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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| 343 | Biological Science |
| 344 | Ecology |
| 344 | Biotechnology |
| 344 | Chemistry: |
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| 346 | Food Science and Technology |
| 346 | Genetics |
| 346 | Geoscience |
| 346 | Marine and Coastal Studies |
| 346 | Materials Science |
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| 347 | Applied Mathematics |
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| 349 | Microbiology |
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| 350 | Physics: |
| 350 | Physics |
| 350 | Physics and Astronomy |
| 351 | Physics with Computer Science |
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| 351 | Physiology and Pharmacology: |
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| 352 | Pharmacology |
| 352 | Psychology |

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 Macintoshs. 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 3998, 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.

423001 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

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Available in Program(s)</th>
<th>UAC Entry Code(s)</th>
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<tbody>
<tr>
<td>Advanced Mathematics</td>
<td>3992*</td>
<td>429013</td>
</tr>
<tr>
<td>Anatomy</td>
<td>3970, 3972, 3991</td>
<td>429000, 429013, 429007</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>3972</td>
<td>429013</td>
</tr>
</tbody>
</table>

Aviation  3980  429016  429017
Biochemistry  3970, 3972, 429000, 429013
Anatomical Science  3970, 3972, 429000, 429013
Biological Anthropology  3970  429000
Biomechanics  3970  429000
Biotechnology  3970, 3972  429000, 429013
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

Food Science and Nutrition  3970  429000
Food Science and Technology genetics  3972  429013

Geology  3970  429000
Geosciences  3972  429013
History and Philosophy of Science  3970  429000
Marine Science  3970  429013
Marine and Coastal Studies  3972  429013
Materials Science  3970, 3972, 3991  429000, 429013

Mathematics  3970  429000
Mathematics and Finance  3986  429013
Mathematics and Computer Science  3972  429013
Medical Chemistry  3972  429013
Medical Microbiology  3970, 3972  429000, 429013
Medical Science  3972  429000
Microbiology  3970, 3972  429000, 429013
Molecular Biology  3970, 3972  429000, 429013
Nanotechnology  3617  429011
Neuroscience  3972  429013
Optometry  3952  429025
Pathology  3971  429007
Pharmacology  3970, 3972, 3991  429000, 429013, 429007
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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 required courses 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 to 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 in addition 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), Referential, 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 the 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 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 or 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 permission from 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 enrol 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<td>LIFE2001</td>
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<td>PHYS1000</td>
<td>Physics and Astronomy</td>
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<tr>
<td>MAIH1000</td>
<td>Physics and Computing</td>
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<td>CHLM1000</td>
<td>Physiology</td>
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<tr>
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<td>Pharmacology</td>
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<td>Material Science</td>
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<tr>
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<td>Pharmacology</td>
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<td>Pure Mathematics</td>
</tr>
<tr>
<td>LIFE2001</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

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. The basis is a suitably 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 BEnSci is designed as a four-year (full-time) program. There is also an opportunity for students to combine the BEnSci with a Bachelor of Arts by taking a five-year program. Students who are unable to complete the BEnSci 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
BIO1101 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)
MA1101H 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 MA2121, NOT MA2101.

Stage 2
ECOL1107 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:
BEE2041 Data Analysis for Life and Earth Sciences (6 UOC)
MATH2301 Mathematical Computing (6 UOC)
MA112841 Statistics SS (6 UOC)
Plus General Education courses (6 UOC)

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

Stage 3
BIO3071 Conservation Biology and Biodiversity (6 UOC)
CHEM3001 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 BIO1201
Level 2 BIO2011, BEES2041, plus at least 6 units of credit from:
BIO2031, BIO2031, BIO2061
Level 3 BIO3061, BIO3111 plus a further 6 units of credit of Level 3 BIOS

Chemistry
Level 1 CHEM1021 or CHEM1041, MA1101
Level 2 CHEM2041, plus 12 units of credit from CHEM2011, CHEM2021, CHEM2031
Level 3 CHEM3041, CHEM3111, plus 6 units of credit from CHEM3011, CHEM3021, CHEM3031
plus 6 UOC of Level 2 Chemistry

Note: Students in the Chemistry specialisation take CHEM3111, 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, MSC2001
Level 3 BIOS3071, BIOS3081, BIOS3091 plus 6 units of credit of Level 3 Marine Science

Microbiology
Level 1 BIOS1201, CHEM1021
Level 2 BIOL2201, BIOS2011, MIRC2011, MIRC2201
Level 3 BIOT3081, MIRC3071 plus 6 units of credit of Level 3 Microbiology

Oceanography
Level 1 MATH1231, PHYS1121, PHYS1221
Level 2 MATH2841, MATH2111, MATH2120, MATH2240, PHYS2810
Level 3 MA112841, MA11H321, MA11H3241, MA11H3261

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 BEnSci and to have satisfied prerequisite requirements as specified. All General Education must also have been completed. Students who have not qualified for the BEnSci 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 options 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
SCOM2011 Professional Science Communication (6 UOC)
And ONE of the following courses:
HPSC2400 Knowledge and Power (6 UOC)
HPSC2500 Environment, Technology and Politics (6 UOC)
HPSC2850 Information Technology, Politics and the Media (6 UOC) (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)
MDCM2001 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.
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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS1301</td>
<td>Evolutionary and Functional Biology</td>
<td>6 UOC</td>
</tr>
<tr>
<td>BIOS1201</td>
<td>Molecules, Cells and Genes</td>
<td>6 UOC</td>
</tr>
<tr>
<td>CHEM1011</td>
<td>Fundamentals of Chemistry 1A</td>
<td>6 UOC</td>
</tr>
<tr>
<td>or</td>
<td>CHEM1031</td>
<td>Higher Chemistry 1C</td>
</tr>
<tr>
<td>or</td>
<td>CHEM1021</td>
<td>Fundamentals of Chemistry 1B</td>
</tr>
<tr>
<td>or</td>
<td>CHEM1041</td>
<td>Higher Chemistry 1D</td>
</tr>
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</table>

PLUS 6 units of credit from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1031</td>
<td>Mathematics for Life Sciences</td>
<td>6 UOC</td>
</tr>
<tr>
<td>MATH1041</td>
<td>Statistics for Life and Social Sciences</td>
<td>6 UOC</td>
</tr>
<tr>
<td>MATH1131</td>
<td>Mathematics 1A</td>
<td>6 UOC</td>
</tr>
<tr>
<td>MATH1141</td>
<td>Higher Mathematics 1A</td>
<td>6 UOC</td>
</tr>
<tr>
<td>SCIF1110</td>
<td>Perspectives in Medical Science 1</td>
<td>3 UOC</td>
</tr>
</tbody>
</table>

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  (3 UOC)

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, PHPH2101, PATH2201, BIOS2621 or BIOS2621

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 BIOS2621 (or BIOS2621). The prerequisite course, MICR2201 may be 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 Theory 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 (totalising 6 UOC)

**Stage 3**

- AVEN3120 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)

**Stage 4**

Plus one of the following AVIA courses:

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

**General Education**

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)

<table>
<thead>
<tr>
<th>Stage 4 (Honours)</th>
</tr>
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<tbody>
<tr>
<td>AVIA4001 Aviation Honours - Full Time (24 UOC)</td>
</tr>
<tr>
<td>AVIA4002 Aviation Honours - Part Time (48 UOC)</td>
</tr>
</tbody>
</table>

**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)
- 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 Theory 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 (totalising 6 UOC)

**Stage 3**

- AVEN3120 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)

**Stage 4**

Plus one of the following AVIA courses:

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

**General Education**

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)

<table>
<thead>
<tr>
<th>Stage 4 (Honours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVIA4001 Aviation Honours - Full Time (24 UOC)</td>
</tr>
<tr>
<td>AVIA4002 Aviation Honours - Part Time (48 UOC)</td>
</tr>
</tbody>
</table>

