(3 UOC)
MICR2201	Fundamentals of Microbiology and Immunology	(6 UOC)
NANO3440	Biosensors and Biodevices for Nanotechnology	(3 UOC)
PHYS2630	Electronics	(3 UOC)
PHYS3040	Experimental Physics A1	(3 UOC)
PHYS3320	Topics in Condensed Matter Physics	(3 UOC)
PHYS3410	Biophysics 2	(3 UOC)
POLY3011	Polymer Science - Theory	(3 UOC)
POLY3012	Polymer Science - Practice	(3 UOC)

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

See Program Structure above and contact the School of Materials Science and Engineering for more information.

3950 Bachelor of Optometry**BOptom**

Note: This program is no longer offered to commencing students. Please refer to program **3952 BOptom BSc**.

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

The School of Optometry and Vision Science provides a four stage full-time program in Optometry leading to the award of the degree of Bachelor of Optometry at either the Pass or Honours level.

Professional training including clinical optometry is interwoven with basic studies of visual and ocular science over the four Stages of the program. The only entry point into Optometry will be at Stage 1 level.

Program Objectives and Learning Outcomes

This program aims to provide a strong knowledge base in the field of optometry.

Program Structure**Stage 2**

OPTM2101	Ocular and Visual Science 2A	(6 UOC)
OPTM2102	Clinical Optometry 2A	(6 UOC)

OPTM2105	Optics and the Eye 3	(3 UOC)
OPTM2201	Ocular and Visual Science 2B	(6 UOC)
OPTM2202	Clinical Optometry 2B	(6 UOC)
OPTM2206	Pathology for Optometry	(3 UOC)
PHPH2121	Principles of Physiology A	(6 UOC)
PHPH2221	Principles of Physiology B	(6 UOC)
General Education courses		

Stage 3

OPTM3102	Clinical Optometry 3A	(12 UOC)
OPTM3108	Ocular Disease	(6 UOC)
OPTM3203	Clinical Optometry 3B	(3 UOC)
OPTM3204	Clinical Optometry 3C	(8 UOC)
OPTM3209	Environmental Optometry	(6 UOC)
PHPH3302	Pharmacology for Optometry	(4 UOC)
PSYC3516	Psychology for Optometry	(3 UOC)
General Education courses		

Stage 4

MEDM8001	Principles of Medicine for Optometry Students	(3 UOC)
OPTM4114	Optometry and the Professional Environment A	(3 UOC)
OPTM4210	Research Project	(3 UOC)
OPTM4214	Optometry and the Professional Environment B	(3 UOC)
OPTM4311	Clinical Optometry 4A	(12 UOC)
OPTM4312	Clinical Optometry 4B	(12 UOC)
OPTM4313	Clinical Optometry 4C	(12 UOC)

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

Please refer to Program Structure and contact the School of Optometry for the academic requirements relating to this program.

3952 Bachelor of Optometry Bachelor of Science**BOptom BSc****Typical Duration**

5 years

Minimum UOC for Award

240 units of credit

Typical UOC per Session

24 units of credit

Program Description

Optometry combines the theoretical discipline of vision science with the clinical art of primary eye care. Vision science includes the optics of lenses, the physiology of the eye, the psychophysics of vision and the neuroscience of the brain. Optometry includes the diagnosis and management of ocular disease, the dispensing of spectacles and contact lenses, the management of people with special needs (children, low vision), sports vision and vision in the workplace.

The School of Optometry and Vision Science offers a five-year full-time combined BOptom BSc program. Graduates of this program will be able to register as an optometrist in Australia. The degree is also recognised in New Zealand and in most parts of Asia. Job opportunities in this field are excellent and are expected to remain excellent given the high visual demands in the modern computer-based workplace, and the aging population in Australia.

An innovative feature of this program is its alternate entry mechanism. Local students who do not achieve the cut-off UAI or equivalent for direct entry into the Optometry program can apply for one of approximately 25 transfer positions. Students wishing to apply for transfer into the BOptom BSc (3952) program will 1) be completing at the end of the year Stage 1 of the Bachelor of Science (3970) Vision Science study plan (including recommended courses), 2) have completed the UMAT exam held in July during Stage 1 of their BSc program and 3) should achieve a minimum performance level of Distinction (75%) in both Stage 1 Vision Science courses (VISN1211 and VISN1231). Students meeting these requirements will be ranked using an algorithm that includes their UAI or equivalent, their WAM achieved at the end of Stage 1 of their BSc (3970) Vision Science study plan and their UMAT result. To be competitive for transfer selection students would need an entry UAI or equivalent of at least 90.

A lower entry index may be used for students from rural and regional locations.

Assumed knowledge

UNSW has a policy of Assumed Knowledge. It is assumed that through secondary or equivalent studies a student will have achieved a level of knowledge of the subject area that is considered appropriate for their future University study. The BOptom BSc program assumes that students entering the program have a strong ability in English, Chemistry and HSC Mathematics (does not include General Mathematics; must have a mark of at least 90; HSC Extension Mathematics is highly recommended). Other recommended knowledge is Physics. Bridging Courses are available to students entering UNSW; these courses usually run in January – February, before the start of Semester 1. Students who do not have the appropriate assumed knowledge are strongly advised to undertake the relevant Bridging Course/s, or other appropriate preparation.

Program Objectives and Learning Outcomes

The program aims to provide a strong knowledge base and clinical competence in the field of optometry and vision science.

Program Structure

Stage 1

BIOS1201	Molecules, Cells and Genes	(6 UOC)
CHEM1031	Higher Chemistry 1C	(6 UOC)
CHEM1829	Biological Chemistry for Optometry	(6 UOC)
MATH1131	Mathematics 1A	(6 UOC)
PHYS1121	Physics 1A	(6 UOC)
VISN1211	Vision Science 1	(6 UOC)
VISN1231	Optics 1	(6 UOC)
Elective – choose one of the following		
BIOS1101	Evolutionary and Functional Biology	(6 UOC)
PSYC1011	Psychology 1B	(6 UOC)

Stage 2

OPTM2111	Optometry 2A	(6 UOC)
OPTM2211	Optometry 2B	(6 UOC)
PHPH2101	Physiology 1A	(6 UOC)
PHPH2201	Physiology 1B	(6 UOC)
VISN2111	Vision Science 2A	(6 UOC)
VISN2131	Optics and the Eye	(6 UOC)
VISN2211	Vision Science 2B	(6 UOC)
VISN2231	Introduction to Ocular Disease	(6 UOC)

Stage 3

OPTM3111	Optometry 3A	(6 UOC)
OPTM3131	Ocular Disease 3A	(6 UOC)
OPTM3211	Optometry 3B	(6 UOC)
OPTM3231	Ocular Disease 3B	(6 UOC)
PHPH330#	Pharmacology for Optometry	(4 UOC)
VISN3111	Vision Science 3A	(6 UOC)
VISN3211	Vision Science 3B	(6 UOC)
General Education courses		(6 UOC)

Stage 4

BEES204#	Data analysis for Optometry	(3 UOC)
MEDM8001	Principles of Medicine for Optometry Students	(3 UOC)
OPTM4110	Optometry 4A	(3 UOC)
OPTM4131	Clinical Optometry 4A	(6 UOC)
OPTM4151	Ocular Therapeutics 4A	(6 UOC)
OPTM4170	Professional Optometry 4A	(3 UOC)
OPTM4211	Optometry 4B	(6 UOC)
OPTM4231	Clinical Optometry 4B	(6 UOC)
OPTM4251	Ocular Therapeutics 4B	(6 UOC)
OPTM4270	Professional Optometry 4B	(3 UOC)
PSYC3516	Psychology for Optometry	(3 UOC)

Stage 5

OPTM5111	Clinical Optometry 5A	(6 UOC)
OPTM5131	Specialist Clinical Optometry 5A	(6 UOC)
OPTM5151	Clinical Ocular Therapeutics 5A	(6 UOC)
OPTM5171	Research Project 5A	(6 UOC)
OPTM5211	Clinical Optometry 5B	(6 UOC)
OPTM5231	Specialist Clinical Optometry 5B	(6 UOC)
OPTM5251	Clinical Ocular Therapeutics 5B	(6 UOC)
OPTM5271	Research Project 5B	(6 UOC)

General Education Requirements

6 units of credit to be completed in Stage 3

Academic Rules

1. The program is a five-year full-time combined program leading to the award of the two degrees of Bachelor of Optometry and Bachelor of Science (BOptom BSc).
2. The five years of the program include at least 111 units of credit in the Science program (3970) and a minimum of 240 units of credit in total.
3. The 111 Science program units of credit must include 48 Level 1 units of credit.
4. The degrees of Bachelor of Optometry and Bachelor of Science are not awarded until the completion of the full five-year program.
5. There will be a testamur for each degree in the combined program.
6. Progression through the Stages of the BOptom BSc program is subject to academic performance. Students are expected to maintain a CREDIT average (65% WAM) in the program. Students not maintaining this level of performance in Stages 1 and 2 of the program will be referred to School Advisors for counselling and career guidance as required. Students who do not attain the required CREDIT average (65% WAM) at the end of Stage 3 will not be allowed to progress into Stage 4. Students who do not attain the required CREDIT average (65% WAM) at the end of Stage 3 of the program will normally be required to transfer to the Bachelor of Science (3970) program, complete a further 6 UOC of General Education and take out the BSc award with a major in Vision Science at a Pass level.

3432 Bachelor of Psychology

BPsychol

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

Psychology is a discipline of both scientific research and applied practice. As a science, psychology is concerned with the study of behaviour and its underlying mental and neural processes. Topics of study include learning, memory, cognition, perception, motivation, life-span development, personality, social interactions, and abnormal psychology. Psychology has many areas of application, especially in clinical, correctional, counselling, educational, and organisational settings. In addition, people with training in psychology pursue careers in academic research, health research, developmental disabilities and rehabilitation, ergonomics, occupational health and safety, personnel selection, training, and management; vocational guidance, and marketing.

Program Objectives and Learning Outcomes

The four-stage full-time program leads to the degree of Bachelor of Psychology. The degree is designed to provide the student with (1) a sound understanding of psychological theory, research skills, and psychological techniques, (2) psychology elective studies in areas of individual interest, (3) supporting studies in science disciplines, and (4) the opportunity to study courses in other faculties including Arts and Social Sciences, and Commerce and Economics.

Program Structure

Stage 1

PSYC1001	Psychology 1A	(6 UOC)
PSYC1011	Psychology 1B	(6 UOC)
PSYC1021	Introduction to Psychological Applications	(6 UOC)
Courses from Science schools		(12 UOC)

18 elective units of credit selected from Arts and Social Sciences, Commerce and Economics, Science or other approved faculty.

Stage 2

PSYC2001	Research Methods 2	(6 UOC)
PSYC2061	Social and Developmental Psychology	(6 UOC)
PSYC2071	Perception and Cognition	(6 UOC)
PSYC2081	Learning and Physiological Psychology	(6 UOC)
PSYC2101	Assessment and Personality	(6 UOC)

12 Level II units of credit following on from one of the Level 1 non-psychology courses

General Education (6 UOC)

Stage 3

PSYC3001	Research Methods 3A	(6 UOC)
PSYC3011	Research Methods 3B	(6 UOC)
General Education		(6 UOC)

PLUS ONE course from EACH of the following 3 elective groups and two other Level III Psychology courses:*

Advanced Perceptual/Cognitive

PSYC3151	Cognition and Skill	(6 UOC)
PSYC3211	Cognitive Science	(6 UOC)
PSYC3221	Vision and Brain	(6 UOC)
PSYC3311	The Psychology of Language	(6 UOC)
PSYC3321	Cognitive Development	(6 UOC)

Advanced Biological

PSYC3051	Physiological Psychology	(6 UOC)
PSYC3241	Psychobiology of Memory and Motivation	(6 UOC)

Advanced Social

PSYC3121	Social Psychology	(6 UOC)
PSYC3271	Personality and Individual Differences	(6 UOC)
PSYC3281	Interpersonal Behaviour	(6 UOC)

Stage 4

PSYC4053	Psychology 4A	(24 UOC)
PSYC4063	Psychology 4B	(24 UOC)

***Note:** Not all level III Psychology elective courses are necessarily offered each year.

General Education Requirements

Students in this program must satisfy the University's General Education requirements. For further information, please refer to the General Education section in this Handbook.

Academic Rules

In order to graduate students must satisfy requirements for the award by passing all courses specified for the degree.

The final grading for the degree is based on performance in all Psychology courses excluding PSYC1001, PSYC1011 and PSYC1021 taken over the four stages. The degree may be awarded at either Pass level or with Honours.

Study Load

This is a four-stage full-time program. **In any one year students must enrol in the full load specified for a particular stage.** Only in exceptional circumstances will students be allowed to enrol in a reduced program for a stage, and this requires the permission of the Head of School of Psychology.

Academic Standing

Students will be required to maintain a high level of performance for progression. Any student who fails to achieve an average of 65 percent or higher in psychology courses taken in any stage (based on the first attempt result for each course) will be deemed to be falling below that level of performance. This will be drawn to the attention of the student and they may be interviewed by the Head of School (or nominee) to discuss the reasons for poor performance. This interview may lead to a recommendation to undertake special studies to assist learning. Students whose performance remains below the required level at the end of Stage 2 or 3, or remains on poor academic standing, may be required to transfer to the Bachelor of Science or another degree and/or to show cause why such transfer should not be required.

