Faculty of Science

Introduction to the Faculty of Science

The Faculty of Science comprises the Schools of Botany, Chemistry, Earth Sciences, and Physics, and the Departments of Genetics, Information Systems, Mathematics and Statistics, Optometry and Vision Sciences, and Zoology. These schools and departments undertake most of the faculty's teaching and research. A number of other departments also make significant teaching contributions to the faculty. These include the Departments of Anatomy and Cell Biology, Biochemistry and Molecular Biology, Computer Science and Software Engineering, Anthropology, Geography and Environmental Studies, History and Philosophy of Science, Microbiology and Immunology, Pathology, Pharmacology, Physiology, and the School of Behavioural Science.

The Faculty of Science offers a range of courses at all levels. It offers professional degrees in optometry and information systems, as well as the more generalist Bachelor of Science and Bachelor of Biomedical Science. These programs are designed to provide graduates with a range of skills sought after by employers in many professions, and with the essential skills required for a career in scientific research.

Students in the Faculty of Science study in a stimulating and exciting environment with access to highly trained academic staff, first rate research equipment and programs of international standing.

Objectives of the faculty

The faculty's objectives are to provide an educational framework which enables:

- graduates to contribute to many areas of society;
- graduates to provide leadership to the science-technology base of the Australian economy and culture;
- students to enter applied science and technology, and professional science-based career paths; and
- scientists to enter the international community of advanced science and technology through postgraduate research studies.

Faculty courses

Undergraduate

- Bachelor of Science (page 4)
- Bachelor of Science (Extended) (page 32)
- Bachelor of Science combined courses:
  - Bachelor of Arts and Bachelor of Science (page 5)
  - Bachelor of Commerce and Bachelor of Science (page 6)
  - Bachelor of Engineering and Bachelor of Science (page 7)
  - Bachelor of Engineering (IT) and Bachelor of Science (page 7)
  - Bachelor of Geomatic Engineering and Bachelor of Science (page 8)
  - Bachelor of Laws and Bachelor of Science (page 1)
  - Bachelor of Science and Bachelor of Information Systems (page 28)
  - Bachelor of Science and Bachelor of Teaching (page 8)
  - Bachelor of Forestry and Bachelor of Science (page 24). *No first year entry into this course from 2003 onwards.*
  - Bachelor of Science and Bachelor of Forest Science. *No first year entry into this course from 2001 onwards.*
- Bachelor of Arts and Sciences (page 7)
- Bachelor of Biomedical Science (page 18)
- Bachelor of Information Systems (page 25)
- Bachelor of Information Systems combined courses:
  - Bachelor of Commerce and Bachelor of Information Systems (page 26)
  - Bachelor of Geomatic Engineering and Bachelor of Information Systems (page 9)
  - Bachelor of Science and Bachelor of Information Systems (page 28)
- Bachelor of Optometry (page 30)
- Diploma in Information Systems (page 30)

Honours programs

- Bachelor of Science (Degree with Honours)
- Bachelor of Information Systems (Degree with Honours)

Both programs may be taken separately, or as part of a combined course. Information about the honours programs may be found in *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)*.

Graduate and postgraduate

Further information about graduate and postgraduate courses offered by the Faculty of Science may be obtained from the Faculty of Science Office or the School of Graduate Studies, Tel. +61 3 8344 8599.

Coursework

- Graduate Diploma in Information Systems
- Postgraduate Certificate in Information Systems
- Postgraduate Diploma in Information Systems
- Master of Information Systems
- Postgraduate Diploma in Science
- Postgraduate Certificate in Ocular Therapeutics
- Postgraduate Diploma in Advanced Clinical Optometry

Research

- Master of Information Systems[1]
- Master of Optometry[1]
- Master of Science (Research)[1]
- Doctor of Philosophy[1]
- Doctor of Science

The Faculty of Science Office

The Faculty of Science Office coordinates the formal requirements of a student's course. Resources located in the reception area of the Faculty of Science Office include:

- enquiries officers;
- publications providing further information about the undergraduate and postgraduate courses offered by the Faculty; and
- free multimedia information kiosks that provide information ranging from key dates to careers in science.

You should visit the Faculty of Science Office if you need advice about:

- course requirements;
- changing your address;
- credit or prerequisite evaluation of previous studies;
- changes to course enrolment (deferment, leave of absence, discontinuation);
- adding subjects or withdrawing from subjects;
- re-enrolment;
- selection;
- special consideration; and
- study skills workshops.

For more in-depth information, students can make an appointment with a student adviser. Information is also provided at the Faculty of Science home page at <http://www.science.unimelb.edu.au/>.

Departments and schools

Departments and schools are the teaching and research centres of the University. Students should visit them for information regarding:

- the teaching of subjects;
- the assessment requirements of subjects;
- practical classes;
- detailed syllabus information;
- academic advice about course planning; and
- honours requirements.

1. Administered by the School of Graduate Studies

Contacting the Faculty of Science Office

The Faculty of Science Office is located on the ground floor of the Old Geology Building (Masson Road) on the Parkville campus of the University.

The various contact points for the Faculty of Science Office are:

Faculty of Science Office
Old Geology Building
The University of Melbourne
Victoria 3010
Australia
Tel: + 61 3 8344 6404
Fax: + 61 3 8344 5803

Email: science-queries@unimelb.edu.au

Web: http://www.science.unimelb.edu.au/

General information for all undergraduate students

What do I need to read in this Handbook?

Students are expected to read:

- the general information section at the start of the Handbook;
- the Faculty of Science introduction; and
- the department entries that follow this introduction. Department entries provide listings of suggested subjects, subject descriptions and other information that is invaluable for course planning. Department entries appear in alphabetical order.