**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).
Biotechnology can be defined as the use of various biological processes to make products and provide 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 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOT1101</td>
<td>Principles of Biochemistry (Advanced)</td>
<td>6</td>
</tr>
<tr>
<td>BIOT2201</td>
<td>Principles of Molecular Biology (Advanced)</td>
<td>6</td>
</tr>
<tr>
<td>BIOS2021</td>
<td>Genetics</td>
<td>6</td>
</tr>
<tr>
<td>BIOS2621</td>
<td>Genetics (Advanced Level)</td>
<td>6</td>
</tr>
<tr>
<td>MICR2011</td>
<td>Microbiology 1</td>
<td>6</td>
</tr>
<tr>
<td>MICR2201</td>
<td>Fundamentals of Microbiology and Immunology</td>
<td>6</td>
</tr>
</tbody>
</table>

General Education courses (6 UOC)

PLUS 12 UOC from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS2011</td>
<td>Evolutionary and Physiological Ecology</td>
<td>6</td>
</tr>
<tr>
<td>CHEM2021</td>
<td>Organic Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>CHEM2041</td>
<td>Chemical and Spectroscopic Analysis</td>
<td>6</td>
</tr>
<tr>
<td>PHYS2101</td>
<td>Physiology 1A</td>
<td>6</td>
</tr>
</tbody>
</table>

Stage 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOT3121</td>
<td>Molecular Biology of Nucleic Acids</td>
<td>6</td>
</tr>
<tr>
<td>BIOT3011</td>
<td>Biotechnology A</td>
<td>6</td>
</tr>
<tr>
<td>BIOT3021</td>
<td>Biotechnology B</td>
<td>6</td>
</tr>
<tr>
<td>BIOT3061</td>
<td>Biopharmaceuticals</td>
<td>6</td>
</tr>
</tbody>
</table>

General Education courses (6 UOC)

PLUS one of the following MICR courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICR3041</td>
<td>Immunology 1</td>
<td>6</td>
</tr>
<tr>
<td>MICR3641</td>
<td>Immunology 1 (Advanced)</td>
<td>6</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOT3111</td>
<td>Molecular Biology of Proteins</td>
<td>6</td>
</tr>
<tr>
<td>BIOT3271</td>
<td>Molecular Cell Biology</td>
<td>6</td>
</tr>
<tr>
<td>BIOT3281</td>
<td>Recombinant DNA Techniques and Eukaryotic Molecular Biology</td>
<td>6</td>
</tr>
<tr>
<td>BIOT3081</td>
<td>Environmental Biotechnology</td>
<td>6</td>
</tr>
<tr>
<td>MICR3021</td>
<td>Microbial Genetics*</td>
<td>6</td>
</tr>
</tbody>
</table>

Note: One of the following courses/combinations may be substituted for MATH1031 and MATH1041.
**Stage 4**
- BIOT3071 Commercial Biotechnology (6 UOC)
- BIOT3091 Professional Issues in Biotechnology (6 UOC)
- BIOT4053 Research Project - Biotechnology (36 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.

**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/MBiomedEng (3130). 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 MATHS13135), Process Metallurgical Engineer (plan MATHS13135), Materials Engineer (plan MATHS13135) and Ceramic Engineer (plan MATHS13135). 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 (BEMBiomedEng).

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

- Plan MA1013135 BE in Physical Metallurgy
- Plan MATHS13135 BE in Process Metallurgy
- Plan MA1SH13135 BE in Materials Engineering
- Plan MATHS13135 BE in Ceramic Engineering

**Stage 1 of all plans**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM1011</td>
<td>Fundamentals of Chemistry 1A</td>
<td>6</td>
</tr>
<tr>
<td>CHEM1021</td>
<td>Fundamentals of Chemistry 1B</td>
<td>6</td>
</tr>
<tr>
<td>MATH1131</td>
<td>Mathematics 1A</td>
<td>6</td>
</tr>
<tr>
<td>MATH1231</td>
<td>Mathematics 1B</td>
<td>6</td>
</tr>
<tr>
<td>MATS1021</td>
<td>Computing in Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>MATS1111</td>
<td>Materials Science 1</td>
<td>3</td>
</tr>
<tr>
<td>MELCH0310</td>
<td>Engineering Drawing and Solid Modelling</td>
<td>3</td>
</tr>
<tr>
<td>MECH0440</td>
<td>Engineering Statics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS1221</td>
<td>Physics 1A</td>
<td>6</td>
</tr>
<tr>
<td>PHYS1222</td>
<td>Physics 1B</td>
<td>6</td>
</tr>
</tbody>
</table>
Stage 2 of all plans

CHEM2718 Physical Chemistry for Materials Science and Engineering (3 UOC)
MAT2049 Mathematics and Statistics for Materials Science A (3 UOC)
MAT2059 Mathematics for Materials Science B (3 UOC)
MA1S100 Microstructure Analysis (3 UOC)
MAT2092 Materials and Design 1 (3 UOC)
MA1S112 Phase Equilibria (3 UOC)
MAT2142 Crystallography and X-Ray Diffraction (3 UOC)
MAT2152 Materials Engineering 1B (6 UOC)
MAT2172 Physical Properties of Materials (3 UOC)
MAT2132 Materials Engineering 1A (3 UOC)
MA1S126 Mechanical Properties of Materials (6 UOC)
MAT2182 Thermodynamic Materials (6 UOC)
General Education course (3 UOC)

Stage 3 of all plans

MAT3103 Diffusion and Kinetics (3 UOC)
MAT3144 Materials Industry Management A (6 UOC)
MAT3203 Ceramic Materials (3 UOC)
MAT3443 Polymer Science and Engineering (3 UOC)
MAT3413 Physical Metallurgy (3 UOC)
MAT3503 Materials Processing (6 UOC)
MA1S113 Materials Engineering Laboratory (3 UOC)
MAT3523 Modelling in Materials Engineering 1 (3 UOC)
Plus Professional Electives totalling 12 UOC
General Education courses (6 UOC)

Stage 4 of all plans

MAT3134 Materials Industry Management B (3 UOC)
MA1S154 Design Project (3 UOC)
MAT3464 Professional Communication and Presentation (3 UOC)
MAT3624 Materials Engineering Project (18 UOC)
(9 UOC per session over two sessions)
Plus Professional Electives totalling 18 UOC
or
MAT3724 Materials Engineering Project (24 UOC)
(12 UOC per session over two sessions)
Plus Professional Electives totalling 12 UOC
General Education courses (6 UOC)

Elective Components (Stage 4)

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

MAT3244 Materials Industry Management A (6 UOC)
MAT3354 Design Project (3 UOC)
MA1S1464 Professional Communication and Presentation (3 UOC)
MA1S3624 Materials Engineering Project (18 UOC)
(9 UOC per session over two sessions)
MAT3574 Materials Engineering Projects (24 UOC)
(12 UOC per session over two sessions)

Physical Metallurgy - Plan MATS13135

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 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:

MAT2124 Welding and Other Joining Processes (3 UOC)
MA1S141 Surface Treatment and Wear (3 UOC)
MAT3064 Composite Materials (3 UOC)
MAT4064 Thermomechanical Processing (3 UOC)
MAT4084 Speciality Alloys (3 UOC)
MAT5342 Modelling in Materials Engineering 2 (3 UOC)
NANO3420 Fabrication of Nanostructured Devices (3 UOC)

Process Metallurgy - Plan MATS13135

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)
MA1S5394 Pollution Control in Materials Processing (3 UOC)
MAT5424 Modelling in Materials Engineering 2 (3 UOC)
NANO3420 Fabrication of Nanostructured Devices (3 UOC)

Materials Engineering - Plan MATS13135

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:

MA1S141 Surface Treatment and Wear (3 UOC)
MAT2294 Mech. And Thermal Properties of Ceramics (3 UOC)
MAT2314 Glass-Based Ceramics (3 UOC)
MAT3064 Composite Materials (3 UOC)
MAT3574 Polymer Engineering 2 (3 UOC)
MA1S5424 Modelling in Materials Engineering 2 (3 UOC)
NANO3420 Fabrication of Nanostructured Devices (3 UOC)

Ceramic Engineering - Plan MATS13135

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)
MA1S203 Physico-Chemical Ceramics Laboratory (3 UOC)
MAT2263 Sintering of Ceramics (3 UOC)
MAT2294 Mech. And Thermal Properties of Ceramics (3 UOC)
MAT2314 Glass-Based Ceramics (3 UOC)
MAT3574 Polymer Engineering 2 (3 UOC)
MA1S5424 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 four 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
CHEM2118 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
MATS1082 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

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

Stage 3
CHEM2118 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
MATS1082 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

* 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.
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 MATS13138
- **Materials Engineering** - plan code MATS13138
- **Physical Metallurgy** - plan code MATS13138
- **Process Metallurgy** - plan code MATS13138

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. Students 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)
- **MATH1123** Mathematics 1B (6 UOC)
- **MAST1021** 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 Science (3 UOC)
- **MATH2049** Mathematics and Statistics for Materials Science A (3 UOC)
- **MATH2059** Mathematics for Materials Science B (3 UOC)
- **MAST1112** Phase Equilibria (3 UOC)
- **MATS1142** Crystallography and X-ray Diffraction (3 UOC)
This program offers a comprehensive education in the field of nanotechnology. On completion of this program, students will have attained a comprehensive knowledge base in the field of nanotechnology.

**Program Objectives and Learning Outcomes**

**Program Structure**

**Stage 1**
- BIOS1201 Molecules, Cells and Genes (6 UOC)
- MA13920 Engineering Materials (3 UOC)
- NANO3001 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:
  - PHYS1211 Physics 1A (6 UOC)
  - PHYS1213 Higher Physics 1A (6 UOC)
- AND one of the following courses:
  - PHYS1221 Physics 1B (6 UOC)
  - PHYS1231 Higher Physics 1B (6 UOC)

**Stage 2**
- 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)
- PHYS3130 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)
- MA131013 Diffusion and Kinetics (3 UOC)
- MATS1262 Mechanical Properties of Materials (6 UOC)

**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.

**Academic Rules**

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

**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.
Materials Indu
Topics in Condensed Matter Physics (3 UOC)
Professional Communication and Presentation (6 UOC)
(3 UOC)
(3 UOC)
(3 UOC)
(3 UOC)
Analytical Chemistry (3 UOC)
Project Laboratory in Chemistry (6 UOC)
(6 UOC)
(6 UOC)
Pharmacology for Optometry (3 UOC)
Clinical Optometry 4A (6 UOC)
Polymer Science - Practice (3 UOC)
Ocular Disease (6 UOC)
Clinical Optometry 3B (3 UOC)
Deformation and Strengthening Mechanisms (6 UOC)
Biophysics 2 (3 UOC)
Polymer Science - Practice (3 UOC)
Pharmacology for Optometry (4 UOC)
General Education courses (6 UOC)

Stage 3

MATS4464 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)
MCK2201 Fundamentals of Microbiology and Immunology (6 UOC)
NANO3440 Biosensors and Biodevices for Nanotechnology (3 UOC)
PHYS3630 Electronics (3 UOC)
PHYS3040 Experimental Physics A1 (3 UOC)
PHYS3320 Topics in Condensed Matter Physics (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 Bachelor of Science

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)

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 program (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 Courses, 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)
MA11111 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)
PSYC1101 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)
PHPH3301 Pharmacology for Optometry (4 UOC)
VISN3111 Vision Science 3A (6 UOC)
VISN3211 Vision Science 3B (6 UOC)
General Education courses (6 UOC)

Stage 4
BIES3004 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

4342 Bachelor of Psychology

BPsys
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)

Stage 2
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 3
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)
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 BPychol 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.

Program Structure

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.

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 Description

Undergraduate Students

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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.

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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 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 1 units of credit and no more than 36 Level 1 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 BSc 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)
SLSP1002 Introduction to Policy Analysis (6 UOC)
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)

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)
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)

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.

Note: Students may complete a major (42 UOC) 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 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.

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 ENVS 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.

**NSW Department of Education Teaching Discipline**

<table>
<thead>
<tr>
<th>Biology</th>
<th>Chemistry</th>
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<tr>
<td>Biochemistry</td>
<td>Biochemistry &amp; Chemistry</td>
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<td>Biological Anthropology</td>
<td>Toxicology</td>
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<td>Biological Science</td>
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<td>Biotechnology</td>
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<td>Ecology</td>
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<td>Genetics</td>
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<td>Marine Biology</td>
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<td>Medical Microbiology &amp; Immunology</td>
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<td>Microbiology</td>
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<td>Molecular Biology</td>
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<td>Pharmacology</td>
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**Earth and Environmental Science**

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<tr>
<th>Physics</th>
<th>Earth and Environmental Science</th>
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<td>Biochemistry &amp; Chemistry</td>
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<td>Bio. Sciences</td>
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<td>Ecology &amp; Environmental &amp; Earth Sciences</td>
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<td>Geology</td>
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<td>Physical Geography</td>
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<td>Marine Geology</td>
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<td>Physical Oceanography</td>
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<td>Meteorology</td>
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<td>Spatial Information Systems</td>
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**Mathematics**

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<td></td>
<td>Mathematics</td>
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<td></td>
<td>Physical Oceanography</td>
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<td></td>
<td>Physical Oceanography/Meteorology</td>
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<td></td>
<td>Statistics</td>
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</tbody>
</table>

**Approved Majors from Table A (Majors)**

*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 BScBEd 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/Mineral 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 1 courses from the subject areas within Table A or Table B.

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 MATH1110 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 1 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