Registration as a Psychologist

In order to become a member of the professional body, the Australian Psychological Society (APS), and for registration as a psychologist in New South Wales, students first need a university bachelor degree which includes four years of approved training in psychology. The BPsychol degree provides four years of approved training in psychology. Students must also follow this by completing an accredited 5th and 6th year academic degree such as one of the Master of Psychology Degrees (Clinical, Forensic, Organisational) or a combined Doctor of Philosophy/Master of Psychology Degree as offered by this University. An alternative of two years of supervised experience in professional practice may be undertaken for registration as a psychologist in NSW.

3451 Diploma in Innovation Management**DiplInnovMan****Typical Duration**

0.8 year

Minimum UOC for Award

36 units of credit

Typical UOC per Session

18 units of credit

Program Description**Undergraduate Students**

The Diploma in Innovation Management is a unique undergraduate program currently being offered by the Entrepreneurs in Science Unit. This program is open to all undergraduate students commencing second year of a science-based (or related discipline) degree or combined degree. Students are assessed for admission based on their past leadership and entrepreneurial activities, enthusiasm and academic achievement. The program aims to encourage an entrepreneurial mind-set and provide students with the knowledge and skills needed for developing business opportunities based on scientific innovation.

Course material covers areas such as creativity in enterprises, business principles, business planning for new ventures, funding, management and commercialisation of intellectual property, and valuation and assessment of high technology businesses. Students engage in an exercise to set up and run a business venture and will participate in case studies with Australian and international entrepreneurs. The lectures, workshops, case studies and tutorials in each of the program's courses are delivered by a well-balanced mixture of university academics and expert industry and government professionals.

Postgraduate Students

At present, the EIS unit does not offer any formal postgraduate programs. However, current postgraduate science students are able and encouraged to "sit in" on several of the lecture series on offer as part of the Diploma program.

Program Objectives and Learning Outcomes

The Innovation Management program is primarily directed at empowering future R&D scientists with an entrepreneurial education that will allow them to recognise, evaluate, finance and exploit science-based commercial opportunities. Graduates with the combined qualifications will also be more competitive for all employment opportunities whether they are in academia, research or administration and will have a wider range of career options. Combinations of business and technical skills are required in careers that involve intellectual property, high technology finance (venture capital) and investment (business analysis), R&D management, corporate management in the biotechnology industry sector, government regulation and administration, and bioscience sales and marketing.

Program Structure

The Diploma is taught concurrently over the student's final 3 years of study and involves 36 units of credit divided into seven formal courses and an industry work placement. To avoid study overload, three of the program's core courses (INOV2100, INOV3100, INOV4001) are delivered in winter or summer sessions. At the completion of 4 to 4.5 years of study, students become eligible for the award of a combined Bachelor of Science and the Diploma in Innovation Management. The industry work placement component is normally undertaken following the completion of the student's Honours program or 4th year of university study.

The Diploma in Innovation Management Study Plan**Stage 2**

INOV2100	The Innovation Process (X2)	(3 UOC)
INOV2110	Business Skills (S2)	(3 UOC)

Stage3

INOV3100	Strategic Communication (X1)	(3 UOC)
INOV3110	Technical Publications (S2)	(3 UOC)
SCOM2505	Science Communication Project A (X1)	(3 UOC)
BIOT3071	Commercial Biotechnology (S1)	(6 UOC)
BIOT3091	Professional Issues in Biotechnology (S2)	(6 UOC)

Stage 4

INOV4001	The Bioentrepreneurial Process (X1)	(6 UOC)
INOV4101	Innovation in Practice A or	(6 UOC)
INOV4201	Innovation in Practice B or	(12 UOC)
INOV4301	Innovation in Practice C	(18 UOC)

Note: For the award of the Diploma in Innovation Management, students must complete all courses in the study plan. Students that take BIOT3071 and BIOT3091 courses as part of their BSc program must complete Innovation in Practice courses at a sufficient UOC level to meet the total 36 UOC requirement for the award of the Diploma.

Academic Rules

Please contact the Faculty of Science for information.

Combined Degree Programs

Faculty of Arts & Social Sciences and the Faculty of Science

3930 Science/Arts

Bachelor of Science Bachelor of Arts BSc BA

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

This combined degree program, the Bachelor of Science Bachelor of Arts, enables students to complete a major sequence from those available in Science and in the Faculty of Arts and Social Sciences.

Note: Majors in Philosophy and History & Philosophy of Science may not be taken as part of the Science component.

The typical duration of this program is four years full-time.

For admission to the program, students must satisfy the entry requirements to Science as well as to the Faculty of Arts and Social Sciences. This degree program is administered by the Faculty of Science.

Program Objectives and Learning Outcomes

Please refer to the program objectives as listed for the Bachelor of Science program 3970 and the Bachelor of Arts program 3400.

Program Structure

Program Requirements

This program requires the successful completion of 192 units of credit in an approved sequence of study.

Students are required to undertake courses totalling 84 units of credit from both the Science and the Arts components of this combined degree. The remaining 24 units of credit may be from either area.

In addition students must complete an approved major sequence of at least 42 units of credit. Students should enrol in at least 24 Level 1 units of credit and no more than 36 Level 1 units of credit in both the Science and the Arts components of the program. No more than 12 units of credit can be taken in any one school or department, for the arts component and 18 UOC in any school for the science component.

Selecting Majors

For information on available Science majors, please refer to the program entry 3970 Bachelor of Science and Table A in this Handbook or contact the Science Student Centre on campus.

For information on available Arts majors, please refer to the program entry 3400 Bachelor of Arts entry in the Arts and Social Sciences section in this Handbook or contact the Faculty of Arts and Social Sciences Office on campus.

Academic Rules

For program rules and requirements, please refer to the Program Structure section above.

Note: Students seeking to complete the Science component of a combined degree would normally be expected to complete a minimum of 84 units of credit in Science courses at Levels I–III, including a major as specified for program 3970. It may be difficult to undertake some plans as part of combined degree structures due to timetable constraints. Students may

not enrol in the Honours Year until they have satisfied all requirements for both the Science and Arts components of the degree.

3931 Advanced Science/Arts

Bachelor of Science Bachelor of Arts BSc BA

Typical Duration

5 years

Minimum UOC for Award

240 units of credit

Typical UOC per Session

24 units of credit

Program Description

The combined Advanced Science/Arts program enables students to complete a study plan in Advanced Science, in addition to a major sequence in the Faculty of Arts and Social Sciences. The duration of the degree program is normally five years full-time.

For admission to this program, students must satisfy the entry requirements to Advanced Science as well as to the Faculty of Arts and Social Sciences.

This degree program is administered by the Faculty of Science.

Program Objectives and Learning Outcomes

On completion of this program, students will have attained a sound knowledge base in both their Advanced Science and Arts specialisations.

Program Structure

The total units of credit required for this program is 240. Students are required to undertake 96 units of credit for the Advanced Science component of this degree program and 84 units of credit for the Arts component, including an approved Arts major sequence of 42 units of credit. The remaining 12 units of credit may be from either area. A further 48 units of credit constitutes the Stage 4 Honours sequence of the Advanced Science study plan.

Students should enrol in at least 24 Level I units of credit and no more than 36 Level I units of credit in both the Advanced Science and the Arts component of the program. No more than 12 units of credit can be taken in any one school or department in the Arts component of the program and 18 units of credit from any one school in the Science component.

Selecting Advanced Science Study Plans and Arts Majors

For information on available Advanced Science study plans, please refer to the 'Plan Rules and Information' section following in this Handbook or contact the Science Student Centre on campus.

For information on available Arts majors, please refer to the program entry 3400 Bachelor of Arts in the Faculty of Arts and Social Sciences section in this Handbook or contact the Faculty of Arts and Social Sciences Office on campus.

Academic Rules

Please refer to Program Structure above.

Note: Students seeking to complete the Advanced Science component of this combined degree program would normally be expected to complete the full Stage 4 Honours sequence for the study plan in which they are enrolled. In practice, it may be difficult to undertake some study plans as part of combined degree structures and students may be restricted in the number of Advanced Science courses that they can undertake. Where these are insufficient to allow the student to complete the recommended study plan, students are advised to consult the relevant Head of School.

3935 Science/Social Science

Bachelor of Science Bachelor of Social Science BSoc BSocSc

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

This combined degree program, the Bachelor of Science Bachelor of Social Science, enables students to complete a major sequence from those available in Science and a specialisation in Social Science within the Faculty of Arts and Social Sciences.

The typical duration of this program is 4 years full-time.

For admission to the program, students must satisfy the entry requirements to Science as well as to the Faculty of Arts and Social Sciences.

This degree program is administered by Faculty of Science.

Program Objectives and Learning Outcomes

Please refer to the program objectives as listed for the Bachelor of Science (BSc) program 3970 and the Bachelor of Social Science (BSocSc) program 3420.

Program Structure

Program Requirements

This program requires the successful completion of 192 units of credit in an approved sequence of study.

In addition to the minimum requirements of the BSc program (84 units of credit), students must complete a major as listed in Table A in the 'Plan Rules and Information' section of this Handbook as well as a minimum of 84 units of credit in the Faculty of Arts and Social Sciences.

This includes the Social Science core program of 48 units of credit.

Social Science Core Program (48 UOC)

SLSP1000	Social Science and Policy	(6 UOC)
or		
SLSP1002	Introduction to Policy Analysis	(6 UOC)
and		
SLSP1001	Research and Information Management	(6 UOC)
SLSP2000	Political Economy and the State	(6 UOC)
SLSP2001	Applied Social Research 1	(6 UOC)
SLSP2002	Policy Analysis Case Studies	(6 UOC)
SLSP3000	Social Theory and Policy Analysis	(6 UOC)
SLSP3001	Applied Social Research 2	(6 UOC)
SLSP3002	Social Science and Policy Project	(6 UOC)

and
An additional 36 units of credit from an approved sequence in a particular Social Science discipline.

Note: Students may complete a major (42 units of credit) in a Social Science discipline by completing an additional elective course as part of the remaining 24 units of credit required for this combined degree program.

Selecting Science and Social Science Majors

For information on available Science majors, please refer to Table A in the 'Plan Rules and Information' section of this Handbook or contact the Science Student Centre on campus.

For information on available Social Science majors, please refer to the program entry for 3420 Bachelor of Social Science in the Arts and Social Sciences section in this Handbook or contact the Faculty of Arts and Social Sciences Office on campus.

Academic Rules

For program rules and requirements, please refer to the Program Structure section above.

Note: Students seeking to complete the Science component of a combined degree would normally be expected to complete a minimum of 84 units of credit in Science courses at Levels I–III, including a major as specified for program 3970. It may be difficult to undertake some plans as part of combined degree structures due to timetable constraints.

Students may not enrol in the Honours Year until they have satisfied all requirements for both the Science and Social Science components of the degree.

3936 Advanced Science/Social Science

Bachelor of Science Bachelor of Social Science BSc BSocSc

Typical Duration

5 years

Minimum UOC for Award

240 units of credit

Typical UOC per Session

24 units of credit

Program Description

The combined Advanced Science/Social Science program enables students to complete a Study Plan in Advanced Science, in addition to a program of study in Social Science offered by the Faculty of Arts and Social Sciences.

The duration of this combined degree program is normally five years full-time.

For admission to this program, students must satisfy the entry requirements to Advanced Science as well as to the Faculty of Arts and Social Sciences.

This degree is administered by the Faculty of Science.

Program Objectives and Learning Outcomes

On completion of this program, students will have attained a sound knowledge base in both their Advanced Science specialisation and Social Science.

Program Structure

The total units of credit required for this program is 240.

Students are required to undertake 96 units of credit for the Advanced Science component of this degree program and 84 units of credit for the Social Science component which includes the Social Science core program of 48 units of credit:

Social Science Core Program

One of the following courses:

SLSP1000	Social Science and Policy	(6 UOC)
or		
SLSP1001	Research and Information Management	(6 UOC)
and		
SLSP1002	Introduction to Policy Analysis	(6 UOC)
SLSP2000	Political Economy and the State	(6 UOC)
SLSP2001	Applied Social Research 1	(6 UOC)
SLSP2002	Policy Analysis Case Studies	(6 UOC)
SLSP3000	Social Theory and Policy Analysis	(6 UOC)
SLSP3001	Applied Social Research 2	(6 UOC)
SLSP3002	Social Science and Policy Project	(6 UOC)

and

An additional 36 units of credit from an approved sequence in a particular Social Science discipline. Please refer to List F of the Faculty of Arts and Social Sciences rules.

24 units of credit free electives taken from either the Science or the Social Science Area

Note: Students may complete a major (42 UOC) in a Social Science discipline from List F in the Faculty of Arts and Social Sciences by completing an additional elective course as part of the remaining 24 units of credit required for this combined degree program.

For List F, please refer to the program entry for 3420 Bachelor of Social Science in the Arts and Social Sciences section in this Handbook or contact the Faculty of Arts and Social Sciences Office on campus.

Selecting Advanced Science Study Plans

For information on available Advanced Science study plans, please refer to the 'Plan Rules and Information' section following in this Handbook or contact the Science Student Centre on campus.

Academic Rules

Please refer to Program Structure above.

Note: Students seeking to complete the Advanced Science component of this combined degree program would normally be expected to complete the full Stage 4 Honours sequence for the Study Plan in which they are enrolled. In practice, it may be difficult to undertake some Study Plans as part of combined degree structures and students may be restricted in the number of Advanced Science courses that they can undertake. Where these are insufficient to allow the student to complete the recommended Study Plan, students are advised to consult the relevant Head of School. Students may not enrol in the Honours Year until they have satisfied all requirements for both the Science and Social Science components of the degree.