Accelerated Entry Program

The Accelerated Entry Program enables students who have undertaken appropriate additional work while completing their Year 12 studies to gain exemption from some first-year subjects.

Exemption tests equivalent to first year BSc standard are conducted in between enrolment and the commencement of Semester 1. Students who pass an exemption test will be granted credit for the relevant first-year subject. Students may receive credit for more than one subject. Students who receive such credit may be able to complete the course in less than the normal duration.

Application forms for accelerated entry will be available at the time of enrolment.

Credit and prerequisite evaluations for previous studies

Credit towards a Faculty of Science course is available for tertiary studies undertaken in the 10 years prior to enrolment in that course. The amount and type of credit granted is determined by the basis of the content, standard, workload and relevance of previous studies to the course into which the student has been admitted. Students are expected to provide appropriate documentation for the credit assessment, including their academic transcript and detailed course and subject descriptions.

Students should refer to the Faculty of Science Credit and Prerequisite Evaluation Policy for Undergraduate Courses before applying for credit. A copy of this policy is available from the Faculty of Science Office.

Prerequisites

Entry into many subjects requires the prior completion of prerequisite subjects or concurrent enrolment in corequisite subjects. Students must not enrol in subjects for which they lack the prerequisites without a written waiver of the prerequisites signed by the subject coordinator or the Head of Department.

It is the responsibility of students to ensure that they have completed the necessary prerequisites before enrolling in subjects. Students are advised that enrolment in subjects for which they lack the prerequisites, or waivers, may be cancelled. If a student remains in a subject for which they lack the appropriate prerequisites, even with a waiver, the lack of the prerequisite is not deemed grounds for special consideration or other concessions should the student fail to complete the subject.

Workloads

All Faculty of Science courses, except for the Bachelor of Optometry and some honours programs, are available on a full-time or a part-time basis. Bachelor of Optometry students require permission from the Head of Department of Optometry and Vision Sciences to enrol part time.

Refer to *Overloads in Semester 1 and 2 (p.9)* for Faculty guidelines on approving overloads.

Combined course students in the Bachelor of Engineering or Bachelor of Geomatic Engineering would also need approval from their Engineering Department and/or Faculty of Engineering to enrol in 62.5 points per semester.

Youth Allowance workload requirements (p.8) in the general information section of this Handbook explains how a student's HECS load (ie. workload) determines if they are a full-time or part-time student.

Time commitment to study

To complete their studies successfully students are expected to attend all scheduled lectures, tutorials and practical classes as well as commit additional time to individual study, group study and the completion of assessment tasks. As students progress through their course contact hours generally decrease while the time spent on independent study and assessment tasks increases.

The following time commitment is expected for a student to complete satisfactorily the academic requirements of a typical 12.5 points subject in the Faculty of Science.

Contact hours:

Contact hours range from 3 to 7 hours per week, with 6 or 7 hours per week being common for subjects with a significant practical component.

Total time commitment:

A minimum total time commitment of ten hours per week, including contact hours, is expected for each subject. Students who wish to excel and students whose background preparation for a subject is not strong should expect to commit additional time.

Course points limits

Students will not normally be permitted to over-enrol beyond the total points requirements of their course.

Table 1: Course points limits

Course	Total points required
Bachelor of Science Bachelor of Information Systems Bachelor of Biomedical Science	300 points
Bachelor of Arts and Sciences	400 points
Combined BSc courses Combined BIS courses Bachelor of Optometry	500 points
Diploma in Information Systems	100 points
Bachelor of Science (Degree with Honours) Bachelor of Information Systems (Degree with Honours)	100 points

Students wishing to complete subjects beyond their course points limit may apply to do so via the Community Access Program (CAP).

Subject levels

Subjects normally taken in first year are referred to as 100-level subjects. Subjects normally taken in second and third year are referred to as 200-level and 300-level subjects respectively. The year level of a science subject is normally indicated by the fourth digit of its six-digit subject code. For example, 610-280 is a 200-level subject.

After completing 50 points at 100-level, students may combine 100-level, 200-level and/or 300-level subjects in any year of their course, providing they have the necessary prerequisites and avoid timetable clashes.

Subject changes

Students must use the on-line subject change system when available or complete a subject change form, available at the Faculty of Science Office, to make changes to their enrolment. BASc and combined course students should notify the office of the faculty which administers the affected course component (eg. Engineering for engineering subjects in the combined BE/BSc; Arts for arts subjects in the BASc or BA/BSc). Students wishing to change the information systems subjects of their BIS or the BIS component of their combined course should notify the Department of Information Systems. Students enrolled in the Diploma of Information Systems should notify the Faculty of Science. The critical dates relating to subject changes are detailed in *Course and subject changes (p.8)* in the general information section of this Handbook.

Subject changes may alter a student's enrolment category from full-time to part-time (or vice versa). Students are encouraged to read *Youth Allowance workload requirements (p.8).*

Timetable clashes

While every effort is made to avoid timetable clashes, the number of subjects offered by the Faculty of Science makes it impossible to accommodate every possible subject combination.

If a subject combination results in lecture or practical class time clashes, students are advised to consider changing subjects. Timetable clashes inevitably affect student performance, and are not grounds for special consideration. Attendance is expected at all scheduled lectures, practical classes, excursions and tutorials.

Special consideration

For information about special consideration, see *Special consideration (p.6)*.

Study difficulties

The faculty organises several study skills seminars throughout the year. These seminars are advertised on faculty and department noticeboards, and discuss both general and discipline-specific study skills. See *Study skills (p.6)* for more information..