<table>
<thead>
<tr>
<th>Major</th>
<th>Contacts</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anatomy</strong></td>
<td>Dr B Freeman</td>
<td>BIOS1101, BIOS1201</td>
<td>ANAT2111</td>
<td>18 UOC from: ANAT3121, ANAT3131, ANAT3141, ANAT3231, ANAT3411, ANAT3421 And 6 UOC from: i) Level III Anatomy not already taken, or ii) Level III Biochemistry, Biological Science, Microbiology, Pathology or Physiology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plus 6 of Level I Chemistry</td>
<td>Plus 12 UOC from: ANAT2241, ANAT2341, ANAT2601, ANAT2611</td>
<td></td>
</tr>
<tr>
<td><strong>Biochemistry</strong></td>
<td>BABS Student Office</td>
<td>BIOS1101, BIOS1201, CHEM1011 or CHEM1031, CHEM1021 or CHEM1041</td>
<td>BIOC2101, BIOC2201</td>
<td>A total of 24 UOC: 12 or 18 UOC from: BIOC3111, BIOC3261, BIOC3271 Plus 0 - 12 UOC from: BIOC3121, BIOC3281 Plus 0 or 6 UOC from: ANAT3231, BIOM3061, CHEM3041, MIRC3041, PHPH3211, PHPH3221</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plus at least 6 UOC from: MATH1031, MATH1041</td>
<td>Plus 6 UOC from: BIOS2021 or BIOS2621, CHEM2021, CHEM2041, MIRC2011</td>
<td></td>
</tr>
<tr>
<td><strong>Biological</strong></td>
<td>Dr D Curnoe</td>
<td>BIOS1101, BIOS1201</td>
<td>ANAT2601, ANAT2611</td>
<td>ANAT3601 Plus 12 UOC from Level III Anatomy (ANAT3131 and ANAT3141 recommended) Plus a further 6 UOC from Level III Biological Science, Biochemistry, Pathology or Physiology</td>
</tr>
<tr>
<td>Anatomical**</td>
<td></td>
<td>Level 1 Chemistry is required for ANAT2111 and Level II Biochemistry and Physiology courses (check individual course prerequisites)</td>
<td>Plus 6 UOC from Level II Biological Science, Biochemistry, Pathology** or Physiology</td>
<td>Plus a Credit grade is required in ANAT2511 for Level III Anatomy courses **Note that ANAT2241 may be required for Level II Pathology</td>
</tr>
<tr>
<td>Anthropology**</td>
<td></td>
<td>BIO101301</td>
<td>ANAT2511* or ANAT2111</td>
<td>ANAT3601 Plus 12 UOC from Level III Anatomy (ANAT3131 and ANAT3141 recommended) Plus a further 6 UOC from Level III Biological Science, Biochemistry, Pathology or Physiology</td>
</tr>
<tr>
<td><strong>Biological</strong></td>
<td>BABS Student Office</td>
<td>BIOS1201, BIOS1101, CHEM1011, MATH1041 Also recommended: BIOS1301</td>
<td>BIOS2011, BIOS2021 (or BIOS2621), BIOC2411, Plus 6 UOC from: BIOS2031, BIOS2051, BIOS2061</td>
<td>24 UOC from Level III Biological Science courses.</td>
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<tr>
<td>Science**</td>
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<td>A total of 30 UOC: BIOM9541, SESCI3451 Plus 6 - 18 UOC from: ANAT3131, SESCI301, BIOM9561, SESCI4420 Plus 0 - 12 UOC from: PHPH2101, PHPH2201, PHPS2410</td>
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<tr>
<td><strong>Biomechanics</strong></td>
<td>Dr A McIntosh</td>
<td>BIOS1201, CHEM1021, MATH1031, MATH1041, BIOS1101 or BIOT1011</td>
<td>ANAT2511, SESCI2451</td>
<td>A total of 24 UOC: BIOT3011, BIOT3021, BIOT3041, BIOT3061 Plus 6 - 12 UOC from: BIOT3021, BIOT3061 Plus a further 0 - 6 UOC from: BIOC3111, BIOC3121, BIOC3271, BIOC3321, MIRC3051, MIRC3071, MIRC3041 or MIRC3041, MIRC3021 or MIRC3061</td>
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<td>Also recommended: PHYS1121.</td>
<td>A total of 24 UOC: BIOT3011, BIOT3021, BIOT3041, BIOT3061 Plus 6 - 12 UOC from: BIOT3021, BIOT3061 Plus a further 0 - 6 UOC from: BIOC3111, BIOC3121, BIOC3271, BIOC3321, MIRC3051, MIRC3071, MIRC3041 or MIRC3041, MIRC3021 or MIRC3061</td>
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<td></td>
<td>A total of 24 UOC: BIOT3011, BIOT3021, BIOT3041, BIOT3061 Plus 6 - 12 UOC from: BIOT3021, BIOT3061 Plus a further 0 - 6 UOC from: BIOC3111, BIOC3121, BIOC3271, BIOC3321, MIRC3051, MIRC3071, MIRC3041 or MIRC3041, MIRC3021 or MIRC3061</td>
</tr>
<tr>
<td><strong>Biotechnology</strong></td>
<td>BABS Student Office</td>
<td>BIOS1201, CHEM1021, MATH1031, MATH1041, BIOS1101 or BIOT1011</td>
<td>BIOC2101, BIOC2201, MIRC2011</td>
<td>A total of 24 UOC: BIOT3011, BIOT3021, BIOT3041, BIOT3061 Plus 6 - 12 UOC from: BIOT3021, BIOT3061 Plus a further 0 - 6 UOC from: BIOC3111, BIOC3121, BIOC3271, BIOC3321, MIRC3051, MIRC3071, MIRC3041 or MIRC3041, MIRC3021 or MIRC3061</td>
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<td></td>
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<td></td>
<td>Also recommended: BIOS2021 or BIOS2621, MIRC2011</td>
<td>A total of 24 UOC: BIOT3011, BIOT3021, BIOT3041, BIOT3061 Plus 6 - 12 UOC from: BIOT3021, BIOT3061 Plus a further 0 - 6 UOC from: BIOC3111, BIOC3121, BIOC3271, BIOC3321, MIRC3051, MIRC3071, MIRC3041 or MIRC3041, MIRC3021 or MIRC3061</td>
</tr>
<tr>
<td>Major Contacts</td>
<td>Stage 1</td>
<td>Stage 2</td>
<td>Stage 3</td>
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<tr>
<td>Chemistry (Dr G Moran)</td>
<td>CHEM1011 or CHEM1031, CHEM1021, CHEM1041, 12 UOC from Level I Mathematics, 6 UOC from Level I Physics</td>
<td>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)</td>
<td>18 UOC from Level III Chemistry of which 12 UOC must be from: CHEM3011, CHEM3021, CHEM3031, CHEM3041</td>
<td></td>
</tr>
<tr>
<td>Ecology (BEES Student Office)</td>
<td>BIOS1101, BIOS1201, GEOS1701, MATH1041, Also recommended: BIOS1301</td>
<td>BEES2041, BIOS2011, Plus 6 UOC from: BIOS2031, BIOS2051, BIOS2061, GEOS2071, GEOS2711, GEOS2821</td>
<td>24 UOC from: BIOS3011, BIOS3061, BIOS3071, BIOS3081, BIOS3111, BIOS3601, BIOS3161, GEOS3761, GEOH3911</td>
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<tr>
<td>Environmental Earth Science (BEES Student Office)</td>
<td>GEOS1701, GEOS1101, GEOS1111, GEOS1211, Also recommended: BIOS1301</td>
<td>BEES2041, GEOS2721, Plus 6 units to credit from Level II GEOH courses</td>
<td>GEOH3911, GEOS3281, Plus 12 UOC from Level III GEOH courses</td>
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</tr>
<tr>
<td>Food Science and Nutrition (Prof G Fleet)</td>
<td>BIOS1201, CHEM1011, CHEM1021, FOOD1120, FOOD1130, MATH1041, Also recommended: MATH1031, PHYS1111</td>
<td>BIOC2181, FOOD3220, FOOD3220, Also recommended: BIOC2291, CHEM2921, FOOD1230, MICR2201, PHPH2101, PHPH2201</td>
<td>FOOD3170, FOOD3440, Plus 12 UOC from: FOOD1390, FOOD2330, FOOD2340, FOOD2350, Also recommended: CHEM3811</td>
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</tr>
<tr>
<td>Genetics (BABS Student Office)</td>
<td>BIOS1101, BIOS1201, CHEM1011 or CHEM1031, CHEM1021 or CHEM1041, MATH1031, MATH1041</td>
<td>BIOS2021 or BIOS2621, Plus 12 UOC from: BIOC2101, BIOC2201, BEES2041*, MICR2011 (*BEES2041 or an approved COMP or MATH course).</td>
<td>A total of 24 UOC: BIOC3151, BIOC3291, Plus 6 or 12 UOC from: BIOC3121, MICR3021, Plus 0 or 6 UOC from: BIO3071, BIOT3061</td>
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<tr>
<td>Geography (Human) (BEES Student Office)</td>
<td>GEOH1601, GEOS1701, SLS1001 or MATH1041</td>
<td>SLS2001, GEOH2001, Plus 12 UOC from Level II GEOH courses</td>
<td>GEOH3101 or GEOH3111, Plus 18 UOC from Level III GEOH courses</td>
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<tr>
<td>Geography (Physical) (BEES Student Office)</td>
<td>GEOH1601, GEOS1701, MATH1041, Also recommended: BIOS1301</td>
<td>24 Level II UOC: BEES2041, Plus GEOS2711 &amp;/or GEOS2721, Plus further UOC from Level II GEOH</td>
<td>Choose 24 UOC from: GEOS3731, GEOS3761, GEOS3811, GEOS3821, GEOS4721, GEOH3911, GEOH3921</td>
<td></td>
</tr>
<tr>
<td>Geology (BEES Student Office)</td>
<td>GEOS1111, GEOS1211</td>
<td>BEES2041, GEOS2171, GEOS2181, Plus 6 UOC from: GEOS2071, GEOS2291, GEOS2721</td>
<td>GEOS3131, GEOS3141, Plus 12 UOC from Level III GEOH courses</td>
<td></td>
</tr>
<tr>
<td>History and Philosophy of Science (Dr A Corones)</td>
<td>Up to 12 UOC from: HPSC1100, HPSC1200, HPSC1400, HPSC1500</td>
<td>24 UOC from Level II History and Philosophy of Science, including at least 12 UOC from: HPSC2100, HPSC2150, HPSC2200, HPSC2300, HPSC2400, HPSC2500, HPSC2550</td>
<td>18 UOC from Level III History and Philosophy of Science</td>
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</tr>
<tr>
<td>Marine Science (Marine Biology) (BEES Student Office)</td>