3932 Bachelor of Environmental Science Bachelor of Arts

BEnvSc BA

Typical Duration

5 years

Minimum UOC for Award

240 units of credit

Typical UOC per Session

24 units of credit

Program Description

The combined degree requires a minimum of five years to complete. To satisfy requirements for Environmental Science, a student must complete the coursework in the ENVSc core and a discipline specialisation, as well as a 24 units of credit independent research project. Refer to Environmental Science Program 3988 for further details on core courses and specialisations.

Students must complete a minimum of 84 units of credit in courses offered by the Faculty of Arts and Social Sciences, including an approved major sequence of 42 units of credit. Students should enrol in at least 24 Level 1 units of credit and no more than 36 Level 1 units of credit within the Arts component of the program. Of these, no more than 12 units of credit can be taken in any one school or department.

This degree is administered by the Faculty of Science.

Program Structure

Selecting Environmental Science Specialisations and Arts Majors

For information on available specialisations within Environmental Science as well as required core coursework, please refer to the program entry for 3988 Bachelor of Environmental Science or contact the Science Student Centre.

For information on available Arts majors, please refer to the program entry 3400 Bachelor of Arts in the Faculty of Arts and Social Sciences section in this Handbook or contact the Faculty of Arts and Social Sciences Office on campus.

Academic Rules

Please refer to Program Structure or contact the Faculty of Science for the academic requirements relating to this program.

4075 Bachelor of Science Bachelor of Education

BScBEd

Typical Duration

4 years

Minimum UOC for Award

192 units of credit

Typical UOC per Session

24 units of credit

Program Description

This four-year, double degree requires the completion of a BSc with a major in Science or Mathematics, as well as a major sequence in Education consisting of Educational Theory and Teaching Methods. In addition, students complete field experiences (teaching practice) in third year (10 days) and fourth year (40 days).

Program Objectives and Learning Outcomes

Please refer to the objectives in the BSc Science and Mathematics degree (Program 3970) and contact the School of Education for Program objectives.

Program Structure

A) Students intending to become **science teachers**, or wishing to graduate in the **natural sciences** (excluding Mathematics), will be required to complete:

i) An approved major from Table A (majors) in the handbook (also see below) corresponding to one of the HSC science teaching disciplines: Physics, Chemistry, Biological Sciences, or Earth and Environmental Sciences. This will include at least 42 UOC at level II and III in a single discipline and study area, including at least 18 units of credit from level III. Study plans for these major sequences are defined in the 3970 program.

ii) At least 12 UOC at level 1 in a second science teaching discipline other than the major.

iii) At least 12 UOC at level 1 in either Chemistry or Physics.

iv) At least 6 UOC at level 1 in each of the main teaching disciplines: Physics, Chemistry, Biological Sciences, Earth and Environmental Sciences.

v) At least 78 UOC in Education. The normal pattern is two courses in the first year (12 UOC); one course in second year (6 UOC); and three

Approved Majors from Table A (Majors)*

NSW Department of Education Teaching Discipline	Biology	Chemistry	Physics	Earth and Environmental Science	Mathematics
Table A Major	Biochemistry Biological Anthropology Biological Science Biotechnology Ecology Genetics Marine Biology Medical Microbiology & Immunology Microbiology Molecular Biology Pharmacology	Biochemistry# Chemistry Toxicology	Physics	Biochemistry# Bio. Sciences Ecology# Environmental & Earth Sciences Geology Physical Geography Marine Geology Physical Oceanography/ Meteorology Spatial Information Systems	Mathematics Physical Oceanography Physical Oceanography/ Meteorology Statistics

*List not exhaustive but representative of our knowledge-to-date. Students are advised to seek advice from the program authority to ensure that their major and Science courses meet the requirements for the BScBEd degree and are recognised as teaching disciplines by DET.

#Some disciplines are recognised as multiple teaching disciplines by DET

courses in the third year (18 UOC) which include one theory elective, introductory teaching methods and teaching experience; and 42 UOC in fourth year, which include educational theory, practice teaching, teaching method, and professional courses.

vi) At least 84 UOC from Science schools.

vii) A maximum total of 10 Level 1 courses (60 UOC).

viii) A total of 192 UOC. Provided all requirements for Science and Education are met, students may complete the balance by choosing courses from the Majors and Schools identified in Tables A and B.

Note:

(a) Upper level Physics and Chemistry courses require completion of at least 12 units of credit of first year Mathematics. Some level three physics courses require a further 6 UOC of level II Mathematics.

(b) For entry to Honours (fourth year) in one of the science disciplines, at least 24 UOC need to be taken at Level III in the discipline, and approval needs to be obtained from the head of the relevant science school.

B) Students wishing to become **Mathematics teachers**, or graduate in **Mathematics**, will be required to:

i) Complete 60 UOC in Mathematics. These Mathematics courses must be chosen so as to fulfill the requirements for a Mathematics major in the science degree program 3970, and include the courses MATH3560 'History of Mathematics' and MATH3570 'Foundations of Calculus'.

ii) Complete at least 6 UOC of computing courses, which can be taken from a variety of different schools in the university.

iii) Complete 78 UOC in Education. The normal pattern is two courses in the first year (12 UOC), one course in second year (6 UOC), and two courses (teaching method (6 UOC) and practice teaching (6 UOC)) in third year, and 48 UOC in fourth year, which include educational theory, practice teaching, teaching method, and professional courses.

iv) A total of 192 UOC. Provided all requirements for Mathematics and Education are met, students may complete the balance by choosing courses from the Majors and Schools identified in Tables A and B.

Note:

(a) All prospective Mathematics teachers need to do the BScBE combined degree. They can no longer (from 2000) do the BABEd degree.

(b) In stage 4, there is the opportunity to do Computer Studies Method if 24 UOC of computing have been completed.

Academic Rules

Please refer to Program Structure for the Academic Requirements relating to this program. Please refer to the School of Education for information on required courses and program structure for each teaching discipline.

Faculty of Commerce and Economics and the Faculty of Science

3529 Bachelor of Commerce Bachelor of Science BCom BSc

For details of the combined Science and Commerce Programs, please refer to the Faculty of Commerce and Economics section of this Handbook.

Faculty of Engineering and the Faculty of Science

Bachelor of Engineering Bachelor of Science BE BSc

For details of the combined Science and Engineering programs, please refer to the appropriate schools in the Faculty of Engineering section of this Handbook.

3711 Science/Aerospace Engineering

3042 Science/Chemical Engineering

3730 Science/Civil Engineering

3726 Science/Computer Engineering

3725 Science/Electrical Engineering

3735 Science/Environmental Engineering

3102 Science/Industrial Chemistry

3711 Science/Manufacturing Engineering and Management

3711 Science/Mechanical Engineering

3711 Science/Mechatronic Engineering

3142 Science/Mining Engineering

3711 Science/Naval Architecture

3655 Science/Photovoltaics and Solar Energy

3651 Science/Software Engineering

3746 Science/Surveying and Spatial Information Systems

3641 Science/Telecommunications

School of Law and the Faculty of Science

4770 Bachelor of Science Bachelor of Laws BSc LLB

For details of the combined Science and Laws program, refer to the Faculty of Law section of this Handbook.

Plan Rules and Information

Table A

Major Plans for the Bachelor of Science (3970) program and Combined BSc Programs

How to Read this Table

New Students

When you have decided which major(s) you want to study, you should enrol in the courses listed for Stage 1. In some majors there is only a small number of specified Stage 1 courses and you should choose additional courses to enrol in, such that you have a full program (24 units of credit per session). These additional courses (electives) may come from any available Level I courses from the subject areas within Table A or Table B.

Students who are unsure which major to choose may enrol in an 'undeclared plan'. The purpose of an undeclared plan is to cover a combination of Level I courses to enable a student to enter a variety of majors. Students are advised to choose a major before commencing Stage 2.

Continuing Students

Students who have completed Stage 1 should select specified courses listed for their major(s) in Stage 2 and Stage 3. Note that these are the minimum requirements for majors and students may take additional courses in the same area provided they also complete a minor and General Education requirements.

Notes:

1. Some of the courses listed in the later stages of a major may have prerequisites in an earlier stage or corequisites to be taken at the same time. It is important to check the course descriptions found in the rear of this Handbook for details.

2. Courses listed for Stage 1 are recommended courses. It is important to note that many of these courses may be required as prerequisites for courses required for later stages.

3. Mathematics Courses:

(a) Many courses in Mathematics are offered at two levels. The higher level courses cater for students with greater mathematical ability and/or a higher level of prior knowledge. Courses listed in Table A are all at the ordinary level. Students with suitable qualifications are encouraged to enrol in the corresponding higher level courses which are listed in the rear of this Handbook (see MATH### courses). In cases where there is a higher course, students should note that the proportion of Distinction and High Distinction grades is lower in the corresponding ordinary level course.

(b) MATH2060 may be omitted from the Mathematics major if the professional education requirement is being met in the other discipline of a double major or double degree.

(c) Students majoring in Mathematics are strongly recommended to take MATH2301 or an equivalent course in practical numerical computing.

4. Chemistry at Level I is offered at two levels. The higher level courses cater for students with greater chemical ability and/or a higher level of prior knowledge. Students with the required background are strongly encouraged to enrol in the higher level courses (CHEM1031 Higher Chemistry 1C and CHEM1041 Higher Chemistry 1D)

5. Students are advised that Mathematics or Physics courses totalling 6 units of credit are recommended for all programs.

6. BIOC2181 and BIOC2291 may be substituted for BIOC2101 and BIOC2201 respectively (but only with the permission of the Head of School). A minimum grade of Credit (65%) in BIOC2181 and BIOC2291 will normally be required for entry into Level III Biochemistry courses.

7. Students wishing to do Honours will need to consult with the appropriate school at the end of Stage 2 of their program.

Table A: Major Plans for the Bachelor of Science (3970) program and Combined BSc Programs

Major Contacts	Stage 1	Stage 2	Stage 3
Anatomy Dr B Freeman	BIOS1101, BIOS1201 Plus 6 of Level I Chemistry	ANAT2111 Plus 12 UOC from: ANAT2241, ANAT2341, ANAT2601, ANAT2611	18 UOC from: ANAT3121 ANAT3131, ANAT3141, ANAT3231, ANAT3411, ANAT3421 Plus 6 UOC from: i) Level III Anatomy not already taken, <i>or</i> ii) Level III Biochemistry, Biological Science, Microbiology, Pathology or Physiology
Biochemistry BABS Student Office	BIOS1101, BIOS1201 CHEM1011 <i>or</i> CHEM1031 CHEM1021 <i>or</i> CHEM1041 Plus at least 6 UOC from: MATH1031, MATH1041	BIOC2101, BIOC2201 Plus 6 UOC from: BIOS2021 <i>or</i> BIOS2621, CHEM2021, CHEM2041, MICR2011	A total of 24 UOC: 12 <i>or</i> 18 UOC from: BIOC3111, BIOC3261, BIOC3271 Plus 0 - 12 UOC from: BIOC3121, BIOC3281 Plus 0 <i>or</i> 6 UOC from: ANAT3231, BIOT3061, CHEM3021, CHEM3041, MICR3041, PHPH3211, PHPH3221
Biological Anatomical Anthropology Dr D Curnoe	BIOS1101, BIOS1201 Level 1 Chemistry is required for ANAT2111 and Level II Biochemistry and Physiology courses (check individual course prerequisites)	ANAT2601, ANAT2611 Plus ANAT2511* <i>or</i> ANAT2111 Plus 6 UOC from Level II Biological Science, Biochemistry, Pathology** <i>or</i> Physiology *A Credit grade is required in ANAT2511 for Level III Anatomy courses **Note that ANAT2241 may be required for Level II Pathology	ANAT3601 Plus 12 UOC from Level III Anatomy (ANAT3131 and ANAT3141 recommended) Plus a further 6 UOC from Level III Biological Science, Biochemistry, Pathology <i>or</i> Physiology
Biological Science BEES Student Office	BIOS1201, BIOS1101, CHEM1011, MATH1041 Also recommended: BIOS1301	BIOS2011, BIOS2021 (<i>or</i> BIOS2621), BEES2041, Plus 6 UOC from: BIOS2031, BIOS2051, BIOS2061	24 UOC from Level III Biological Science courses.
Biomechanics Dr A McIntosh	12 UOC from Level I Mathematics Recommended: MATH1131, MATH1231 Also recommended: PHYS1111	ANAT2511, SESC2451 Also recommended: PHYS1121.	A total of 30 UOC: BIOM9541, SESC3451 Plus 6-18 UOC from: ANAT3131, SESC3101, BIOM9561, SESC4420 Plus 0-12 UOC from: PHPH2101, PHPH2201, PHYS2410
Biotechnology BABS Student Office	BIOS1201, CHEM1011, CHEM1021, MATH1031, MATH1041, BIOS1101 <i>or</i> BIOT1011	BIOC2101, BIOC2201, MICR2201 Also recommended: BIOS2021 <i>or</i> BIOS2621, MICR2011	A total of 24 UOC: BIOT3011, BIOT3021, Plus 6-12 UOC from: BIOT3061, BIOT3081 Plus a further 0-6 UOC from: BIOC3111, BIOC3121, BIOC3271, BIOC3281, MICR3051, MICR3071, MICR3041 <i>or</i> MICR3641, MICR3021 <i>or</i> MICR3621