Students at risk

Many first-year students experience academic difficulties, particularly during their first semester of university study. Students who fail 50% or more of the subjects attempted in their first semester of tertiary study are invited to discuss any problems and ways of improving their performance. Interviews, with an academic staff member or a student adviser, will be held as soon as possible after the first semester results have been finalised by departments.

Unsatisfactory progress guidelines

At the end of each semester, the Faculty of Science reviews the academic progress of all students enrolled in Faculty of Science courses.

Students enrolled in any Faculty of Science course who:

- pass 75 per cent or more of the points attempted in any semester will be deemed to have made satisfactory progress in that semester;
- pass greater than 50 per cent but less than 75 per cent of the points attempted in any semester will be required to gain faculty approval before being allowed to continue in their course;
- pass 50 per cent or less of the points attempted in any semester will be required to make a case to the Faculty of Science Unsatisfactory Progress Committee;
- fail a core subject a second time will be required to make a case to the Faculty of Science Unsatisfactory Progress Committee.

Students are given an opportunity to make a written submission or to appear before the committee or to do both. In considering a student's progress, the committee will normally consider the student's results, attendance at lectures, practical classes and tutorials, and any extenuating circumstances, such as personal difficulties, financial hardship and study problems.

The committee will determine the best course of action for the student's academic future and make one of three decisions:

- take no action (ie. the student is able to continue in the course with no restrictions);
- restrict the student's enrolment for the following semester or year; or
- recommend to the Academic Board that the student be suspended (ie. have enrolment cancelled) from the course, or from one component of a combined course. Students recommended for suspension have the right to appeal to the Academic Board before a final decision is made.

At the very least, unsatisfactory progress will:

- increase the length of time required to complete the degree (with a corresponding increase in fees and HECS liability); and
- make selection into quota subjects or other courses more difficult as selection is usually based on academic merit.

Students suspended from their course can apply for re-admission. Generally, re-admission is only possible if the student has demonstrated that there is a reasonable chance that they would successfully complete their course if re-admitted. Relevant studies completed at another tertiary institution, or through the University of Melbourne Community Access Program, can be used to show that a student is now capable of completing their course.

Community Access Program

The Community Access Program (CAP) enables students to undertake individual subjects on a fee-paying basis. Students wishing to resume their studies after being suspended may apply to enrol through CAP to show academic rehabilitation.

Students currently enrolled in Faculty of Science courses who wish to take subjects for which they will not receive credit in their course should enrol in such subjects through CAP. See *Community Access Program (for enrolled students) (p.4)*.

Taking time off from study

Applications for deferment, leave of absence, or discontinuation are made by completing a cancellation of enrolment form at the Faculty of Science Office. The Faculty of Science allows students to take one year of leave from their course, under the conditions set out in *Taking time from study (p.6)*.

International exchange program

Going on exchange to another university with which the Faculty of Science has an exchange agreement can enhance a student's degree. Students may apply to go on exchange in their second, third or fourth years. Students intending to participate in the University's exchange program need to discuss their options with the faculty and have their proposed course plan approved both by the department and faculty to ensure they receive full credit for their studies abroad.

See *Studying at an overseas university as part of an exchange program (p.5)* in the general information section of this Handbook.

Concurrent diplomas

The Faculty of Science allows eligible students to enrol in the Diploma in Modern Languages, the Diploma in Music (Practical), the Diploma in Arts, the Diploma in Creative Arts or the Diploma in Information Systems, concurrently with their degree studies. Enrolling in a concurrent diploma adds an extra year to the duration of the course. See *Additional general studies of importance (p.4)* for more information.

Faculty awards

Dean's Prize

The Dean's Prize is determined by academic merit and is awarded to the highest achieving commencing students in the faculty each year. These prizes are presented by the Dean of the Faculty of Science at a ceremony in the presence of heads of departments, invited alumni and parents.

Dean's Honour List

The Dean's Honour List recognises high achieving students in the Faculty of Science. Students on the Dean's Honour List receive a certificate from the Dean of the Faculty of Science at an annual presentation ceremony, and their achievement is also recorded on their academic transcript.

To be considered for the Dean's Honour List, students enrolled in the Bachelor of Information Systems, Bachelor of Optometry, Bachelor of Science, Bachelor of Biomedical Science, Bachelor of Arts and Sciences and the combined courses will normally have:

- completed a full year of science study (for combined course students this can be over two years) at the 100-, 200- or 300-level;
- passed all subjects; and
- obtained an average mark greater than 80 per cent in science subjects.

To be considered for a place on the Dean's Honour List, Bachelor of Science (Degree with Honours) students must achieve an overall mark for the Honours year that is greater than 85 per cent.

Numerous other prizes, scholarships, awards and bursaries are provided by companies and through bequests. These are available to students enrolled in the undergraduate courses offered by the Faculty of Science and are awarded for academic excellence at each year level and in individual subjects.

Further information on Faculty of Science awards and prizes is available at the following web site <http://www.science.unimelb.edu.au/awards>.

The Student Financial Aid Office can provide details of other University awards.

Career opportunities

One of the major benefits of a degree from the Faculty of Science at the University of Melbourne is that the breadth of the degrees can lead in all sorts of interesting career directions. The faculty has a strong commitment to ensuring that during their studies students develop an understanding of the breadth of the opportunities available to them. In conjunction with the Careers and Employer Liaison Units the faculty offers the professional development program Kick Start Your Career, which focuses on the value of the science degree and the skills obtained as well as methods for successful job-hunting across various industry types.

Our graduates are employed in a wide array of both science-related and non-science-related positions in the business, industry, government, and education sectors. Graduates from the faculty benefit from excellent career opportunities within Australia and internationally, and enjoy competitive salaries.