<td>BIOS1101, BIOS1201, Also recommended: MATH1041</td>
<td>MSCI2001, MSCI6200, BIOS2031, MICR2201</td>
<td>MSCI3001, BIOS3081, BIOS3091, MICR3071</td>
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<tr>
<td>Marine Science (Marine Geology) (BEES Student Office)</td>
<td>GEOS1111, GEOS1211</td>
<td>MSCI2001, MSCI6200, GEOS2181, GEOS2721</td>
<td>MSCI3001, GEOS3731, Plus 6 UOC from: GEOS3141, GEOS3281, Plus 6 UOC from Level III GEOH courses.</td>
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<tr>
<td>Major Contacts</td>
<td>Stage 1</td>
<td>Stage 2</td>
<td>Stage 3</td>
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<tr>
<td><strong>Marine Science (Physical Oceanography)</strong>&lt;br&gt;School of Mathematics</td>
<td>MATH1131 or MATH1141, MATH1231 or MATH1241, PHYS1121, PHYS1221</td>
<td>MSCI2001, MATH2011, MATH2240, MATH2120, MATH2301</td>
<td>MSCI3001, MATH3121, MATH3241, MATH3261</td>
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<tr>
<td><strong>Materials Science</strong>&lt;br&gt;Dr O Standard</td>
<td>MATH1131, MATH1231, PHYS1121, PHYS1221</td>
<td>MATS1172, MATS1262, MATS1002, MATS1112, MATS1142, MATS1282</td>
<td>21 UOC from Level III MATS courses including: MATS1013, MATS1223, MATS2013, MATS3443, MATS4013</td>
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</tr>
<tr>
<td><strong>Mathematics</strong>&lt;br&gt;(See Note 3 above)&lt;br&gt;School of Mathematics</td>
<td>MATH1131, MATH1231 MATH1081</td>
<td>MATH2011, MATH2060, MATH2120, MATH2501, MATH2520, MATH2801</td>
<td>18 UOC from Level III Mathematics</td>
<td></td>
</tr>
<tr>
<td><strong>Medical Microbiology and Immunology</strong>&lt;br&gt;BABS Student Office</td>
<td>CHEM1011, CHEM1021, BIOS1101, BIOS1201&lt;br&gt;Plus 6 UOC from: MATH1031, MATH1041</td>
<td>MICR2201, MICR2011&lt;br&gt;Plus 6 UOC from: ANAT2111, ANAT 2200, BIOC2101 or BIOC2181, BIOC2201&lt;br&gt;BEE2041, BIOS2021 or BIOS2621, PATH2201, PHPH2101, PHPH2201</td>
<td>A total of 24 UOC:&lt;br&gt;At least 18 UOC from: MICR3041 or MICR3641, MICR3051, MICR3061, MICR3081&lt;br&gt;Plus 0 - 6 UOC from: MICR3031, MICR3021 or MICR3621, PHPH3121, PHPH3151 or PHPH3551, BIOC3261, BIOC3271, BIOC3291, PATH3205, PATH3206, PHPH3251</td>
<td></td>
</tr>
<tr>
<td><strong>Microbiology</strong>&lt;br&gt;BABS Student Office</td>
<td>CHEM1011, CHEM1021, BIOS1101, BIOS1201&lt;br&gt;Plus 6 UOC from: MATH1031, MATH1041</td>
<td>MICR2201, MICR2011&lt;br&gt;Plus 6 UOC from: BIOS2021 or BIOS2621, BIOC2201</td>
<td>MICR3021 or MICR3621&lt;br&gt;Plus 12 UOC from: MICR3611, MICR3061, MICR3071, MICR3081&lt;br&gt;Plus 6 UOC from: MICR3611, MICR3031, MICR3061, MICR3071, MICR3081, BIOS3071 or BIOS3671, BIOT3011 or BIOT3611, BIOT3081, BIOC3121 or BIOC3621, FOOD2480, FOOD2490, CHEM3901</td>
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<tr>
<td><strong>Molecular Biology</strong>&lt;br&gt;BABS Student Office</td>
<td>BIOS1101, BIOS1201&lt;br&gt;CHEM1011 or CHEM1031, CHEM1021 or CHEM1041&lt;br&gt;Plus 6 UOC from: MATH1031, MATH1041</td>
<td>MICR2201, MICR2011 or MICR2611, BIOC2101, BIOC2201, BIOS2021 or BIOS2621.</td>
<td>MICR3021 or MICR3621, BIOC3121 or BIOC3621, BIOC3281&lt;br&gt;Plus 6 UOC from: BIOT3061, MICR3011, BIOC3111, BIOC3271 or BIOC3671</td>
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<tr>
<td><strong>Pharmacology</strong>&lt;br&gt;Dr. T Binder</td>
<td>6 UOC from Level 1 Biology (BIOS1201 preferred)&lt;br&gt;Plus 12 UOC from Level 1 Chemistry,&lt;br&gt;Plus 6 UOC from Level 1 Mathematics (MATH1041 excluded)</td>
<td>PHPH2011 (also compulsory for Minor), PHPH2101, PHPH2201&lt;br&gt;Plus 12 UOC from BIOC2101 or BIOC2181, BIOC2201 or BIOC2291, CHEM2021, CHEM2041</td>
<td>PHPH3251 (also compulsory for Minor), PHPH3101&lt;br&gt;Plus 12 UOC from: PHPH3121, PHPH3131, PHPH3211, PHPH3221, BIOC3261, BIOC3111, BIOC3121, CHEM3021, CHEM3901</td>
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<tr>
<td><strong>Philosophy</strong>&lt;br&gt;Dr M Michael</td>
<td>6 UOC from Level 1 Philosophy</td>
<td>18 UOC from PHIL2100 courses and above</td>
<td>24 UOC from Level II/III Philosophy</td>
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<tr>
<td>Major Contacts</td>
<td>Stage 1</td>
<td>Stage 2</td>
<td>Stage 3</td>
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<tr>
<td>Physical Oceanography/Meteorology</td>
<td>MATH1131, MATH1231, PHYS1121, MATH1081</td>
<td>MATH2011, MATH2060, MATH2120, MATH2240, MATH2301, PHYS2810 Plus 3 UOC from Mathematics or Physics</td>
<td>MATH3121, MATH3241, MATH3261</td>
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<tr>
<td>School of Mathematics</td>
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<tr>
<td>Physics</td>
<td>MATH1131, MATH1231, PHYS1121, MATH1081</td>
<td>PHYS2050, PHYS2060, PHYS2040, PHYS2030 Plus 12 UOC from Level II or Level III Physics. Also recommended: MATH2011, MATH2120</td>
<td>18 UOC from Level III Physics.</td>
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<tr>
<td>Mr S Hagon</td>
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<tr>
<td>A/Prof G Morriss</td>
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<tr>
<td>Physiology</td>
<td>6 UOC from Level I Biology (BIOS1201 preferred) Plus 6 UOC from Level I Chemistry Plus 6 UOC from Level I Mathematics (MATH1041 excluded).</td>
<td>PHPH2101, PHPH2201, Highly recommended: BIOC2101 and BIOC2201 or BIOC2181 and BIOC2291 A total of 24 UOC: At least 18 from: PHPH3121, PHPH3131, PHPH3211, PHPH3221 Plus 0 – 6 from: PHPH3101, PHPH3251, BIOC3261, BIOC3271, BIOC3111, BIOC3121, MICR3041, MICR3051, PATH3205, PATH3206, PATH3207 or any Level III Anatomy course.</td>
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<tr>
<td>Dr L Ulman</td>
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<tr>
<td>Psychology</td>
<td>PSYC1001, PSYC1011 Plus 18 UOC from: PSYC2061, PSYC2071, PSYC2081, PSYC2101.</td>
<td>PSYC2001</td>
<td>PSYC3001 Plus 18 UOC from Level III Psychology courses (from at least two elective groups)</td>
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<tr>
<td>Mr T Clulow</td>
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<tr>
<td>Dr M Gleitzman</td>
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<tr>
<td>Safety Science</td>
<td>SESC1001 Plus 12 UOC from Level I Mathematics.</td>
<td>ANAT2151, MATH2839* SESC2091, MGMT2721. * MATH2839 or other approved statistics course</td>
<td>SESC3101, SESC3541, SESC3601, SESC4310 Plus additional Level II or III SESC courses to total 42 UOC.</td>
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<tr>
<td>Dr A Green</td>
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<tr>
<td>Spatial Information Systems</td>
<td>GEOS1211, GEOS170, MATH1041 Also recommended: BIOS1101, BIOS1301</td>
<td>BEES2041, GEOS2811, GEOS2821</td>
<td>GEOS3811, GEOS3821 Plus 12 UOC from Level III GEOS courses</td>
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<td>BEES Student Office</td>
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<tr>
<td>Statistics</td>
<td>MATH1131, MATH1231, MATH1081.</td>
<td>MATH2060, MATH2501, MATH2011 or MATH2510, MATH2801, MATH2810, MATH2831.</td>
<td>MATH3801, MATH3811, MATH3821</td>
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<tr>
<td>School of Mathematics</td>
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<tr>
<td>Toxicology</td>
<td>BIOS1201, BIOS1101, CHEM1001, MATH1031, MATH1041, SESC1001</td>
<td>BIOC2181 or BIOC2101, BIOC2201, BIOC2291 or BIOC2201, CHEM2021, SESC2091, PHPH2011 Recommended: BIOS2021, further Level II CHEM, PHPH2101, PHPH2201.</td>
<td>CHEM3901, SESC4820, SESC4850 Recommended: PHPH3251, PHPH3101, SESC3101, BIOC3261, BIOC3121, further Level III CHEM</td>
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<tr>
<td>A/Prof C Winder</td>
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<tr>
<td>Vision Science</td>
<td>VISN1211, VISN1231 Also recommended: BIOS1101, BIOS1201, CHEM1031, CHEM1829, MATH1131, PHYS1121, PSYC1011</td>
<td>24 UOC from: VISN2111, VISN2131, VISN2211, VISN2231, PSYC2071.</td>
<td>18 UOC from: VISN3111, VISN3131, VISN3221, PSYC3221.</td>
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</table>
Table B: Minors Offered in the Bachelor of Science Program (3970)