Major Contacts	Stage 1	Stage 2	Stage 3
Chemistry Dr G Moran	CHEM1011 or CHEM1031 CHEM1021 or CHEM1041 12 UOC from Level I Mathematics, 6 UOC from Level I Physics	18 UOC from: CHEM2011, CHEM2021, CHEM2031 or CHEM2839, CHEM2041 Plus a further 6 UOC from Level II/III Chemistry (taken in either Stage 2 or Stage 3)	18 UOC from Level III Chemistry of which 12 UOC must be from: CHEM3011, CHEM3021, CHEM3031, CHEM3041
Ecology BEES Student Office	BIOS1101, BIOS1201, GEOS1701, MATH1041 Also recommended: BIOS1301	BEES2041, BIOS2011 Plus 6 UOC from: BIOS2031, BIOS2051, BIOS2061, GEOS2071, GEOS2711, GEOS2821	24 UOC from: BIOS3011, BIOS3061, BIOS3071, BIOS3081, BIOS3111, BIOS3601, BIOS3161, GEOS3761, GEOH3911
Environmental Earth Science BEES Student Office	GEOS1701, BIOS1101, GEOS1111, GEOS1211 Also recommended: BIOS1301	BEES2041, GEOS2721 Plus 6 units of credit from Level II GEOS courses	GEOH3911, GEOS3281 Plus 12 UOC from Level III GEOS courses
Food Science and Nutrition Prof G Fleet	BIOS1201, CHEM1011, CHEM1021, FOOD1120, FOOD1130, MATH1041 Also recommended: MATH1031, PHYS1111	BIOC2181, FOOD2320, FOOD3220 Also recommended: BIOC2291, CHEM2921, FOOD1230, MICR2201, PHPH2101, PHPH2201	FOOD1370, FOOD3440 Plus 12 UOC from: FOOD1390, FOOD2330, FOOD2340, FOOD2350 Also recommended: CHEM3811
Genetics BABS Student Office	BIOS1101, BIOS1201, CHEM1011 or CHEM1031 CHEM1021 or CHEM1041 MATH1031, MATH1041	BIOS2021 or BIOS2621 Plus 12 UOC from: BIOC2101, BIOC2201, BEES2041*, MICR2011 <i>(*BEES2041 or an approved COMP or MATH course).</i>	A total of 24 UOC: BIOC3151, BIOC3291 Plus 6 or 12 UOC from: BIOC3121, MICR3021 Plus 0 or 6 UOC from: BIOS3071, BIOT3061
Geography (Human) BEES Student Office	GEOH1601, GEOS1701, SLSP1001 or MATH1041	SLSP2001, GEOH2001 Plus 12 UOC from Level II GEOH courses	GEOH3101 or GEOH3111 Plus 18 UOC from Level III GEOH courses
Geography (Physical) BEES Student Office	GEOH1601, GEOS1701, MATH1041 Also recommended: BIOS1301	24 Level II UOC: BEES2041 Plus GEOS2711 &/or GEOS2721 Plus further UOC from Level II GEOS	Choose 24 UOC from: GEOS3731, GEOS3761, GEOS3811, GEOS3821, GEOS4721, GEOH3911, GEOH3921
Geology BEES Student Office	GEOS1111, GEOS1211	BEES2041, GEOS2171, GEOS2181 Plus 6 UOC from: GEOS2071, GEOS2291, GEOS2721	GEOS3131, GEOS3141 Plus 12 UOC from Level III GEOS courses
History and Philosophy of Science Dr A Coronas	Up to 12 UOC from: HPSC1100, HPSC1200, HPSC1400, HPSC1500	24 UOC from Level II History and Philosophy of Science, including at least 12 UOC from: HPSC2100, HPSC2150, HPSC2200, HPSC2300, HPSC2400, HPSC2500, HPSC2550	18 UOC from Level III History and Philosophy of Science
Marine Science (Marine Biology) BEES Student Office	BIOS1101, BIOS1201 Also recommended: MATH1041	MSCI2001, MSCI6200, BIOS2031, MICR2201	MSCI3001, BIOS3081, BIOS3091, MICR3071
Marine Science (Marine Geology) BEES Student Office	GEOS1111, GEOS1211	MSCI2001, MSCI6200, GEOS2181, GEOS2721	MSCI3001, GEOS3731 Plus 6 UOC from: GEOS3141, GEOS3281 Plus 6 UOC from Level III GEOS courses.

Major Contacts	Stage 1	Stage 2	Stage 3
Marine Science (Physical Oceanography) School of Mathematics	MATH1131 <i>or</i> MATH1141, MATH1231 <i>or</i> MATH1241, PHYS1121, PHYS1221	MSCI2001, MATH2011, MATH2240, MATH2120, MATH2301	MSCI3001, MATH3121, MATH3241, MATH3261
Materials Science Dr O Standard	MATH1131, MATH1231, PHYS1121, PHYS1221	MATS1172, MATS1262, MATS1002, MATS1112, MATS1142, MATS1282	21 UOC from Level III MATS courses including: MATS1013, MATS1223, MATS2013, MATS3443, MATS4013
Mathematics (See Note 3 above) School of Mathematics	MATH1131, MATH1231 MATH1081	MATH2011, MATH2060, MATH2120, MATH2501, MATH2520, MATH2801	18 UOC from Level III Mathematics
Medical Microbiology and Immunology BABS Student Office	CHEM1011, CHEM1021, BIOS1101, BIOS1201 Plus 6 UOC from: MATH1031, MATH1041	MICR2201, MICR2011, Plus 6 UOC from: ANAT2111, ANAT 2200, BIOC2101 <i>or</i> BIOC2181, BIOC2201 BEES2041, BIOS2021 <i>or</i> BIOS2621, PATH2201, PHPH2101, PHPH2201	A total of 24 UOC: At least 18 UOC from: MICR3041 <i>or</i> MICR3641, MICR3051, MICR3061, MICR3081 Plus 0 - 6 UOC from: MICR3031, MICR3021 <i>or</i> MICR3621, PHPH3121, PHPH3151 <i>or</i> PHPH3551, BIOC3261, BIOC3271, BIOC3291, PATH3205, PATH3206, PHPH3251
Microbiology BABS Student Office	CHEM1011, CHEM1021, BIOS1101, BIOS1201 Plus 6 UOC from: MATH1031, MATH1041	MICR2201, MICR2011 Plus 6 UOC from: BIOS2021 <i>or</i> BIOS2621, BIOC2201	MICR3021 <i>or</i> MICR3621 Plus 12 UOC from: MICR3611, MICR3061, MICR3071, MICR3081 Plus 6 UOC from: MICR3611, MICR3031, MICR3061, MICR3071, MICR3081, BIOS3071 <i>or</i> BIOS3671, BIOT3011 <i>or</i> BIOT3611, BIOT3081, BIOC3121 <i>or</i> BIOC3621, FOOD2480, FOOD2490, CHEM3901
Molecular Biology BABS Student Office	BIOS1101, BIOS1201 CHEM1011 <i>or</i> CHEM1031, CHEM1021 <i>or</i> CHEM1041 Plus 6 UOC from: MATH1031, MATH1041.	MICR2201, MICR2011 <i>or</i> MICR2611, BIOC2101, BIOC2201, BIOS2021 <i>or</i> BIOS2621.	MICR3021 <i>or</i> MICR3621, BIOC3121 <i>or</i> BIOC3621, BIOC3281 Plus 6 UOC from: BIOT3061, MICR3011, BIOC3111, BIOC3271 <i>or</i> BIOC3671
Pharmacology Dr. T Binder	6 UOC from Level 1 Biology (BIOS1201 preferred) Plus 12 UOC from Level I Chemistry, Plus 6 UOC from Level I Mathematics (MATH1041 excluded)	PHPH2011 (also compulsory for Minor), PHPH2101, PHPH2201 Plus 12 UOC from BIOC2101 <i>or</i> BIOC2181, BIOC2201 <i>or</i> BIOC2291, CHEM2021, CHEM2041	PHPH3251 (also compulsory for Minor), PHPH3101 Plus 12 UOC from: PHPH3121, PHPH3131, PHPH3211, PHPH3221, BIOC3261, BIOC3111, BIOC3121, CHEM3021, CHEM3901
Philosophy Dr M Michael	6 UOC from Level I Philosophy	18 UOC from PHIL2100 courses and above	24 UOC from Level II/III Philosophy

Major Contacts	Stage 1	Stage 2	Stage 3
Physical Oceanography/Meteorology School of Mathematics	MATH1131, MATH1231, PHYS1121, PHYS1221, MATH1081	MATH2011, MATH2060, MATH2120, MATH2240, MATH2301, PHYS2810 Plus 3 UOC from Mathematics or Physics	MATH3121, MATH3241, MATH3261
Physics Ms S Hagon A/Prof G Morriss	MATH1131, MATH1231, PHYS1121, PHYS1221	PHYS2050, PHYS2060, PHYS2040, PHYS2030 Plus 12 UOC from Level II or Level III Physics. Also recommended: MATH2011, MATH2120	18 UOC from Level III Physics.
Physiology Dr L Ulman	6 UOC from Level I Biology (BIOS1201 preferred) Plus 6 UOC from Level I Chemistry Plus 6 UOC from Level I Mathematics (MATH1041 excluded).	PHPH2101, PHPH2201, Highly recommended: BIOC2101 <i>and</i> BIOC2201 or BIOC2181 <i>and</i> BIOC2291	A total of 24 UOC: At least 18 from: PHPH3121, PHPH3131, HPH3211, PHPH3221 Plus 0 – 6 from: PHPH3101, PHPH3251, BIOC3261, BIOC3271, BIOC3111, BIOC3121, MICR3041, MICR3051, PATH3205, PATH3206, PATH3207 or any Level III Anatomy course.
Psychology Mr T Clulow Dr M Gleitzman	PSYC1001, PSYC1011	PSYC2001 Plus 18 UOC from: PSYC2061, PSYC2071, PSYC2081, PSYC2101.	PSYC3001 Plus 18 UOC from Level III Psychology courses (from at least two elective groups)
Safety Science Dr A Green	SESC1001 Plus 12 UOC from Level I Mathematics.	ANAT2151, MATH2839* SESC2091, MGMT2721. <i>* MATH2839 or other approved statistics course</i>	SESC3101, SESC3541, SESC3601, SESC4310 Plus additional Level II or III SESC courses to total 42 UOC.
Spatial Information Systems BEES Student Office	GEOS1211, GEOS170, MATH1041 Also recommended: BIOS1101, BIOS1301	BEES2041, GEOS2811, GEOS2821	GEOS3811, GEOS3821 Plus 12 UOC from Level III GEOS courses
Statistics School of Mathematics	MATH1131, MATH1231, MATH1081.	MATH2060, MATH2501, MATH2011 or MATH2510, MATH2801, MATH2810, MATH2831.	MATH3801, MATH3811, MATH3821
Toxicology A/Prof C Winder	BIOS1201, BIOS1101, CHEM1011, CHEM1021, MATH1031, MATH1041, SESC1001	BIOC2181 <i>or</i> BIOC2101, BIOC2291 <i>or</i> BIOC2201, CHEM2021, SESC2091, PHPH2011 Recommended: BIOS2021, further Level II CHEM, PHPH2101, PHPH2201.	CHEM3901, SESC4820, SESC4850 Recommended: PHPH3251, PHPH3101, SESC3101, BIOC3261, BIOC3121, further Level III CHEM
Vision Science Dr Peter Herse	VISN1211, VISN1231 Also recommended: BIOS1101, BIOS1201, CHEM1031, CHEM1829, MATH1131, PHYS1121, PSYC1011	24 UOC from: VISN2111, VISN2131, VISN2211, VISN2231, PSYCH2071	18 UOC from: VISN3111, VISN3131, VISN3211, PSYCH3221

Table B: Minors Offered in the Bachelor of Science Program (3970)

Minor	Stage 1	Stage 2	Stage 3
Please note: In addition to the Minors listed below, 24 units of credit taken at Level II or III in any Major listed in Table A will also satisfy the requirements of a Minor.			
Australian Studies Chinese Studies Cognitive Studies Development Studies Education English Environmental Studies European Studies Film French German Studies Greek (Modern) History History and Philosophy of Science Indonesian Studies Japanese Studies Jewish Studies Korean Studies Linguistics Media, Culture and Technology Music Philosophy Political Economy Politics and International Relations Policy Studies Sociology and Anthropology Spanish and Latin American Studies Theatre Studies Women's and Gender Studies	All Minors from the Faculty of Arts and Social Sciences require a total of 24 upper level units of credit from a particular School. Note: No more than 12 units of credit of level 1 courses may be taken in any one of these Minors.		
Accounting	ACCT1501, ACCT1511	24 Level II or III UOC in Accounting courses.	
Aviation	AVIA1321, AVIA1900, AVIA1850	24 UOC from: AVIA2110, AVIA2200, AVIA1700, AVIA2400, AVIA2500, AVIA2700, AVIA2800, AVIA3101, AVIA3400, AVIA3710,	
Biomechanics	12 UOC of Level 1 Maths	SESC2451, ANAT2511	BIOM9510, SESC3451
Biological Anthropology	BIOS1101	18 UOC from: ANAT2610, ANAT2611, ANAT3601, ANAT3611 Plus 6 UOC from any other Level II or III course in Anatomy or Biological Anthropology or 6 UOC from courses in Biological Science, Geology/Geography or Social Anthropology listed under "Biological Anthropology" in Table A.	
Botany	BIOS1101, BIOS1201, also recommended: BIOS1301	BIOS2011, BIOS2051	BIOS3061, MICR3071
Business Economics	ECON1101, ECON1102	24 Level II or III UOC in Business Economics courses.	
Business Law and Taxation		24 Level II or III UOC in Business Law and Taxation	
Business Statistics	ECON1101, ECON1102	24 Level II or III UOC in Business Statistics courses.	