Many students use the subject material they have learnt through their degree and apply it directly in the scientific industries, becoming research botanists, industrial chemists, geologists, geneticists, forensic scientists, marine ecologists, physicists, biomedical researchers, statisticians, meteorologists, optometrists and vision scientists to name just a few occupations.

Alternatively, some graduates use their studies in other, allied industries which require practitioners to have a strong understanding of science, scientific concepts and the practice of science. Such careers include intellectual property law, market research, science journalism, teaching, and actuarial

roles in the superannuation, finance and insurance industries. Other students take the general skills gained in the courses offered by the faculty, such as numeracy, analytic and logical thinking, information and time management, scientific method and research skills. These graduates enter employment areas which may be completely unrelated to their field of study but which value these skills highly. Examples include management consulting and the actuarial industry.

Students graduating from information systems courses may become systems analysts, programmers, database administrators, information systems managers or project managers in a variety of companies. Many of these graduates also take up roles in information technology consulting or management consulting firms.

A significant proportion of science graduates choose to continue their studies and progress into higher degrees. In particular, many students complete an additional honours year in order to focus on a specific discipline area and significantly enhance their career choices and outcomes in the scientific industries.

Science alumni

The Faculty of Science and the University of Melbourne are dedicated to helping current and past students, staff and other professionals in science build a lifelong relationship with the faculty and the University, and to promoting these contacts at a local, national and international level. For further information please contact the University Development office, Tel. +61 3 8344 7469.

Veterinary science

Science students who seek entry to the Faculty of Veterinary Science must apply to the General Manager (Veterinary Science) for lateral transfer to that course. Applications are usually due on the last Friday in September during the first year of science studies. Contact the General Manager (Veterinary Science) for details.

The Faculty of Veterinary Science has specified that science students wanting to be considered for a transfer to Veterinary Science must take 100 points in their first year, including:

- Biology 600-141 and 600-142;
- Chemistry 610-141 and 610-142;
- Physics 640-121 and 640-122, or 640-141 and 640-142, or 640-161 and 640-162.

Students who have undertaken physics in their final year of secondary schooling and who study physics 640-161 and 640-162 will have their marks in that subject debited by 15 per cent when considered for selection into the veterinary science course.

Students enrolled in the Bachelor of Science (Veterinary Science) course should see the *Faculty of Veterinary Science (p.1)* section of this Handbook for further information.

Bachelor of Science (BSc)

Course objectives

Bachelor of Science graduates:

- have a broad knowledge of science across a range of disciplines, with a higher level of understanding in one or more of these disciplines;
- when solving scientific problems:
  - are capable of applying appropriate knowledge,
  - are able to access relevant information,
  - understand the principles of project and experimental design,
  - have a capacity to apply practical skills and technology;
- are able to communicate the results of their studies in both written and oral form;
- have an appreciation of the historical background and evolution of scientific concepts;
- have the knowledge, skill and attitude to enable adaptation to scientific, technological and social change, have a sense of intellectual curiosity and a desire for lifelong learning, and a capacity to be creative and innovative.

Bachelor of Science (Degree with Honours) graduates should, in addition to the above, be able to define and solve problems relating to their speciality and be capable of conducting supervised research in their field.

Attributes of the Bachelor of Science graduate

In science at the University of Melbourne we expect to educate our students in the fundamental skill of transforming information into knowledge. This outcome is fully consistent with the University's general ambition for our graduates, and emphasises the transferability of the skills practised in science.

Throughout their course students will find that many of the abilities that they develop are shared by, and so are valued by and are applicable to, activities in all walks of life. In particular, these are the skills that are essential to providing leadership to the science-technology base of the Australian economy and culture.

Bachelor of Science graduates have a broad knowledge of science across a range of disciplines, with a higher level of understanding in one or more of these disciplines. They also have an appreciation of the historical background and evolution of scientific concepts. They have the knowledge, skills and attitude to enable them to adapt to scientific, technological and social change and have a sense of intellectual curiosity and a desire for lifelong learning.

Science graduates are particularly strong in their cognitive skills. They are able to:

- synthesise information from a range of sources, evaluate this, and add new ideas to their existing knowledge;
- observe, record and evaluate data or evidence appropriately;
- deal with complex data sets and apply their strong numerical competence to identify and analyse key factors and components;
- make effective use of information to identify and solve problems; and
- synthesise and integrate disparate elements into a meaningful whole.

Graduates take these skills further in the creative realm, formulating hypotheses which can be tested for validity. They are used to extrapolating from the known to the unknown and are comfortable working with analogues rather than needing to deal with literal situations. They understand the need to question and clarify before developing a response to a particular issue or problem, enabling them to analyse critically.

Having undertaken laboratory and tutorial classes, science graduates are adept at activity planning as well as the application of theory to practice. They understand the principles of project and experimental design. Some students will have found collaborative learning an efficient tool, while others will find their practical work enhanced by effective teamwork.

Science disciplines value clear reporting. Consequently, the science graduate has developed skills of efficient and effective communication of ideas and results, whether in the accepted modes of scientific report writing or through more informal oral presentations. Graduates recognise the need to present information and ideas in an effective written form that is appropriate to the purpose and the reader.

The need to manage the multiplicity of tasks (lectures, laboratory and assignment work) means that science graduates are aware of the need to structure and manage time effectively and efficiently, to retain balance and to prioritise their activities. They are able to juggle several tasks simultaneously, take responsibility for their own work independently or within a group, and to plan their schedule appropriately.

The breadth of the Science @ Melbourne program, which allows students to undertake other disciplines such as humanities or commerce within the science degree, means that many science graduates will have been exposed, directly or indirectly, to thoughts and ideas from all parts of knowledge. These graduates are aware of the breadth and depth of knowledge in areas beyond their specific areas of specialisation.