<table>
<thead>
<tr>
<th>Minor</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
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<tbody>
<tr>
<td>Australian Studies</td>
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<td>Chinese Studies</td>
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<td>Cognitive Studies</td>
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<td>Development Studies</td>
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<td>Education</td>
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<td>English</td>
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<td>Environmental Studies</td>
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<td>European Studies</td>
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<td>Film</td>
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<td>French</td>
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<tr>
<td>German Studies</td>
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<tr>
<td>Greek (Modern)</td>
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<tr>
<td>History</td>
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<tr>
<td>History and Philosophy of</td>
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<tr>
<td>Science</td>
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<tr>
<td>Indonesian Studies</td>
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<td>Japanese Studies</td>
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<td>Jewish Studies</td>
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<td>Korean Studies</td>
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<tr>
<td>Linguistics</td>
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<tr>
<td>Media, Culture and Technology</td>
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<td>Music</td>
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<td>Philosophy</td>
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<td>Political Economy</td>
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<tr>
<td>Politics and International</td>
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<tr>
<td>Relations</td>
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<td>Policy Studies</td>
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<td>Sociology and Anthropology</td>
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<td>Spanish and Latin</td>
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<tr>
<td>American Studies</td>
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<tr>
<td>Theatre Studies</td>
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<tr>
<td>Women's and Gender Studies</td>
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<tr>
<td>Accounting</td>
<td>ACCT1501, ACCT1511</td>
<td>24 Level II or III UOC in Accounting courses.</td>
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<tr>
<td>Aviation</td>
<td>AVIA1321, AVIA1900, AVIA1850</td>
<td>24 UOC from: AVIA2110, AVIA2200, AVIA1700, AVIA2400, AVIA2500, AVIA2700, AVIA2800, AVIA3101, AVIA3400, AVIA3710,</td>
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<tr>
<td>Biomechanics</td>
<td>12 UOC of Level 1 Maths</td>
<td>SESC2451, ANAT2511</td>
<td>BIOM9510, SESC3451</td>
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<tr>
<td>Biological Anthropology</td>
<td>BIOS1101</td>
<td>18 UOC from: ANAT2610, ANAT2611, ANAT3601, ANAT3611</td>
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<td></td>
<td>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.</td>
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<tr>
<td>Botany</td>
<td>BIOS1101, BIOS1201, also recommended: BIOS1301</td>
<td>BIOS2011, BIOS2051</td>
<td>BIOS3061, MICR3071</td>
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<tr>
<td>Business Economics</td>
<td>ECON1101, ECON1102</td>
<td>24 Level II or III UOC in Business Economics courses.</td>
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<tr>
<td>Business Law and Taxation</td>
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<td>24 Level II or III UOC in Business Law and Taxation</td>
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<tr>
<td>Business Statistics</td>
<td>ECON1101, ECON1102</td>
<td>24 Level II or III UOC in Business Statistics courses.</td>
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<tr>
<td>Minor</td>
<td>Stage 1</td>
<td>Stage 2</td>
<td>Stage 3</td>
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<tr>
<td>Chemical Engineering and Industrial Chemistry</td>
<td>To be advised</td>
<td>24 Level II or III UOC in Chemical Engineering or Industrial Chemistry courses</td>
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<tr>
<td>Civil Engineering</td>
<td>CVEN1023, CVEN1026, CVEN1024</td>
<td>CVEN2023</td>
<td>Plus 21 UOC from: CVEN0646, CVEN0656, CVEN2026, CVEN2125, CVEN2126, CVEN2322, CVEN2525, CVEN3126, CVEN3224, CVEN3438, CVEN3448, CVEN3525, CVEN4533, CVEN4722, INDC4120, CEIC0050.</td>
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<tr>
<td>Computing</td>
<td>COMP1011</td>
<td>COMP2811, COMP2011</td>
<td>COMP2121, COMP2041</td>
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<tr>
<td>Ecology</td>
<td>BIOS1101, BIOS1201</td>
<td>GEOS2711 and/or BIOS2011</td>
<td>BIOS3111</td>
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<td></td>
<td>Also recommended: BIOS1301</td>
<td>May include 6 UOC from BIOS2031, BIOS2051, BIOS2061, GEOS2071 for a total 12 UOC of Level 2 courses</td>
<td>Plus 6 UOC from: BIOS3071, BIOS3081, BIOS3091, GEOS3761</td>
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<tr>
<td>Economic History</td>
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<td>24 Level II or III UOC in Economic History courses</td>
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<tr>
<td>Electrical Engineering &amp; Telecommunications</td>
<td>ELEC1011</td>
<td>ELEC2031, ELEC2032</td>
<td>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</td>
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<tr>
<td>Finance</td>
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<td>24 Level II or III UOC in Finance courses</td>
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<tr>
<td>Human Resource Management</td>
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<td>24 Level II or III UOC in Human Resource Management courses</td>
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<tr>
<td>Industrial Relations</td>
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<td>24 Level II or III UOC in Industrial Relations courses</td>
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<tr>
<td>Information Systems</td>
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<td>24 Level II or III UOC in Information Systems courses</td>
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<tr>
<td>International Business</td>
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<td>24 Level II or III UOC in International Business courses</td>
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<tr>
<td>Marketing</td>
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<td>24 Level II or III UOC in Marketing courses</td>
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<tr>
<td>Mechanical and Manufacturing Engineering</td>
<td>MECH2611, MECH2711, MECH2612, MECH2712</td>
<td>MECH3601, MECH3602 or an alternative sequence of 24 UOC at Level II or III with the approval of the Head of School</td>
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<tr>
<td>Pathology</td>
<td>PATH2201</td>
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<td>PATH3205, PATH3206, PATH3207</td>
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<tr>
<td>Pharmacology</td>
<td>PPHH2011, PPHH3251</td>
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<td>plus 12 UOC from any Level II or III Physiology, Pharmacology, Biochemistry, Chemistry</td>
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<tr>
<td>Planning</td>
<td>PLAN1241, PLAN1042</td>
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<td>24 UOC from Level II and III PLAN courses</td>
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<td>Remote Sensing</td>
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<td>GEOS2811, GEOS2821</td>
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<td>GEOS3811, GEOS3821</td>
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<tr>
<td>Science Communication</td>
<td>SCOM1021 (or SCOM2014)</td>
<td>SCOM 2014, SCOM2021</td>
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<td>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.</td>
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<tr>
<td>Surveying and Spatial Information Systems</td>
<td>One of GMAT0411, GMAT0442, GMAT0443</td>
<td>24 Level II or III UOC in Surveying and Spatial Information Systems courses</td>
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<tr>
<td>Zoology</td>
<td>BIOS1101, BIOS1201</td>
<td>BIOS2031, BIOS2061</td>
<td>12 UOC from: BIOS3011, BIOS3021, BIOS3081, BIOS3111</td>
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<tr>
<td></td>
<td>Also recommended: BIOS1301</td>
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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.