Minor	Stage 1	Stage 2	Stage 3
Chemical Engineering and Industrial Chemistry	To be advised	24 Level II or III UOC in Chemical Engineering or Industrial Chemistry courses	
Civil Engineering	CVEN1023, CVEN1026, CVEN1024	CVEN2023 Plus 21 UOC from: CVEN0646, CVEN0656, CVEN2026, CVEN2125, CVEN2126, CVEN2322, CVEN2525, CVEN3126, CVEN3224, CVEN3438, CVEN3448, CVEN3525, CVEN4533, CVEN4722, INDC4120, CEIC0050.	
Computing	COMP1011	COMP2811, COMP2011	COMP2121, COMP2041
Ecology	BIOS1101, BIOS1201 Also recommended: BIOS1301	GEOS2711 and/or BIOS2011 May include 6 UOC from BIOS2031, BIOS2051, BIOS2061, GEOS2071 for a total 12 UOC of Level 2 courses	BIOS3111 Plus 6 UOC from: BIOS3071, BIOS3081, BIOS3091, GEOS3761
Economic History		24 Level II or III UOC in Economic History courses	
Electrical Engineering & Telecommunications	ELEC1011	ELEC2031, ELEC2032	18 UOC from one of the following groups: Group one: Choose three from these courses - ELEC3004, ELEC3014, ELEC3041, ELEC3006, ELEC3016 Group two: TELE3013, TELE4352, TELE3018
Finance		24 Level II or III UOC in Finance courses	
Human Resource Management		24 Level II or III UOC in Human Resource Management courses	
Industrial Relations		24 Level II or III UOC in Industrial Relations courses	
Information Systems		24 Level II or III UOC in Information Systems courses	
International Business		24 Level II or III UOC in International Business courses	
Marketing		24 Level II or III UOC in Marketing courses	
Mechanical and Manufacturing Engineering		MECH2611, MECH2711, MECH2612, MECH2712	MECH3601, MECH3602 or an alternative sequence of 24 UOC at Level II or III with the approval of the Head of School
Pathology		PATH2201	PATH3205, PATH3206, PATH3207
Pharmacology		PHPH2011, PHPH3251 plus 12 UOC from any Level II or III Physiology, Pharmacology, Biochemistry, Chemistry	
Planning	PLAN1241, PLAN1042	24 UOC from Level II and III PLAN courses	
Remote Sensing		GEOS2811, GEOS2821	GEOS3811, GEOS3821
Science Communication	SCOM1021 (or SCOM2014)	SCOM 2014, SCOM2021 Plus 12 Level II or III UOC in SCOM electives (e.g. Internship, HPSC, PSYC, MARK) Refer to the Science Communication Office for appropriate selection.	
Surveying and Spatial Information Systems	One of GMAT0411, GMAT0442, GMAT0443	24 Level II or III UOC in Surveying and Spatial Information Systems courses	
Zoology	BIOS1101, BIOS1201 Also recommended: BIOS1301	BIOS2031, BIOS2061	12 UOC from: BIOS3011, BIOS3021, BIOS3081, BIOS3111

Study Plans in Advanced Science

Anatomy

Anatomy is the study of the structure of the human body. The word 'anatomy' is derived from the Greek, and means 'cutting up' or 'dissection'. However, anatomy today is much more than the descriptive study of the dissected body, although dissected specimens are still used for research and instruction. The study of anatomy now embraces separate but strongly related disciplines. Gross Anatomy deals with the description of form, arrangement and function of the bones, joints, muscles and internal organs, together with their blood and nerve supply. Histology deals with the microscopic structure of tissues and cells. Embryology is concerned with the normal development of the embryo and fetus from conception to birth and with the mechanisms of development and malformations. Neuroanatomy deals with the internal organisation and functions of the brain and spinal cord. Biological Anthropology involves applying biological principles and approaches to the study of humans and non-human primates. In all courses in anatomy, strong emphasis is given to the functional significance of the structures in health and in disease. Advanced anatomy courses may include affiliation with a research project and a project evaluation report and, in some courses, an assessable dissection program.

A major in Anatomy may be combined with elective courses in Biochemistry, Physiology, Microbiology, Pathology or Psychology.

Anatomy

Stage 1

BIOS1101, BIOS1201

CHEM1011 or CHEM1031

CHEM1021 or CHEM1041

Choose at least 6 units of credit from Level I Mathematics courses.

Elective courses totalling 12 units of credit

LIFE1001

One General Education course totalling 3 units of credit.

Stage 2

Level II Anatomy courses totalling at least 18 units of credit from:

ANAT2111, ANAT2210, ANAT2310, ANAT2601, ANAT2611,

ANAT2241, ANAT2341.

Elective courses totalling 24 units of credit.

Recommended: Biological Science, Biochemistry, Physiology, Microbiology, Pharmacology, Microbiology, Pathology, Psychology, LIFE2001

One General Education course totalling 3 units of credit

Stage 3

Level III Anatomy courses totalling at least 18 units of credit from:

ANAT3121, ANAT3131, ANA3141, ANAT3231, ANAT3411,

ANAT3421, ANAT3601, ANAT3611

General Education courses totalling 6 units of credit

Further level III courses from Biological Science, Biochemistry, Microbiology, Pathology, Physiology, Pharmacology to give a total of 48 units of credit.

Students proposing to proceed to Stage 4 (Honours) must complete Level III courses totalling 36 units of credit.

Stage 4 (Honours)

ANAT4508

Biochemistry

The Biochemistry plan is closely allied to the Genetics plan and the Molecular Biology plan (see later) all of which are concerned with understanding life processes at the level of molecular structure, function and interaction. The Biochemistry plan therefore provides a knowledge base and a broad range of specialised techniques, which are relevant to all biology. The major impact of this discipline is largely at the molecular level and is ideal for those students whose interests are in understanding and appreciating biological processes at the molecular rather than the descriptive level. Integration of these molecular approaches at the cellular, tissue and whole organism level is an increasingly important part of biochemistry. This discipline is also the foundation of medical science and is playing an increasingly important role in many aspects of modern medicine. The Biochemistry plan (see below) provides opportunities to combine biochemistry with other related discipline areas through careful choice of elective courses in Stages 2 and 3 of the plan.

Biochemistry*

Stage 1

BIOS1101, BIOS1201

CHEM1011 or CHEM1031

CHEM1021 or CHEM1041

Choose at least 6 units of credit from:

MATH1031, MATH1041**

Elective courses totalling 12 units of credit

(Recommended: Physics)

LIFE1001

One General Education course totalling 3 units of credit

Stage 2

BIOC2101* and BIOC2201*

LIFE2001

Choose 6 units of credit from:

BIOS2021 or BIOS2621, CHEM2021, CHEM2041, MICR2011

Elective courses totalling 24 units of credit

One General Education course totalling 3 units of credit

Stage 3

Choose 12 or 18 units of credit from:

BIOC3111, BIOC3261, BIOC3271

Choose 0 – 12 units of credit from:

BIOC3121, BIOC3281

Choose 0 – 6 units of credit from:

ANAT3231, BIOC3301, BIOT3061, CHEM3021, CHEM3041,

MICR3041, MICR3641, PHPH3211, PHPH3221

Elective courses totalling 18 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

BIOC4318

**At least two of the Stage 2 and two of the Stage 3 courses contributing to the major in Biochemistry must be taken at the advanced level.*

***Other higher level study plan Mathematics courses may be substituted.*

Biological Science

Biological Science encompasses all aspects of plants and animals including their relationship to each other and to the environment. The areas of study leading to the award of a science degree in Biological Science include cell biology, plant and animal physiology, ecology, genetics, taxonomy, marine biology and evolutionary studies. These studies are particularly relevant in the fields of agriculture, forestry, wildlife management, conservation and related environmental sciences. Within Advanced Science there are two plans available: Biological Science and Ecology.

Biological Science

Staff Contact: Associate Professor I Suthers

Stage 1

BIOS1101, BIOS1201, BIOS1301

CHEM1011

MATH1041

Elective courses totalling 12 units of credit

LIFE1001

One General Education course totalling 3 units of credit

Stage 2

BIOS2011, BIOS2621, BEES2041,

LIFE 2001

Choose 6 units of credit from:

BIOS2031, BIOS2051, BIOS2061

One General Education course totalling 3 units of credit

Elective courses totalling 18 units of credit.

(Recommended: BIOS2031, BIOS2051 and BIOS2061)

Stage 3

Level III Biological Science courses totalling 36 units of credit, including advanced courses where available.

General Education courses totalling 6 units of credit

Elective courses totalling 6 units of credit.

Stage 4 (Honours)

Required course material comprises:

BEES4521 Literature Review

and

24 UOC project courses from the list below:

BIOS4514 Biological Science Honours B

BIOS4515 Biological Science Honours B

BIOS4516 Biological Science Honours B
 BIOS4518 Biological Science Honours B
 or

BIOS4524 Botany Honours B
 BIOS4525 Botany Honours B
 BIOS4526 Botany Honours B
 BIOS4528 Botany Honours B
 or

BIOS4534 Zoology Honours B
 BIOS4535 Zoology Honours B
 BIOS4536 Zoology Honours B
 BIOS4538 Zoology Honours B
 and

12 UOC Biology courses at Stage 3 (not completed previously) or other Science courses approved by the Honours Coordinator.

Ecology

Staff Contact: Associate Professor I Suthers

Stage 1

BIOS1101, BIOS1201, BIOS1301
 CHEM1011
 MATH1041
 LIFE1001

One General Education course totalling 3 units of credit
 Elective courses totalling 12 units of credit

Stage 2

BIOS2011, BEES2041
 LIFE2001

Choose 6 units of credit from: BIOS2031, BIOS2051, BIOS2061

One General Education course totalling 3 units of credit

Elective courses totalling 24 units of credit.

(Recommended: BIOS2031, BIOS2051, BIOS2061 and BIOS2621)

Stage 3

Choose courses totalling 36 units of credit from:

BIOS3601, BIOS3011, BIOS3061, BIOS3071, BIOS3081, BIOS3091,
 BIOS3111, BIOS3671, BIOS3681

Where ordinary and advanced options exist for the same course students are advised to take the advanced option.

Elective courses totalling 6 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

Entry requires the completion of Stages 1–3 of the Advance Science plan in Ecology or Biological Science.

Required course material comprises:

BEES4521 Literature Review
 and

24 UOC project courses from the list below:

BIOS4544 Ecology Honours B
 BIOS4545 Ecology Honours B
 BIOS4546 Ecology Honours B
 BIOS4548 Ecology Honours B
 and

12 UOC Biology courses at Stage 3 (not completed previously) or other Science courses approved by the Honours Coordinator.

Biotechnology

Biotechnology can be defined as the use of various biological processes to make products and perform services. The essential feature of biotechnology therefore is the use of biological processes based on living cells and biochemical macro-molecules such as proteins, DNA and RNA in a rapidly expanding range of activities of benefit to mankind. As such, biotechnology makes practical use of the recent scientific advances in areas such as molecular genetics.

The development of recombinant-DNA (r-DNA) technology has resulted in the ability to produce large quantities of any potentially useful product. Based on this technology, a new generation of biopharmaceuticals, including hormones, vaccines, anti-hypertensive and anti-inflammatory agents, are being developed which have the potential to revolutionise medicine. Microorganisms and viruses are being modified for use in controlling plant and animal diseases and pests. Diagnostic kits are being developed for use in forensic science and in product identification and quality control. In addition, genetic improvements in agriculture, plants and animals are becoming a reality, as is the control of inborn genetic disorders in humans.

Some aspects of biotechnology are traditional, having been used for centuries. The first makers of bread, cheese and fermented beverages over six thousand years ago were applying biotechnological principles in processing these goods. Without understanding the processes they were operating, they were in fact making use of catalysis mediated by microbial cells. Such processes are still in use today and scientific advances now allow for much greater control of the processes with resultant improvements in quality and economics of production. The number of such biological processes has also expanded and enzymes and/or microorganisms are used in the production of a wide range of fermented foods (such as cheese, wine, beer, soy sauce, sauerkraut, yoghurt, tofu, kefir) and in the production of flavouring, colouring and sweetening agents.

Bioprocesses are also used in the extraction of minerals from low-grade ores, and modified and novel bioprocesses are being developed for the treatment of waste and degradation of recalcitrant molecules, an area of vital importance in our increasingly polluted planet.

The future for expansion in all the above areas is immense and an ability to cope with the problems of the 21st century will be heavily dependent on these advances.

Biotechnology*

Stage 1

BIOT1011, BIOS1201
 CHEM1011, CHEM1021
 LIFE1001

One General Education course totalling 3 units of credit

Choose at least 6 units of credit from: MATH1031, MATH1041

Choose electives to make a total of 48 units of credit for Stage 1
 (Recommended: PHYS1111)

Stage 2

BIOC2101*, BIOC2201*
 MICR2201
 LIFE2001

One General Education course totalling 3 units of credit

Choose elective courses totalling 24 units of credit

(Recommended: BIOS2021 or BIOS2621, MICR2011)

Stage 3

Choose at least 18 units of credit from: BIOT3011, BIOT3061,
 BIOT3021, BIOT3081

Choose elective courses totalling 24 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

BIOT4073 (Full-Time)
 BIOT4083 (Part-Time)

**At least two of the level II and two of the level III courses contributing to the major must be taken at advanced level.*

Chemistry

Within Advanced Science there are two plans available: Chemistry, and Medical Chemistry. Both plans provide a broad scientific education and a professional training in the chemical sciences. Fundamental, applied, environmental and industrial aspects of chemistry may be included by the appropriate choice of courses.

Chemistry

The Chemistry plan is designed for students who wish to specialise in the chemical sciences and undertake the maximum number of chemistry courses. It is designed to provide education and training in all contemporary fields of chemistry and should be selected by students who wish to devote the majority of their studies at Stage 3 to Chemistry.