In the longer term, these graduates have the knowledge, skill and attitude to enable adaptation to scientific, technological and social change. They have a sense of intellectual curiosity and a desire for lifelong learning and a capacity to be creative and innovative. These attributes enable them to continue to develop their own professional abilities as well as contributing to the development of the profession in which they are employed.

Duration

Students enrolled full-time usually take three years to complete the BSc course.

Course requirements

A minimum (and maximum) of 300 points is required, which must include at least 237.5 science points, comprising:

- between 75 and 125 science points at the 100-level;
- completion of 50 points of a prescribed science major at the 300-level.

Note that:

- at least 75 science points at 100-level must be completed;
- a maximum of 125 points of science and non-science subjects at 100-level can be included;
- at least 50 points at the 100-level must be completed before proceeding to 200-level subjects;
- there are no 200-level requirements;
- the 300 points can include *up to* 62.5 non-science points. Of the 62.5 non-science points, up to 25 points can be at the 100-level. The only exception to this is if students undertake a sequence of 100-level language subjects: in these cases the 62.5 non-science points can include up to 37.5 points at the 100-level;

- students completing a major in psychology must complete 50 science points at 300-level (37.5 points of prescribed 300-level psychology subjects plus an additional 12.5 points of 300-level science subjects);
- students considering applying for Bachelor of Science (Degree with Honours) should attempt at least 87.5 points of 300-level science subjects to maximise their faculty honours score. Students planning to apply for entry into the BSc (Honours) should refer to *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)* for further details.

See *Science and non-science subjects (p.9)* for discussion as to what constitutes subjects earning science points.

Students who commenced prior to 1999

Students who first enrolled in the BSc before 1999 must complete the requirements set out above except they need to complete 50 science points at the 300-level of subjects of their choice rather than a prescribed science major.

Selection into BSc (Honours)

Students planning to apply for entry into the BSc (Honours) should refer to *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)* for further details.

Combined courses involving the Bachelor of Science

Students who complete a combined course will graduate with two undergraduate degrees. Combined course students therefore have an increased choice of subjects and an opportunity to either specialise in inter-related discipline areas across two faculties, and/or to broaden their educational base.

Although the Bachelor of Arts and Sciences is a single degree it has two discrete components and other similarilites with combined science programs. It has therefore been listed with other combined science programs despite not literally being a combined course.

Students wanting to specialise in a science discipline should consider completing the BSc degree and undertaking postgraduate study in their area of interest rather than completing a combined course.

The wide-ranging objectives of each of the combined courses can be gleaned by referring to the objectives for both the BSc and the other degree forming the combined course.

For the full list of combined courses offered by the Faculty of Science, see *Faculty courses (p.1)*.

Combined course requirements

All combined course students must satisfy the requirements of both components of the combined course in which they are enrolled, as well as accumulating a minimum number of points. These requirements vary and are stated in the specific entry for each combined course.

Students enrolled in BSc combined courses should read the section *Course planning information for the BSc, BASc and BSc combined courses (p.9)* for information relevant to the BSc, including details about majors and science and non-science subjects. Combined course students should also note that no credit toward the BSc component of combined courses will be awarded for non-science subjects. Science and non-science subjects are defined on page 9.

Enrolment of combined course students in Bachelor of Science (Degree with Honours)

Students need to have completed at least 300 points, including the requirements of the BSc, to be considered for entry into the BSc (Honours) course.

Students planning to apply for BSc (Honours) should also ensure that all departmental requirements for entry into BSc (Honours) have been satisfied.

The faculty will use the weighted average mark achieved for the 300-level science subjects to determine if a combined course student can enter BSc (Honours). The faculty usually requires a weighted average of 65 per cent or more for the 300-level science subjects that have been completed.

BSc (Honours) will require at least one extra year of study. Further information about honours is provided in *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)*.

Bachelor of Arts/Bachelor of Science (BA/BSc)

The BA/BSc combined course provides students with an opportunity to obtain a general education in the humanities, social sciences and the languages and cultures of other people, and to also complete a major in one or more science disciplines.

Attributes of the Bachelor of Arts/Bachelor of Science graduate

In arts/science at the University of Melbourne, we expect to educate our students in the fundamental skills of transforming information into knowledge and communicating this knowledge clearly. These outcomes are fully consistent with the University's general ambition for our graduates, and emphasise the transferability of the skills practised in the arts and in science.

Throughout their course, students will find that many of the abilities that they develop are shared by, and so are valued by and are applicable to, activities in all walks of life. In particular, these are the skills that are essential to providing leadership to the science-technology base of the Australian economy and culture.

The Bachelor of Arts and Bachelor of Science degrees aim to educate and train students in both science and humanities areas of study. The combined course enables students to access a major (specialisation) stream in both the arts and science components of the course, which may be chosen as complementary or independent to each other. In addition, the length of the course allows students to pursue minor studies in other discipline areas beyond their majors. Graduates are therefore aware of and educated in a broad variety of knowledge areas.

Through their scientific training, these graduates have a broad knowledge of science across a range of disciplines, with a higher level of understanding in one or more of these disciplines. They also have an appreciation of the historical background and evolution of scientific concepts. They have the knowledge, skills and attitude to enable them to adapt to scientific, technological and social change and have a sense of intellectual curiosity and a desire for lifelong learning.

From their exposure to a range of quantitative and qualitative disciplines, Bachelor of Arts/Bachelor of Science graduates have strong cognitive, social and communication skills. In particular they are able to:

- synthesise and evaluate information from a range of sources and add new ideas to their existing knowledge;
- observe, record and evaluate data or evidence appropriately;
- make effective use of information to identify and solve problems;
- synthesise and integrate disparate elements into a meaningful whole;
- express ideas, opinions and judgements and present them effectively in written or oral format that is appropriate to the audience;
- question, reflect and clarify;
- explain and defend their position on an issue; and
- work effectively in group discussions.