Biochemistry

Biochemistry 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:
MAT1031, MAT1041**
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:
BIOL3111, BIOL3261, BIOL3271
Choose 0 – 12 units of credit from:
BIOL3121, BIOL3281
Choose 0 – 6 units of credit from:
ANAT2321, BIOC3301, BIOC3301, CHEM3021, CHEM3041, MICR3041, MICR3641, PPHH3211, PPHH3221
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
MAHT1041
Elective courses totalling 12 units of credit
LIFE1001
One General Education course totalling 3 units of credit

Stage 2
BIOS2021, 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: Physics)
LIFE1001
One General Education course totalling 3 units of credit

Stage 3
Choose 12 or 18 units of credit from:
BIOL3111, BIOL3261, BIOL3271
Choose 0 – 12 units of credit from:
BIOL3121, BIOL3281
Choose 0 – 6 units of credit from:
ANAT2321, BIOC3301, BIOC3301, CHEM3021, CHEM3041, MICR3041, MICR3641, PPHH3211, PPHH3221
Elective courses totalling 18 units of credit
General Education courses totalling 6 units of credit

Stage 4 (Honours)
BEES4521
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
Biological Science Honours B
Biological Science Honours B
Botany Honours B
Ecology Honours B
Zoology Honours B
Associate Professor I Suthers

technology 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
LIFE1101
One General Education course totalling 3 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

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.

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

*B: Follow the appropriate choice of courses.

344 UNSW UNDERGRADUATE HANDBOOK
Stage 1
CHEM1031, CHEM1041*
MATH1131 or MAIH1141 or MAIH1031
MATH1231 or MAIH1241 or MAIH1041
Choose 6 units of credit from Level 1 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 knowledge in both chemical and biological areas is appropriate to the requirements of employers in Australia.

Stage 1
CHEM1031, CHEM1041*
BIOS1101, BIOS1201
MATH1031 or MAIH1131 or MAIH1141
MAIH1041 or MAIH1241 or MAIH1041
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
PHUH2102 and PHUH2201
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 MAIH1111, MAIH1141
and one of MATH1231, MATH1241
LIFE1001
One General Education course totalling 3 units of credit
PHYS1111 or PHYS2101

Stage 2
BIOC2101 or BIOC2181
BIOC2201 or BIOC2291
CHEM2921
LIFE2001
MIRC2201
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 18 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 BIOL2101 must choose BIOL3101 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 diversity 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 or such 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:
MAH1031**, MAH1041**
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:
BIOL2101, BIOL2201, BEES2041, MLC2011
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

BIOL3291, BIOL3151
Choose 6 or 12 units of credit from:
BIOL3121 or BIOL3621, MLC3021 or MLC3621
Choose 0 or 6 units of credit from:
BIOL3301, BIOS3071, BIOT3061
Elective courses totalling 18 units of credit
General Education courses totalling 6 units of credit
Stage 4 (Honours)

BIOL4103

*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 I 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

GEOG1701, GEOG1111, GEOG1211
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 GEOG4204, 4205, 4206, 4207 plus elective courses totalling 18 UOC from BEES4421, 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 1972 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
MAH1041
LIFE1001, MATH1000
Elective courses totalling 12 units of credit
(Recommended: BIOS1301 MATH1031, GEOH1601, GEOS1701, CHEM1011, PHYS1201)

Stage 2

MSC2001, MSCI6200
BIOS2031, GEOS2721
General Education courses totalling 6 units of credit
Elective courses totalling 18 units of credit
(Recommended: BIOS2011, BEES2041, GEOS2711, GEOS2811, GEOS2821, GEOS2281, GEOS2291, MICR2201)

Stage 3

MSC3001, 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)

MASC4003 (Full-Time)
MASC4009 (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, LIFH2001
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 MAT2400 in Stage 2, and MAT3411 and MAT3421 in Stage 3.

Pure Mathematics courses relevant to mathematics teaching are MAT3351, MAT3352, MAT3353, MAT3356 and MAT3370 in Stage 3, or their higher equivalents.

Pure Mathematics courses relevant to the applications of mathematics in physics or engineering are MAT3331, MAT3341 and MAT3370 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: MAT2140, MAT2240, MAT2260, MAT2280

Level III: At least three of: MAT3101, MAT3121, MAT3161, MAT3181, MAT3201, MAT3241, MAT3261, MAT3301.

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

For students interested in physics 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: COMP1P91 or COMP1791.