Within this plan there are sufficient electives available to complete the equivalent of a minor in another discipline. The School of Chemistry recommends the following discipline areas: Biochemistry, Biotechnology, Computing, Food Science and Nutrition, Geoscience, Materials Science, Mathematics, Physics. Other areas are available both within and outside the Faculty of Science. These possibilities should be discussed with an advisor from the School.

Inclusion of advanced level studies, from more than one field of specialisation, result in a broadly based degree in the chemical sciences. For example, a combination of Chemistry and Biochemistry leads to further work in areas such as Toxicology and Neurochemistry. Combining Level III Chemistry with Mathematics or Computing provides a valuable basis for the many applications of computers in Chemistry. Chemistry with Physics or Materials Science allows entry into the rapidly developing field of Advanced Materials.

Stage 1

CHEM1031, CHEM1041*
 MATH1131 or MATH1141 or MATH1031
 MATH1231 or MATH1241 or MATH1041
 Choose 6 units of credit from Level I Physics
 One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001
 One General Education course totalling 3 units of credit
 Elective courses totalling 12 units of credit

Stage 2

CHEM2011, CHEM2021, CHEM2031, CHEM2041
 One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001, LIFE2001
 Elective courses totalling 12 units of credit
 General Education courses totalling 9 units of credit

Stage 3

CHEM3011, CHEM3021, CHEM3031, CHEM3041
 Choose further Level III chemistry courses totalling 12 units of credit
 Elective courses totalling 12 units of credit

Stage 4 (Honours)

CHEM4003

**Students without the assumed knowledge for these courses may substitute CHEM1011 and CHEM1021*

Medical Chemistry

This program combines a strong knowledge of synthetic and analytical chemistry and aspects of biochemistry or pharmacology. The program is designed to produce graduates whose background in both chemical and biological areas is appropriate to the requirements of employers in Australia.

Stage 1

CHEM1031, CHEM1041*
 BIOS1101, BIOS1201
 MATH1031 or MATH1131 or MATH1141
 MATH1041 or MATH1231 or MATH1241
 One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001
 One General Education course totalling 3 units of credit
 Elective courses totalling 6 units of credit

Stage 2**

CHEM2011, CHEM2021, CHEM2031, CHEM2041
 BIOC2101 or BIOC2181
 Choose further specialisation in either physiology, pharmacology, biochemistry, molecular biology
 BIOC2201 or BIOC2291
 Plus elective courses totalling 6 units of credit
 or
 PHPH2102 and PHPH2201
 One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001, LIFE2001
 One General Education course totalling 3 units of credit

Stage 3

CHEM3021, CHEM3041
 Further specialisation in either physiology, pharmacology, biochemistry, molecular biology, as follows:
 12UOC from Level III Physiology or Level III Pharmacology according to choice of Level II prerequisites
 or
 Courses totalling 12 units of credit from Level III biochemistry and MICR3041
 Elective courses totalling 18 units of credit
 General Education courses totalling 6 units of credit

Stage 4

CHEM4003
 Joint supervision of Honours projects between the School of Chemical Sciences and either the Department of Physiology & Pharmacology or the School of Biotechnology & Biomolecular Sciences is strongly encouraged.

**Students without the assumed knowledge for these courses may substitute CHEM1011 and CHEM1021*

*** CHEM2839 may be substituted for CHEM2031.*

Food Science and Technology

Food Science and Technology involves the understanding of basic sciences and the application of this knowledge to foods from the point of production, through handling, processing, preservation, distribution and marketing, up to consumption and utilisation by consumers. It is concerned with food processes, food commodities, food composition and food quality (including sensory properties, safety and nutritional value).

The study of Food Science and Technology integrates many scientific disciplines. Its bases are in chemistry, physics, biochemistry and microbiology. Its borders merge with those of agriculture, engineering, human nutrition, public health, commerce, psychology and law. Biotechnology has a role of increasing importance in food science and technology.

The food scientist and food technologist are concerned with food supplies and requirements, community wants and needs, and equitable distribution of foods to ensure human nutritional needs are met.

New knowledge is acquired in the laboratory, the pilot plant and the community, and then applied to the development of safe, nutritious and palatable foods, beverages and food ingredients by optimisation of processes and equipment. Foods are studied in terms of their basic constituents and structures and the changes they undergo when subjected to handling, processing and distribution.

The food scientist and food technologist are equally concerned with the development and selection of raw materials from agricultural, horticultural, animal and marine sources.

A safe, adequate, palatable and nutritious food supply is essential to human health. The food and beverage industry is of major economic importance and is the largest sector of manufacturing industry in Australia. Internationally, food production, processing and service are among the largest and most stable industries. The challenges are to increase the availability, variety, quality and quantity of foods economically and in line with the needs of the world population. Australian industry has a major role to play in supplying high quality foods to overseas markets and there is a national and international demand for professionally trained people prepared to accept responsibility for the quality and safety of food.

These programs provide basic preparation for food science and technology careers in the food industry, the public sector, education, research, the food service industry, public health, management and marketing. Graduates may also find careers in health and environmental sciences, management of food resources and food wastes, and communication, and in areas such as dietetics after further training.

Undergraduate training in the Food Science and Technology plan is administered through the Science Student Centre. The BSc program is three stages for a Pass degree during which students can study aspects of food science and technology in combination with other courses in a relevant discipline, preferably biochemistry, microbiology, biotechnology or chemistry. The fourth Honours Stage of the BSc program involves an extensive research project.

Food Science and Technology**Stage 1**

BIOS1201
 CHEM1031, CHEM1041*
 FOOD1130 or BIOS1101**
 MATH1031, MATH1041
 or one of MATH1131, MATH1141
 and one of MATH1231, MATH1241
 LIFE1001
 One General Education course totalling 3 units of credit
 PHYS1111 or PHYS1201

Stage 2

BIOC2101 or BIOC2181
 BIOC2201 or BIOC2291
 CHEM2921
 LIFE2001
 MICR2201
 General Education courses totalling 9 units of credit
 Elective courses totalling 12 units of credit
 (Recommended: FOOD1230, FOOD2320, FOOD3220)

Stage 3

FOOD1360, FOOD1370, FOOD1390
 Elective courses totalling 30 units of credit
 (Recommended: FOOD1380, FOOD1490, FOOD2330, FOOD2340, FOOD2350, FOOD2480, FOOD3440, FOOD4450)

Stage 4 (Honours)

FOOD9420

**Students without the assumed knowledge for these courses may substitute CHEM1011 and CHEM1021*

***Students planning to take BIOC2101 must choose BIOS1101 at Stage 1.*

Genetics

The Genetics plan is broadly based and offers a general introduction to the discipline during the first two years of study. The plan allows students in Stage 3 to diversify into the more specialised areas of genetics, including molecular genetics, human genetics, plant and microbial molecular biology, conservation biology, etc. The flexibility of this plan therefore allows students the scope to combine genetics with a number of other courses offered by the different schools within the Faculty of Science so that Stage 4 (Honours) may be completed in any of these schools provided that suitable Genetics Honours projects are offered.

Genetics***Stage 1**

BIOS1101, BIOS1201

CHEM1011 or CHEM1031

CHEM1021 or CHEM1041

Choose at least 6 units of credit from:

MATH1031**, MATH1041**

Elective courses totalling 12 units of credit

(Recommended: Physics)

LIFE1001

One General Education course totalling 3 units of credit

Stage 2

BIOS2621

LIFE2001

Choose 12 units of credit from:

BIOC2101, BIOC2201, BEES2041, MICR2011

Elective courses totalling 24 units of credit

One General Education course totalling 3 units of credit

Note: BEES2041 may be replaced with MATH2841 or another MATH or COMP course as approved by the study plan coordinators

Stage 3

BIOC3291, BIOC3151

Choose 6 or 12 units of credit from:

BIOC3121 or BIOC3621, MICR3021 or MICR3621

Choose 0 or 6 units of credit from:

BIOC3301, BIOS3071, BIOT3061

Elective courses totalling 18 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

BIOC4103

**At least two of the Stage 2 and two of the Stage 3 courses contributing to the Genetics Study Plan must be taken at the advanced level.*

***Other higher Level 1 Mathematics courses may be substituted.*

Geoscience

The School of Biological, Earth and Environmental Sciences offers the following study plan within Advanced Science.

Geoscience**Stage 1**

GEOS1701, GEOS1111, GEOS1211

MATH1041

CHEM1011 and PHYS1111

Elective courses totalling 6 UOC

3 UOC from Table X*

3 UOC General Education courses

Stage 2

BEES2041

24 UOC from Level II GEOS courses

12 UOC of elective courses

3 UOC from Table X*

3 UOC General Education courses

Stage 3

36 UOC from Level III GEOS courses

6 UOC elective courses

6 UOC General Education courses

Stage 4

BEES Honours program in Geology or Physical Geography

BEES4511 Professional Skills

and either

24 UOC project from GEOL4204, 4205, 4206, 4207 plus elective courses totalling 18 UOC from BEES4521, Level III Courses in Geology (GEOS) or other science courses at Levels II to IV (not completed previously) and approved by the Honours coordinator.

or

24 UOC from GEOS4418, 4417, 4416, 4415 plus elective courses totalling 8 UOC from BEES4521, Level III courses in Physical Geography (GEOS) or other science courses at Levels II to IV (not completed previously) and approved by the Honours coordinator.

** Please refer to the program entry for 3972 Advanced Science under 'Program Rules and Information'.*

Marine and Coastal Studies

The Marine and Coastal Studies Study Plan allows specialisation in selected areas of marine science, yet also includes adequate exposure to other pertinent disciplines.

Marine and Coastal Studies**Stage 1**

BIOS1101, BIOS1201

GEOS1111, GEOS1211

MATH1041

LIFE1001, MATH1000

Elective courses totalling 12 units of credit

(Recommended: BIOS1301 MATH1031, GEOH1601, GEOS1701,

CHEM1011, PHYS1201)

Stage 2

MSCI2001, MSCI6200

BIOS2031,

GEOS2721

General Education courses totalling 6 units of credit

Elective courses totalling 18 units of credit

(Recommended: BIOS2011, BEES2041, GEOS2711, GEOS2811,

GEOS2821, GEOS2181, GEOS2291, MICR2201)

Stage 3

MSCI3001, GEOS3731

BIOS3681, BIOS3091

General Education courses totalling 6 units of credit

Elective courses totalling 18 units of credit

(Recommended: BIOS3671, BIOS3111, GEOS3761, GEOS3811,

GEOH3911, GEOH3921, GEOS3281, MICR3071)

Stage 4 (Honours)

MSCI4003 (Full-Time)

MSCI4009 (Part-Time)

Materials Science

The School of Materials Science and Engineering offer the following Study Plan.

Materials Science**Stage 1**

MATS1111, MATS1021

MECH0440

CHEM1011, CHEM1021

MATH1131 or MATH1141

MATH1231 or MATH1241

PHYS1121, PHYS1221

One course from: MATH1000, PHYS1000, CHEM1000, LIFE1001

Stage 2

MATS1172, MATS1282, MATS1242, MATS1262

MATH2049, MATH2059

CHEM2011 and CHEM2021 or CHEM2031

PHYS2030

General Education courses totalling 6 units of credit

Stage 3

MATS1013, MATS1112, MATS1414

MATS2013, MATS3443, MATS4013

PHYS3020 and PHYS3080, PHYS3310

One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001,

LIFE2001

Elective courses totalling 12 units of credit General Education courses totalling 6 units of credit

Stage 4

MATS4444

Mathematics

The School is divided into Departments of Pure Mathematics, Applied Mathematics, and Statistics. It offers an Advanced Science Study Plan in each of these areas and also plans in Physical Oceanography/Meteorology, in Mathematics and Computer Science (in conjunction with the School of Computer Science) and in Mathematics and Finance (in conjunction with the Faculty of Commerce). There is also a plan in "Advanced Mathematics" that allows for more flexibility in choice of courses. Entry into this plan is by invitation only.

Note: In all Advanced Science Study Plans in Mathematics, all courses are at the higher level where that is available. Any student wishing to take these higher courses at the ordinary level will need to make a formal application to vary their program.

In all these plans, except Mathematics and Finance, Stage 4 is a special Honours year. For entry to the Honours year, students will normally be required to have a Credit average in their Level III Mathematics courses. They will also need to have permission from the Head of the appropriate Department or from the Head of School. In order to receive this permission, students will normally be expected to have included a significant number of higher level courses among the courses they study in the earlier stages of the plan. To ensure that they will be eligible for entry to the Honours year, students should discuss their choice of Level III courses with the Head of the appropriate Department.

The Mathematics and Finance plan is a four-year plan in which Honours may be awarded on the basis of a weighted average of all courses studied in the plan.

Pure Mathematics is the study of the essential structures of mathematics. Work by pure mathematicians underpins most of the technological advances of this century. Pure Mathematics is concerned with problems and techniques which transcend specific applications. Research, focussing on the development of existing theories or the creation of new ones, may be driven by applications or by the internal demands of the discipline. Pure Mathematics courses provide the insights and understanding required by those using mathematics, leading to mastery of the fundamental processes of mathematical science and the capacity for innovative applications in any area.

Applied Mathematics concerns the development of mathematics and models for understanding scientific phenomena, for the solution of technical and industrial problems, and for use in the social, economic and management sciences. Courses 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.

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.

Choosing electives

The following information is provided to assist students in choosing their elective courses. Students who intend to proceed to Stage 4 (Honours) should consult with the relevant department in the School of Mathematics before making a final choice of Level III courses.

Pure Mathematics

Pure Mathematics courses relevant to the mathematical aspects of Computer Science are MATH2400 in Stage 2, and MATH3411 and MATH3421 in Stage 3.