Graduates in arts/science are independent and creative thinkers, and are able to approach scientific or social issues creatively. They are used to formulating hypotheses which can be tested for validity. They can extrapolate from the known to the unknown and are comfortable working with analogues rather than needing to deal with literal situations.

Studies in the humanities and social sciences strengthen students' understanding of the need to question and clarify issues surrounding a particular situation before developing a response. By suspending judgement and listening to other points of view, they are able to build on the ideas of others enabling their strong critical analysis skills. These studies also provide graduates with excellent written and oral communication skills.

The science disciplines also value clear reporting. Consequently, the arts/science graduate has developed skills of efficient and effective communication of ideas and results, whether in the accepted modes of scientific report writing or through more informal oral presentations. Graduates recognise the need to present information and ideas in an effective written form that is appropriate to the purpose and the reader.

Having undertaken laboratory and tutorial classes, arts/science graduates are adept at activity planning as well as the application of theory to practice. Some students will have found collaborative learning an efficient tool, while others will find their practical work enhanced by effective teamwork.

The need to manage the multiplicity of tasks (lectures, laboratory and assignment work) means that arts/science graduates are aware of the need to structure and manage time effectively and efficiently, to retain balance and to prioritise their activities. They are able to juggle several tasks simultaneously, take responsibility for their own work, independently or within a group, and to plan their schedule appropriately.

The breadth of the Science @ Melbourne program means that arts/science graduates will have been exposed, directly or indirectly, to thoughts and ideas from a number of bodies of knowledge. These graduates are aware of the breadth and depth of knowledge in areas beyond their specific areas of specialisation.

Duration

The BA/BSc combined course is normally completed over five years.

Course requirements

Students enrolled in the BA/BSc combined course must accumulate a minimum (and maximum) of 500 points. Within the 500 points students must satisfy the minimum requirements for both the BSc component and the BA component. These requirements are detailed below.

Subjects offered by the School of Anthropology, Geography and Environmental Studies, the Department of History and Philosophy of Science and the Department of Philosophy cannot count toward the science component of the combined course.

Students undertaking psychology subjects can receive credit toward *either* the science *or* arts component of the combined BA/BSc course. Credit for psychology cannot be split between the two faculties. Students should advise the Faculty of Science Office if they would like psychology to count toward the BSc component of the BA/BSc combined course.

Science component

A minimum of 237.5 science points is required, which must include:

- between 75 and 125 science points at the 100-level; and
- completion of 50 points of a prescribed science major at the 300-level.

There are no 200-level requirements.

Students who first enrolled in the BA/BSc before 1999 must complete the requirements set out above with the exception that they do not need to complete a prescribed science major, but rather 50 science points at the 300-level of subjects of their choice.

See *Science and non-science subjects (p.9)* for discussion of what constitutes subjects earning science points.

Arts component

A minimum of 225 arts points is required, of which:

- 50 points must be at the 100-level;
- 75 points must be at the 200-level; and
- 100 points must be at the 300-level.

Please refer to the Faculty of Arts introduction section for a list of teaching departments. Also refer to *Combined arts degree requirements (p.11)*.

Balance of points

The remaining 37.5 points may be taken from subjects offered by either faculty.

Bachelor of Commerce/Bachelor of Science (BCom/BSc)

Attributes of the Bachelor of Commerce/Bachelor of Science graduate

In commerce/science at the University of Melbourne, we expect to educate our students in the fundamental skills of transforming information into knowledge and being able to integrate this knowledge into a business environment. These outcomes are fully consistent with the University's general ambition for our graduates, and emphasise the transferability of the skills practised in commerce and in science.

Throughout their course, students will find that many of the abilities that they develop are shared by, and so are valued by and are applicable to, activities in all walks of life. In particular, these are the skills that are essential to providing leadership to the science-technology base and business community of the Australian economy and culture.

The Bachelor of Commerce and Bachelor of Science degrees aim to educate and train students in both science and commercial areas of study. The combined course enables students to access a major (specialisation) stream in both the commercial and science components of the course. In addition, the length of the course allows students to pursue minor studies in other discipline areas beyond their majors. Graduates are, therefore, aware of and educated in a broad variety of knowledge areas.

From their exposure to a range of quantitative and qualitative disciplines, Bachelor of Commerce/Bachelor of Science graduates have strong cognitive skills with an awareness of the business environment. In particular, they are able to:

- synthesise information from a range of sources, evaluate this, and add new ideas to their existing knowledge;
- observe, record and evaluate data or evidence appropriately;
- make effective use of information to identify and solve problems;
- synthesise and integrate disparate elements into a meaningful whole;
- work independently or in teams;
- understand and fit into a work organisation's culture;
- view and understand an organisation's wider business picture and position; and
- understand the commercial environment and recognise and define issues or problems within it.

Graduates in commerce/science are able to be creative in their approach to scientific or business issues. They are used to formulating hypotheses that can be tested for validity. They can extrapolate from the known to the unknown and are comfortable working with analogues rather than needing to deal with literal situations.

Their studies in commercial disciplines enable graduates to accept and deal with a level of uncertainty in problem solving and decision making, particularly when access to information is limited.

The science disciplines also value clear reporting. Consequently, the commerce/science graduate has developed skills of efficient and effective communication of ideas and results, whether in the accepted modes of scientific and business report writing or through more informal oral presentations. Graduates recognise the need to present information and ideas in an effective written form that is appropriate to the purpose and the reader.