**Applied Mathematics**

**Stage 1**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>MATH1141</td>
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<tr>
<td>MATH1241</td>
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<td>MATH1000</td>
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<tr>
<td>MATH1081</td>
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<tr>
<td><strong>Courses totalling 6 units of credit</strong></td>
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</tbody>
</table>

Other Courses: Level III Mathematics courses totalling 18 units of credit

One General Education course totalling 3 units of credit

**Stage 2**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH2060</td>
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<tr>
<td>MATH2111</td>
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<tr>
<td>MATH2130</td>
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<tr>
<td>MATH2601</td>
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<tr>
<td>MATH2620</td>
<td></td>
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<tr>
<td>MATH2901</td>
<td></td>
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<tr>
<td>MATH2301</td>
<td></td>
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<tr>
<td><strong>Elective courses totalling 9 units of credit</strong></td>
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</tbody>
</table>

One course from: PHYS1000, CHEM1001, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

**Stage 3**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH3101</td>
<td></td>
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<tr>
<td>MATH3121</td>
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<tr>
<td>MATH3161</td>
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<td>MATH3181</td>
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<tr>
<td>MATH3201</td>
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<td>MATH3241</td>
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<tr>
<td>MATH3261</td>
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<tr>
<td>MATH3301</td>
<td></td>
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<tr>
<td><strong>Elective courses totalling 24 units of credit</strong></td>
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</tbody>
</table>

Further Mathematics courses totalling 12 units of credit

General Education courses totalling 6 units of credit

**Stage 4 (Honours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH4103 or MAH4104</td>
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</tbody>
</table>

**Mathematics and Computer Science**

**Stage 1**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>COMP1P11, COMP1P21</td>
<td></td>
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<tr>
<td>MATH1141</td>
<td></td>
</tr>
<tr>
<td>MATH1241</td>
<td></td>
</tr>
<tr>
<td>MATH1000, MATH1081, MATH2400</td>
<td></td>
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<tr>
<td><strong>Elective courses totalling 9 units of credit</strong></td>
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</tbody>
</table>

One General Education course totalling 3 units of credit

**Stage 2**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH2111</td>
<td></td>
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<tr>
<td>MATH2601</td>
<td></td>
</tr>
<tr>
<td>COMP2P11, COMP2P21, COMP2P41</td>
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</tr>
<tr>
<td><strong>Further Level II Mathematics courses totalling 6 units of credit.</strong></td>
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</tr>
</tbody>
</table>

Level III Computer Science courses totalling 6 units of credit

One course from: PHYS1000, CHEM1001, LIFE1001, LIFE2001

One General Education course totalling 3 units of credit

**Stage 3**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH3301 or MAH3310</td>
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<tr>
<td>MATH3411</td>
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</tr>
<tr>
<td><strong>Further Level III Mathematics courses totalling 6 units of credit.</strong></td>
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</tbody>
</table>

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

Plus either

**Stage 4 (Honours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH4003 or Honours Computer Science</td>
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</tr>
</tbody>
</table>
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
MAH2060
MAH2111
MAH2300
MAH2601
MAH2620
MAH2901
MAH2910
MAH2931
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
MAH3901
MAH3911
MAH3821
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)
MAH4903 or MAH4904

Mathematics and Finance
Stage 1
ACL11501
COMP1091
ECON1101, ECON1102
MAH1000
MAH1151
MAH1251
FINS1612
One General Education course totalling 3 units of credit
Stage 2
MAH2111
MAH2130
MAH2601
MAH2901
MAH2910
ACCT1511
FINS1612
One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001
One General Education course totalling 3 units of credit
Stage 3
MAH3121, MAH3241
MAH3261
MAH3301
MSCI3001
Elective courses totalling 12 units of credit
General Education courses totalling 6 units of credit
Stage 4 (Honours)
MAH4103 or MAH4104

Pure Mathematics
Stage 1
MAH1141
MAH1241
MAH1000
MAH1081
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
MAH2060
MAH2111
MAH2130
MAH2601
MAH2620
MAH2901
MAH2931
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
MAH3121, MAH3241
MAH3261
MAH3301
MSCI3001
Elective courses totalling 12 units of credit
One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001
One General Education course totalling 3 units of credit
Stage 4 (Honours)
MAH4103 or MAH4104

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.

1. (Computing) MATH3101, MATH3041, MATH3821
2. (Modelling) MATH2140, MATH2265, MATH3161, MATH3181, MATH3201, MATH3141, MATH3901, MATH3941, MATH3980
3. (Statistics) Level III Statistics

Physical Oceanography/Meteorology
Stage 1
MAH1141
MAH1241
MAH1000
MAH1081
PHYS1121 or PHYS1131, PHYS1221 or PHYS1231
Elective courses totalling 12 units of credit
One General Education course totalling 3 units of credit
Stage 2
MAH2060
MAH2111
MAH2130
MAH2620
MAH2901
MAH2931
PHYS2810
GEOG2511
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
MAH3121, MAH3241
MAH3261
MAH3301
MSCI3001
Elective courses totalling 12 units of credit
One course from: PHYS1000, CHEM1000, LIFE1001, LIFE2001
One General Education course totalling 3 units of credit
Stage 4 (Honours)
MAH4103 or MAH4104

This 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, MATH2265, MATH3161, MATH3181, MATH3201, MATH3141, MATH3901, MATH3941, MATH3980
3. (Statistics) Level III Statistics
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 this 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, LIFE1001, 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
MAZH2101, MAZH2120
One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001, LIEH2003
PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050, PHYS2060, PHYS2410, PHYS2630
General Education courses totalling 6 units of credit

**Stage 3**
PHEF2101
PHYS1601, PHYS3110, PHYS3120, PHYS3410
One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001, LIEF2001
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, PHYSA411, PHYSA4413
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 ANA2111, 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, CHEM1101, CHEM1201
MATH1041
Elective courses totalling 12 units of credit
LIFE1001
One General Education course totalling 3 units of credit

**Stage 2**
MIRC2201, MIRC2101
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**
MIRC3611, MIRC3621 or MILK3621, MILK3071
Choose 6 units of credit from:
MIRC3031, MIRC3061, MIRC3081, BIOT3081, BIOS3071, BIOT3011, CHEM3901, GEOH3911, FOOD2D490
Elective courses totalling 18 units of credit
General Education courses totalling 6 units of credit

**Stage 4 (Honours)**
MIRC4013 or MILK4013

*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.*
**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**

BIOS2101*, BIOS2201*

BIOS2201 or BIOS2621*

MICR2201, MICR2201

LIFE2001

Elective courses totalling 12 units of credit

One General Education course totalling 3 units of credit

**Stage 3**

BIOS3121 or BIOS321*, BIOS3281, MICK3021 or MICK3021*

Choose 6 units of credit from:

BIOS3111, BIOS3271, BIOS3301, BIOT3061, MICR3011

Elective courses totalling 18 units of credit

General Education courses totalling 6 units of credit

**Stage 4 (Honours)**

BIOS4428 or MICR4013 or BIOS4013

*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.

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**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, PSYC1101

Choose 6 units of credit from the Level I Mathematics options

LIFE1001

One General Education course totalling 3 units of credit

**Stage 2**

ANAT1211 or ANAT1251*

BIOS2101 and BIOS2201, or BIOS2181 and BIOS2491

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.

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**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

**Stage 2**

MATH2011, MATH2120, MATH2520*

PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050, PHYS2060, PHYS2630

One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001

One General Education course totalling 3 units of credit

**Stage 3**

PHYS3100 or PHYS3110, PHYS3200 or PHYS3300, PHYS3500**, PHYS3600***, PHYS3800

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 PHYS4013, BSSM4013

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

****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: PHYS1100, 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, PHYS3220, PHYS3230 or PHYS3240
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 1 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
PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050,
PHYS2630
One course from: CHEM1000, PHYS1000, MATH1000, LIFE1001,
LIFE2001
One General Education course totalling 3 units of credit

Stage 3
PHYS3010, PHYS3020, PHYS3030 or PHYS3210,
PHYS3220, PHYS3230 or PHYS3240
PHYS3050, PHYS3060, PHYS3080, PHYS3160 or PHYS3170
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
ELEC2011
MATH2011, MATH2520, MATH2120
PHYS2010, PHYS2020, PHYS2030, PHYS2040, PHYS2050,
PHYS2060, PHYS2070 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 MATH2849
PHYS3020, PHYS3030, PHYS3080, PHYS3310, PHYS3610,
PHYS3630, PHYS3710
COMP3221 or COMP3311 or COMP3916
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.

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, PHPH3121, BIOC3221, BIOC3261, BIOC3271, BIOC3111,
BIOC3212, MICR3041, MICR3051, PATH2205, PATH2206,
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
One General Education course totalling 3 UOC

Stage 4 (Honours)
PSYC4053 and PSYC4063

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, PSYC3223, 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.