Pure Mathematics courses relevant to mathematics teaching are MATH3511, MATH3521, MATH3531, MATH3560 and MATH3570 in Stage 3, or their higher equivalents.

Pure Mathematics courses relevant to the applications of mathematics in physics or engineering are MATH3531, MATH3541 and MATH3570 in Stage 3, or their higher equivalents.

Applied Mathematics

It is recommended that students in the Applied Mathematics plan should include the following among their electives.

Level II: At least 6 units of credit from: MATH2140, MATH2240, MATH2260, MATH2280

Level III: At least three of: MATH3101, MATH3121, MATH3161, MATH3181, MATH3201, MATH3241, MATH3261, MATH3301.

In addition, the following recommendations are made for Stage 1 of the Applied Mathematics plan.

For students interested in physical sciences or theoretical oceanography, meteorology or fluid dynamics: PHYS1121 and PHYS1221.

For students interested in social or biological sciences, at least 12 units of credit from the following: BIOS1101 and BIOS1201; PSYC1001 and PSYC1011; PHYS1121 and PHYS1221; CHEM1011 and CHEM1021.

For students interested in computational methods or computer science: COMP1091 or COMP1791.

Applied Mathematics

Stage 1

MATH1141

MATH1241

MATH1000

MATH1081

Courses totalling 6 units of credit from Science schools other than Mathematics

Elective courses totalling 18 units of credit

One General Education course totalling 3 units of credit

Stage 2

MATH2060

MATH2111

MATH2130

MATH2601

MATH2620

MATH2901

MATH2301

Elective courses totalling 9 units of credit

One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

Stage 3

Level III Applied Mathematics courses totalling 24 units of credit

Further Mathematics courses totalling 12 units of credit

Elective courses totalling 6 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

MATH4103 or MATH4104

Mathematics and Computer Science

Stage 1

COMP1011, COMP1021

MATH1141

MATH1241

MATH1000, MATH1081, MATH2400

Elective courses totalling 9 units of credit

One General Education course totalling 3 units of credit

Stage 2

MATH2111

MATH2601

COMP2011, COMP2121, COMP2041

Further Level II Mathematics courses totalling 6 units of credit.

Level III Computer Science courses totalling 6 units of credit

One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

Stage 3

MATH3301 or MATH3101

MATH3411

Further Level III Mathematics courses totalling 6 units of credit

Level III or IV Computer Science courses totalling 18 units of credit

Plus either

Further level III Mathematics courses totalling 6 units of credit (if proceeding to MATH4003)

or

Further level III or IV Computer Science courses totalling 6 units of credit (if proceeding to Honours Computer Science General Education courses totalling 6 units of credit

Stage 4 (Honours)

MATH4003 or Honours Computer Science

Statistics**Stage 1**

MATH1141

MATH1241

MATH1000

MATH1081

Courses totalling 6 units of credit from Science Schools other than Mathematics

Elective courses totalling 18 units of credit

One General Education course totalling 3 units of credit

Stage 2

MATH2060

MATH2111

MATH2130

MATH2601

MATH2620

MATH2901

MATH2910

MATH2931

Elective courses totalling 6 units of credit

One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

Stage 3

MATH3901

MATH3911

MATH3821

Level III Statistics courses totalling 6 units of credit

Further Mathematics courses totalling 12 units of credit

Elective courses totalling 6 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

MATH4903 or MATH4904

Mathematics and Finance**Stage 1**

ACCT1501

COMP1091

ECON1101, ECON1102

MATH1000

MATH1151

MATH1251

FINS1612

One General Education course totalling 3 units of credit

Stage 2

MATH2111

MATH2130

MATH2601

MATH2901

MATH2910

MATH2931

ACCT1511

FINS1613

One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

Stage 3

MATH2060

MATH 3311

Further level III Mathematics courses totalling 6 units of credit*

A further level II or III Mathematics course totalling 3 units of credit*

FINS2624, FINS3616

Further level III Finance courses totalling 6 units of credit

Elective courses totalling 6 units of credit

General Education courses totalling 6 units of credit

Stage 4

MATH4012

Further level III Mathematics courses totalling 12 units of credit*

FINS3635

Further level III Finance courses totalling 6 units of credit

Elective courses totalling 12 units of credit

*It is recommended that the choice of Mathematics courses in Stages 3 and 4 include at least 6 units of credit from each of the following 3 groups:

1. (Computing) MATH3101, MATH3041, MATH3821

2. (Modelling) MATH2140, MATH2260, MATH3161, MATH3181, MATH3201, MATH3641, MATH3901, MATH3941, MATH3980

3. (Statistics) Level III Statistics

Physical Oceanography/Meteorology**Stage 1**

MATH1141

MATH1241

MATH1000

MATH1081

PHYS1121 or PHYS1131, PHYS1221 or PHYS1231

Elective courses totalling 12 units of credit

One General Education course totalling 3 units of credit

Stage 2

MATH2060

MATH2111

MATH2130

MATH2620

MATH2901

MATH2301, MATH2240

PHYS2810

GEOS2811

Elective courses totalling 3 units of credit

One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

Stage 3

MATH3121, MATH3241

MATH3261

MATH3301

MSCI3001

Elective courses totalling 12 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

MATH4103 or MATH4104

Pure Mathematics**Stage 1**

MATH1141

MATH1241

MATH1000

MATH1081

Courses totalling 6 units of credit from Science Schools other than Mathematics

Elective courses totalling 18 units of credit

One General Education course totalling 3 units of credit

Stage 2

MATH2060

MATH2111

MATH2130

MATH2601

MATH2620

MATH2901

Further Level II Mathematics courses totalling 6 units of credit.

Elective courses totalling 9 units of credit

One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

Stage 3

Level III Pure Mathematics courses totalling 24 units of credit

Further Mathematics courses totalling 12 units of credit

Elective courses totalling 6 units of credit

General Education courses totalling 6 units of credit

Stage 4 (Honours)

MATH4603 or MATH4604

Advanced Mathematics

This study plan is only available by invitation from the Head of School of Mathematics. Normally students would not be invited unless they have a UAI of at least 98 and a mark of at least 97 in HSC Maths Extension 2 or have Mathematical Olympiad experience. Students in later years may also be invited to join this plan if their WAM exceeds 85 and their Maths WAM exceeds 90. Enrolment in the plan is also subject to approval by the Associate Dean (Academic) of the Faculty of Science. Students are able to approach the Head of School of Mathematics if they are interested in being invited to join the plan.

Students will need to maintain a very high level of achievement (normally a WAM in excess of 80 and Maths WAM in excess of 85) to stay in this plan.

If a student is not able to continue in the plan for any reason, then they will be transferred to another suitable plan in Advanced Science or major in Science with a variation of program to that plan or major if necessary so that they are not disadvantaged by having taken the Advanced Mathematics Plan.

The selection of Advanced Mathematics options and electives in the student's program of study will be made by the student in consultation with their academic mentor. The choice of electives can be made to suit a student's interests and may include a mix of Mathematics Courses and courses from other Schools. The final details require approval of the Head of School of Mathematics and the Associate Dean (Academic) of the Faculty of Science. The outline below is the normal program of study, but may be varied to suit the particular student.

Stage 1

MATH1141 or MATH1151
MATH1241 or MATH1251
MATH1000
3 UOC of General Education
Electives totalling 30 UOC

Stage 2

Advanced Mathematics courses totalling at least 15 UOC
MATH2060
One of PHYS1000, CHEM1000, GEOS1000, LIFE 1001, LIFE2001
3 UOC of General Education
Electives totalling 24 UOC

Stage 3

Advanced Mathematics courses totalling at least 24 UOC
Electives totalling 18 UOC
6 UOC of General Education

Stage 4

Mathematics Honours Year

Medical Physics

Please note: This plan is not available to commencing students in 2006

Honours may be awarded. The basis is a suitably weighted performance over the last three stages of this four-year Advanced Science program.

Medical Physics

Stage 2

BIOC2101
MATH2011, MATH2120
One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001, LIFE2001
PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050, PHYS2060, PHYS2410, PHYS2630
General Education courses totalling 6 units of credit

Stage 3

PHPH2101
PHYS1601, PHYS3110, PHYS3120, PHYS3410
One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001, LIFE2001
General Education courses totalling 6 units of credit
Plus electives chosen to make a total of 48 units of credit. Those in the supplementary table below are especially recommended.

Stage 4

PHYS3020, PHYS3030 or PHYS3230, PHYS4411, PHYS4413
SESC4140
Plus electives to make a total of 48 units of credit. Those in the supplementary table below are especially recommended.

Supplementary Table

ANAT2511 or ANAT2111,
PHYS2601, PHYS3010, PHYS3050, PHYS3060, PHYS3210,
PHYS3310, PHYS3610, PHYS3630, PHYS3710, PHYS3720,
PHYS3770, PHYS3780

Microbiology and Immunology

Microbiology is the scientific study of the smallest forms of life namely, bacteria, viruses, archaea, fungi and protozoa. These fascinating organisms impact on our lives in many ways. On the negative side, they cause disease in humans, animals and plants and spoil our food. However, microorganisms are also of great benefit. Indeed, microorganisms are the

key participants for the turnover of nutrients and elements and are the main producers of carbon and biomass. They turn the biological wheels on this globe and are responsible for sustainability of life. They also contribute to a better environment via recycling of organic wastes, maintenance of soil fertility and biodegradation of pollutants. Many foodstuffs, beverages, pharmaceuticals and other products of biotechnology are products of microbial action. The genetic engineering of microorganisms is a fundamental aspect of molecular biology and the way of the future.

Immunology, the study of the immune system, has contributed significantly to modern medicine in areas such as blood transfusion, organ transplantation, treatments of allergic reactions and development of vaccines, and immunity to disease. In cell biology, Immunology has advanced our understanding of differentiation, cell cooperation and the triggering of proliferation and differentiation by cell surface receptors.

Both Microbiology and Immunology also provide an excellent training in the scientific method and scientific communication. We aim to provide an undergraduate training that serves as a starting point for many careers within our disciplines and beyond. An energetic Honours program provides experience of scientific research and aims to further develop a wide range of skills.

Microbiology*

Stage 1

BIOS1101, BIOS1201
CHEM1011, CHEM1021
MATH1041
Elective courses totalling 12 units of credit
LIFE1001
One General Education course totalling 3 units of credit

Stage 2

MICR2201, MICR2011
LIFE2001
Choose 6 units of credit from:
BIOC2201, BIOS2021 or BIOS2621,
Elective courses totalling 24 units of credit
One General Education course totalling 3 units of credit

Stage 3

MICR3611, MICR3021 or MICR3621, MICR3071
Choose 6 units of credit from:
MICR3031, MICR3061, MICR3081, BIOT3081, BIOS3071,
BIOT3011, CHEM3901, GEOH3911, FOOD2490
Elective courses totalling 18 units of credit
General Education courses totalling 6 units of credit

Stage 4 (Honours)

MICR4013 or MICR4023

*At least two of the Stage 2 and two of the Stage 3 courses contributing to the Microbiology Study Plan must be taken at the advanced level.

Medical Microbiology and Immunology*

Stage 1

BIOS1101, BIOS1201
CHEM1011, CHEM1021
MATH1041
Elective courses totalling 12 units of credit
LIFE1001
One General Education course totalling 3 units of credit

Stage 2

MICR2201, MICR2011
LIFE2001
Choose 6 units of credit from:
ANAT2111, ANAT2200, BIOC2101, BIOC2201, BIOS2021 or
BIOS2621, PHPH2101, PHPH2201, PATH2201
Elective courses totalling 24 units of credit
One General Education course totalling 3 units of credit

Stage 3

Choose at least 18 units of credit from:
MICR3041 or MICR3641, MICR3051, MICR3061, MICR3081
Choose 0–6 units of credit from:
MICR3021 or MICR3621, MICR3031, PHPH3121, BIOC3261,
BIOC3271, PATH3204, PATH3205
General Education courses totalling 6 units of credit
Further elective courses to give a total of 48 units of credit

Stage 4 (Honours)

MICR4013 or MICR4023

*At least two of the Stage 2 and two of the Stage 3 courses contributing to the Medical Microbiology and Immunology Study Plan must be taken at the advanced level.

Molecular Biology

Recent advances in molecular biology, especially the continuing development of recombinant DNA technology, have revolutionised our understanding of the structure, function and regulation of individual genes. These advances have opened up the exciting field of molecular biology, one of the most rapid growth areas in biology. This marriage of Biochemistry, Microbiology, Cell Biology and Genetics provides an exciting new approach for the study of all living organisms, including the human. Molecular Biology therefore represents fundamental components of biological and medical science and they will have increasingly important roles to play in many aspects of modern medicine, genetics, evolutionary biology, bioinformatics, biotechnology and genomics.

Molecular Biology*

Stage 1

BIOS1101, BIOS1201
CHEM1011 or CHEM1031
CHEM1021 or CHEM1041
Choose 6 units of credit from:
MATH1031**, MATH1041**
Elective courses totalling 12 units of credit
(Recommended: Physics)
LIFE1001
One General Education course totalling 3 units of credit

Stage 2

BIOC2101*, BIOC2201*
BIOS2021 or BIOS2621*
MICR2201, MICR2011
LIFE2001
Elective courses totalling 12 units of credit
One General Education course totalling 3 units of credit

Stage 3

BIOC3121 or BIOC3621*, BIOC3281, MICR3021 or MICR3621*
Choose 6 units of credit from:
BIOC3111, BIOC3271, BIOC3301, BIOT3061, MICR3011
Elective courses totalling 18 units of credit
General Education courses totalling 6 units of credit

Stage 4 (Honours)

BIOC4428 or MICR4013 or BIOT4073

**At least two of the Stage 2 and two of the Stage 3 courses contributing to the Molecular Biology study plan must be taken at the advanced level.*

***Other higher level I Mathematics courses may be substituted.*

Neuroscience

This Study Plan introduces students to the biological and behavioural aspects of the nervous system. The program is based around the neuroscience courses offered by the Departments of Anatomy, Physiology and Pharmacology, and School of Psychology.