Having undertaken laboratory and tutorial classes, commerce/science graduates are adept at activity planning as well as the application of theory to practice. Some students will have found collaborative learning an efficient tool, while others will find their practical work enhanced by effective teamwork.

The need to manage the multiplicity of tasks (lectures, laboratory and assignment work), means that commerce/science graduates are aware of the need to structure and manage time effectively and efficiently, to retain balance and to prioritise their activities. They are able to juggle several tasks simultaneously, take responsibility for their own work, independently or within a group, and to plan their schedule appropriately.

The breadth of the Science @ Melbourne program means that commerce/science graduates will have been exposed, directly or indirectly, to thoughts and ideas from a number of bodies of knowledge. These graduates are aware of the breadth and depth of knowledge in areas beyond their specific areas of specialisation.

Duration

The BCom/BSc combined course is normally completed over five years.

Course requirements

Students enrolled in the BCom/BSc combined course must accumulate a minimum (and maximum) of 500 points. Within the 500 points students must satisfy the minimum requirements stated below for both the BSc component and the BCom component.

Science component

A minimum of 237.5 science points is required, which must include:

- between 75 and 125 science points at the 100-level;
- completion of 50 points of a prescribed science major at the 300-level.

There are no 200-level requirements.

Students who first enrolled in the BCom/BSc before 1999 must complete the requirements set out above with the exception that they do not need to complete a prescribed science major, but rather 50 science points at the 300-level of subjects of their choice.

See *Science and non-science subjects (p.9)* for discussion of what constitute subjects earning science points.

Commerce component

A minimum of 200 commerce points is required, which must include:

- 50-125 points at the 100-level;
- at least 50 points at the 300-level;
- the following compulsory subjects:

  316-101 Introductory Macroeconomics *(p.1)*

  316-102 Introductory Microeconomics *(p.1)*

  316-130 Quantitative Methods 1 *(p.1)*

  325-201 Organisational Behaviour *(p.1)*[1]

  and one of:

  316-205 Introductory Econometrics *(p.1)*

  316-206 Quantitative Methods 2 *(p.1)*

  325-210 Managerial Decision Analysis *(p.2)*

  325-212 Market Research *(p.2)*

The 200 commerce points must be chosen from subjects taught by departments in the Faculty of Economics and Commerce, or subjects with a 732 prefix taught by the Faculty of Law.

1. Students who commenced the Bachelor of Commerce/Bachelor of Science prior to 2005 are not required to complete this subject.

Balance of points

The remaining 62.5 points may be taken from subjects offered by the Faculties of Economics and Commerce, Science, and Arts.

Bachelor of Arts and Sciences (BASc)

The Bachelor of Arts and Sciences is a single degree course which allows students to study subjects from the Faculties of Arts and Science.

BASc students will be able to complete majors in both faculties, and have the option to complete an honours year in either arts or science. The degree will appeal to applicants who wish to study more broadly than is currently possible in either the BA or the BSc, but who do not wish to complete the five years of study required for the combined BA/BSc course.

Course objectives

The Bachelor of Arts and Sciences course has as its objectives that graduates:

- can demonstrate a sound knowledge and understanding of selected fields of study in the sciences, humanities, languages and social and behavioural sciences, and a higher understanding in one or more of these disciplines;
- can access and appreciate national and international debates in their areas of study;
- can apply critical and analytical skills and methods to the identification and resolution of problems within a changing social context;
- when solving scientific problems:
  - are capable of applying appropriate knowledge,
  - are able to access relevant information,
  - understand the principles of project and experimental design,
  - have a capacity to apply practical skills and technology;
- have the knowledge, skill and attitude to enable adaptation to scientific, technological and social change, and have an appreciation of the historical background and evolution of scientific concepts;
- can demonstrate an independent approach to knowledge that uses rigorous methods of inquiry and appropriate theories and methodologies that are applied with intellectual honesty and respect for ethical values;
- can communicate effectively and, in the case of those students undertaking a language major, are able to read, write and speak with fluency and with an appreciation of the cultural context of the language;
- can act as informed and critically discriminating participants within the community of scholars, as citizens and in the workplace;
- have a sense of intellectual curiosity and a desire for lifelong learning, and a capacity to be creative and inventive; and
- are proficient in the use of appropriate modern technologies, such as computer and audio-visual systems, for the acquisition, processing and interpretation of data.

Attributes of the Bachelor of Arts and Sciences graduate

In the Bachelor of Arts and Sciences at the University of Melbourne, we expect to educate our students with the fundamental skills of transforming information into knowledge and communicating this knowledge clearly. These outcomes are fully consistent with the University's general ambition for our graduates, and emphasise the transferability of the skills practised in the arts and in science.

Throughout their course, students will find that many of the abilities that they develop are shared by, and so are valued by and are applicable to, activities in all walks of life. In particular, these are the skills that are essential to providing leadership to the science-technology base of the Australian economy and culture.

The Bachelor of Arts and Sciences aims to educate and train students in both science and humanities areas of study. The course enables students to access a major (specialisation) stream in both the arts and science components of the degree, which may be chosen as complementary or independent to each other.

Through their scientific training, these graduates have a broad knowledge of science across a range of disciplines, with a higher level of understanding in one or more of these disciplines. They also have an appreciation of the historical background and evolution of scientific concepts. They have the knowledge, skills and attitude to enable them to adapt to scientific, technological and social change and have a sense of intellectual curiosity and a desire for lifelong learning.