Neuroscience

Stage 1

BIOS1101, BIOS1201
CHEM1011, CHEM1021
PSYC1001, PSYC1011
Choose 6 units of credit from the Level I Mathematics options
LIFE1001
One General Education course totalling 3 units of credit

Stage 2

ANAT2111 or ANAT2511*
BIOC2101 and BIOC2201, or
BIOC2181 and BIOC2291
PHPH2101, PHPH2201
PSYC2071, PSYC2081
LIFE2001
One General Education course totalling 3 units of credit

**A Credit grade is required in ANAT2511 to enrol in Level 3 Anatomy courses.*

Stage 3

ANAT3411, ANAT3421
PHPH3121, PHPH3131
Level III Psychology courses totalling 12 units of credit with one course selected from Advanced Perceptual/Cognitive (PSYC3151, PSYC3211, PSYC3221, PSYC3311, PSYC3321) and one course from Advanced Biological (PSYC3051, PSYC3241, PSYC3251).

An additional course totalling 6 units of credit at Level II or III to complete 48 units of credit. This course might be chosen from those offered by the School in which Honours study is contemplated. In the case of Psychology, this course must be PSYC3001.
General Education courses totalling 6 units of credit.

Stage 4

Subject to satisfactory progress throughout the course (normally a Credit average), students may proceed to the Honours Stage. Before the commencement of Stage 2 students should consult with the appropriate schools and the Neuroscience program coordinating committee consisting of representatives from the Departments of Anatomy, Physiology and Pharmacology and School of Psychology, about the courses required for a particular Honours program. Students should also note general guidelines for Advanced Science Stage 4.

Physics

The Majors offered by the School of Physics reflect the importance of Physics in science and technology at both the fundamental and at the applied levels.

Physics

Stage 1

MATH1131 or MATH1141*
MATH1231 or MATH1241*
PHYS1131
PHYS1231 or PHYS1241
Elective courses totalling 18 units of credit**
One course from: PHYS1000, CHEM1000, MATH1000, LIFE1001
One General Education course totalling 3 units of credit

Stage 2

MATH2011, MATH2120, MATH2520*
PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050,
PHYS2060, PHYS2630
One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001,
LIFE2001
Elective courses totalling 9 units of credit****
One General Education course totalling 3 units of credit

Stage 3

PHYS3010 or PHYS3210, PHYS3020, PHYS3030 or PHYS3230,
PHYS3050***, PHYS3060***, PHYS3080
Two of PHYS3040, PHYS3070, PHYS3110, PHYS3120
Level III elective courses totalling 18 units of credit****
General Education courses totalling 6 units of credit

Stage 4 (Honours)

Choose one of PHYS4103, BSSM4013

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

***Appropriate Level I electives include COMP1001, PHYS1601, CHEM1011 and CHEM1021.*

****Students interested in Biophysics may replace PHYS3050 (or PHYS3060) with PHYS3410 provided CHEM1011, CHEM1021, BIOS1101 and BIOS1201 are completed in Stage 1 and BIOC2101 and BIOC2201 are taken in Stage 2.*

*****Excluded PHYS2170 and PHYS2520. For students specialising in Theoretical Physics, additional mathematics courses are specified. In Stage 2 students should include MATH2501 (or MATH2601) and in Stage 3 MATH3121 and Theoretical Physics courses.*

Physics and Astronomy

This Study Plan provides the basic physics essential for a career in astronomy. It will not prevent specialisation in some other field of physics if students' interests change during their studies. There is astronomy content in each stage of the plan. There are special lectures and projects in PHYS1241. The other astronomy courses are PHYS2160 and PHYS3160 or PHYS3170, and lecture course and projects in the Honours stage.

Stage 1

MATH1131 or MATH1141*
MATH1231 or MATH1241*
PHYS1131
PHYS1231 or PHYS1241
Elective courses totalling 18 units of credit**
One course from: PHYS1000, CHEM1000, MATH1000, LIFE1001
One General Education course totalling 3 units of credit

Stage 2

MATH2011, MATH2120, MATH2520*
 PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050,
 PHYS2060, PHYS2160, PHYS2630
 One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001,
 LIFE2001
 Elective courses totalling 6 units of credit****
 One General Education course totalling 3 units of credit

Stage 3

PHYS3010 *or* PHYS3210, PHYS3020, PHYS3030 *or* PHYS3230
 PHYS3050, PHYS3060, PHYS3080, PHYS3160 *or* PHYS3170
 Two of PHYS3040, PHYS3070, PHYS3110, PHYS3120
 Level III elective courses totalling 15 units of credit****
 General Education courses totalling 6 units of credit

Stage 4 (Honours)

PHYS4103

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

**Appropriate Level I electives include COMP1001, PHYS1601, CHEM1011 and CHEM1021.

****Excluded PHYS2170 and PHYS2520.

Physics and Computing

This Study Plan provides a strong background in physics together with the computing skills necessary to fully utilise computers in research and industrial laboratories.

Stage 1

COMP1011, COMP1021
 MATH1131 *or* MATH1141
 MATH1231 *or* MATH1241
 PHYS1131, PHYS1231 *or* PHYS1241, PHYS1601,
 One course from: PHYS1000, CHEM1000, MATH1000, LIFE1001
 One General Education course totalling 3 units of credit

Stage 2

COMP2011, COMP2121
 MATH2011, MATH2120, MATH2520
 PHYS2020, PHYS2030, PHYS2040, PHYS2050, PHYS2060,
 PHYS2630
 One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001,
 LIFE2001
 One General Education course totalling 3 units of credit

Stage 3

PHYS2010, PHYS3010 *or* PHYS3210, PHYS3020, PHYS3030 *or*
 PHYS3230, PHYS3080
 Further Level III Physics courses totalling 15 units of credit
 Further Level III Computer Science courses *or* PHYS2601 totalling 12
 units of credit
 General Education courses totalling 6 units of credit

Stage 4 (Honours)

PHYS4103

Engineering Physics

This Study Plan is not available to commencing students.

This Study Plan combines a thorough knowledge of experimental physics, electronics, computing and instrumentation, optoelectronics and communications with elements of engineering practice and management. It is designed to produce graduates with skills and knowledge appropriate to the requirements of Australian industry. An industrial project of one session's duration with an industrial sponsor is included in Stage 4.

The program prepares graduates for membership of the Institution of Engineers, Australia, within two years of initial employment in an engineering field. Graduates will be accepted for membership of the Australian Institute of Physics.

Honours may be awarded. The basis is a suitably weighted performance over the last three Stages.

Stage 2

ELEC2031
 MATH2011, MATH2520, MATH2120
 PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050,

PHYS2060, PHYS2601, PHYS3770 *or* PHYS3780
 One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001,
 LIFE2001
 One General Education course totalling 3 units of credit

Stage 3

ELEC3004, ELEC3016
 MATH2839 *or* MATH2859
 PHYS3020, PHYS3060, PHYS3080, PHYS3310, PHYS3610,
 PHYS3630, PHYS3710
 COMP3221 *or* COMP3311 *or* COMP9316
 General Education courses totalling 6 units of credit

Stage 4

COMP3331 *or* COMP4011
 ELEC4010
 PHYS3010 *or* PHYS3210, PHYS3030 *or* PHYS3230, PHYS3040,
 PHYS3110, PHYS3720, PHYS4764

Physiology and Pharmacology

Physiology, the study of the processes and mechanisms which serve and control the various functions of the body, begins at Level II.

Students majoring in Physiology should note the prerequisites for Level III Physiology. There are four Level III Physiology courses, each six units of credit:

PHPH3121 Membrane and Cellular Physiology
 PHPH3131 Neurophysiology
 PHPH3211 Cardiorespiratory and Exercise Physiology
 PHPH3221 Endocrine, Reproductive and Developmental Physiology

For a major in Physiology, students must complete at least three of these courses (18 units of credit) together with at least 6 units of credit from allied disciplines specified in the study plan below.

Students majoring in Pharmacology should note that there are prerequisites for Level III Pharmacology. There are two Level III Pharmacology courses, each six units of credit:

PHPH3151 Pharmacology and Toxicology
 PHPH3251 Clinical and Experimental Pharmacology

For a major in Pharmacology, students must complete both of these courses (12 units of credit) together with at least 12 units of credit from allied disciplines specified in the study plan below.

Note should also be taken of the prerequisites and corequisites for the courses taken with Physiology and Pharmacology courses.

Physiology**Stage 1**

6 units of credit of Level 1 Biology (BIOS1201 preferred)
 6 units of credit of Level 1 Chemistry
 6 units of credit of Level 1 Maths (MATH1041 excluded)
 Elective courses totalling 24 units of credit
 LIFE1001
 One General Education course totalling 3 units of credit

Stage 2

PHPH2101, PHPH2201
 LIFE2001
 Elective courses totalling 30 units of credit
 BIOC2101 and BIOC2201, *or*
 BIOC2181 and BIOC2291 are highly recommended
 One General Education course totalling 3 units of credit

Stage 3

Choose 18 or 24 units of credit from:
 PHPH3121, PHPH3131, PHPH3211, PHPH3221
 If you choose only 18 UOC from the above, choose a further 6 UOC from the following:
 PHPH3101, PHPH3251, BIOC3261, BIOC3271, BIOC3111,
 BIOC3121, MICR3041, MICR3051, PATH3205, PATH3206,
 PATH3207, or any Level III Anatomy course,
 Elective courses totalling 18 units of credit
 General Education courses totalling 6 units of credit

Stage 4 (Honours)

PHPH4218

Subject to satisfactory progress throughout the program (normally a Credit average), students may proceed to the Honours stage. Students should consult with the Department of Physiology and Pharmacology, and note general guidelines for Advanced Science Stage 4.

Pharmacology

Stage 1

6 UOC of Level 1 Biology (BIOS1201 preferred)
 12 UOC of Level 1 Chemistry
 6 UOC of Level 1 Mathematics (excluding MATH1041)
 Elective courses totalling 18 UOC
 LIFE1001
 One General Education course totalling 3 UOC

Stage 2

PHPH2011, PHPH2101, PHPH2201
 12 UOC from BIOC2101 or BIOC2181, BIOC2201 or BIOC2291,
 CHEM2021, CHEM2041
 LIFE2001
 Elective courses totalling 12 UOC
 One General Education course totalling 3 UOC

Stage 3

PHPH3251, PHPH3101
 12 UOC from PHPH3121, PHPH3131, PHPH3211, PHPH3221,
 BIOC3261, BIOC3111, BIOC3121, CHEM 3021, CHEM3901
 Elective courses totalling 18 UOC
 General Education courses totalling 6 UOC

Stage 4 (Honours)

PHPH4258

Subject to satisfactory progress throughout the program (normally a Credit average), students may proceed to the Honours stage. Students should consult with the Department of Physiology and Pharmacology, and note general guidelines for Advanced Science Stage 4.

Psychology

Psychology is the scientific study of human behaviour. It is a diverse discipline that includes study of the processes of perceiving, learning and memory; the assessment of abilities and attitudes; the origins of personality and emotional states; the nature and effects of social interactions with other people; brain-behaviour relationships; and the causes of abnormal behaviour. Study in the scientific discipline of psychology provides the background necessary for further training in the application of psychology in a variety of professional contexts.

Psychologists work in clinical, correctional, counselling, legal, educational and organisational settings. People with training in psychology also pursue careers in diverse areas including academic and health research; rehabilitation; occupational health and safety; advertising and marketing; and personnel selection, training and management.

Registration as a Psychologist

In order to become a member of the professional body, the Australian Psychological Society (APS), and for registration as a psychologist in

NSW, students first need a university Bachelor degree which includes four years of approved training in psychology. Psychology in the Advanced Science program provides four years of approved training in Psychology. Students must also follow this by completing an accredited 5th and 6th year academic degree such as one of the Master of Psychology degrees (Clinical, Forensic or Organisational) or a combined Doctor of Philosophy/Master of Psychology degree as offered by this University. An alternative of two years of supervised experience in professional practice may be undertaken for registration as a psychologist in NSW.

English Proficiency

A high proficiency in English is needed to pass Psychology courses.

Psychology

Stage 1

LIFE1001
 PSYC1001 and PSYC1011
 Level I courses from Science Schools totalling 12 units of credit
 Elective courses totalling 18 units of credit*
 One General Education course totalling 3 units of credit

Stage 2

LIFE 2001
 PSYC2001, PSYC2061, PSYC2071, PSYC2081 and PSYC2101
 Elective courses totalling 12 units of credit*
 One General Education course totalling 3 units of credit

Stage 3

PSYC3001 and PSYC3011
 Four Level III Psychology electives+
 Elective courses totalling 6 units of credit*
 General Education courses totalling 6 units of credit

Stage 4 (Honours)

PSYC4053 and PSYC4063

+Level III Psychology electives must include one course from at least two of the following three elective groups:

Advanced Perceptual/Cognitive – PSYC3151, PSYC3211, PSYC3221, PSYC3311, PSYC3321

Advanced Biological – PSYC3051, PSYC3241, PSYC3251, PSYC3261

Advanced Social – PSYC3121, PSYC3271, PSYC3281

Note: Not all Level III Psychology elective courses are necessarily offered in each year

*Suitable electives include courses from areas such as: Anatomy, Biological Science, Mathematics, Physiology, History and Philosophy of Science, and Philosophy.