From their exposure to a range of quantitative and qualitative disciplines, Bachelor of Arts and Sciences graduates have strong cognitive, social and communication skills. In particular they are able to:

- synthesise and evaluate information from a range of sources and add new ideas to their existing knowledge;
- observe, record and evaluate data or evidence appropriately;
- make effective use of information to identify and solve problems;
- synthesise and integrate disparate elements into a meaningful whole;
- express ideas, opinions and judgements and present them effectively in written or oral format that is appropriate to the audience;
- question, reflect and clarify;
- explain and defend their position on an issue; and
- work effectively in group discussions.

Graduates in arts and sciences are independent and creative thinkers, and are able to approach scientific or social issues creatively. They are used to formulating hypotheses which can be tested for validity. They can extrapolate from the known to the unknown and are comfortable working with analogues rather than needing to deal with literal situations.

Studies in the humanities and social sciences strengthen students' understanding of the need to question and clarify issues surrounding a particular situation before developing a response. By suspending judgement and listening to other points of view, they are able to build on the ideas of others enabling their strong critical analysis skills. These studies also provide graduates with excellent written and oral communication skills.

The science disciplines also value clear reporting. Consequently, the arts and sciences graduate has developed skills of efficient and effective communication of ideas and results, whether in the accepted modes of scientific report writing or through more informal oral presentations. Graduates recognise the need to present information and ideas in an effective written form that is appropriate to the purpose and the reader.

Having undertaken laboratory and tutorial classes, arts and sciences graduates are adept at activity planning as well as the application of theory to practice. Some students will have found collaborative learning an efficient tool, while others will find their practical work enhanced by effective teamwork.

The need to manage the multiplicity of tasks (lectures, laboratory and assignment work), means that arts and sciences graduates are aware of the need to structure and manage time effectively and efficiently, to retain balance and to prioritise their activities. They are able to juggle several tasks simultaneously, take responsibility for their own work, independently or within a group, and to plan their schedule appropriately.

The breadth of the Science @ Melbourne program means that arts and sciences graduates will have been exposed, directly or indirectly, to thoughts and ideas from a number of bodies of knowledge. These graduates are aware of the breadth and depth of knowledge in areas beyond their specific areas of specialisation.

Duration

The course involves four years of full-time study, and may be studied part-time.

Course requirements

The BASc degree requires the completion of a minimum (and maximum) of 400 points of study, comprising 200 points of subjects from approved departments of *each* faculty. The study must be completed according to the requirements stated below.

Subjects offered by the School of Anthropology, Geography and Environmental Studies, the Department of History and Philosophy of Science and the Department of Philosophy cannot count toward the science requirement of the BASc course.

Students undertaking psychology subjects can receive credit toward *either* the science *or* arts requirement of the BASc course. Credit for psychology cannot be split between the two faculties. Students should advise the Faculty of Science Office if they would like psychology to count toward the science requirement of their BASc course.

Arts requirement

A minimum (and maximum) of 200 arts points is required, of which:

- 50 points must be at 100-level;
- 75 points must be at 200-level; and
- 75 points must be at 300-level.

This study must be in arts-approved subjects. Refer to list of arts-approved subject areas (page 5). All language subjects are arts-approved.

Science requirement

A minimum (and maximum) of 200 science points is required, which must include:

- 50 points, but no more than 75 points, at the 100-level;
- completion of 50 points of a prescribed science major at the 300-level.

Students who first enrolled in the BASc course before 1999 must complete the requirements set out above with the exception that they do not need to complete a prescribed science major, but rather 50 science points at the 300-level of subjects of their choice.

Students should refer to the course planning information on page 9 for details relating to their science studies, including information about majors and science and non-science points.

Bachelor of Science/Bachelor of Teaching

Course objectives

The Bachelor of Science/Bachelor of Teaching aims to provide a high quality pathway for the preparation of secondary teachers in the physical sciences and information technology. Students in the combined degree program start their Education studies in the second year of the program and obtain their teaching qualification at degree, rather than diploma level.

Attributes of the Bachelor of Science/Bachelor of Teaching graduate

Bachelor of Science/Bachelor of Teaching graduates should:

- have a broad knowledge of science across a range of disciplines, with a higher level of understanding in one or more of the physical or mathematical sciences;
- demonstrate the essential knowledge and skills required to perform competently as a beginning teacher of science and/or mathematics;
- when solving scientific problems:
  - be capable of applying appropriate knowledge,
  - be able to access relevant information,
  - understand the principles of project and experimental design,
  - have a capacity to apply practical skills and technology;
- be able to communicate the results of their studies in both written and oral form;
- have the knowledge, skills and attitude to enable adaptation to scientific, technological and social change, have a sense of intellectual curiosity and a desire for lifelong learning, and a capacity to be creative and innovative;
- understand the key concepts of curriculum policy formation and curriculum development and implications for science and mathematics education;
- demonstrate awareness of the intellectual, social and psychological domains in their work with learners and be able to adapt teaching strategies to interest and motivate students;
- have an appreciation of the theoretical understandings of schooling and education and be able to implement an on-going program of self education appropriate to their personal and professional needs.

Duration

The BSc/BTeach is normally completed over four years of full-time study. Part-time study is only available before entering the third year of the program.

Course requirements

Students enrolled in the BSc/BTeach must accumulate a minimum (and maximum) of 400 points. Within the 400 points students must satisfy the minimum requirements for both the Bachelor of Science component and the Bachelor of Teaching component.

Science component

A minimum (and maximum) of 250 science points, comprising:

- between 75 and 125 science points at the 100-level, including 25-point sequences in each of chemistry, mathematics and/or statistics, and physics;
- completion of 50 points of a prescribed science major at the 300-level in one of chemistry, computer science, mathematics and statistics, or physics.

At least 50 points at 100-level must be completed before proceeding to 200-level subjects.

There are no 200-level science requirements except those required to meet the pre-requisite requirements for students' chosen science major in the Bachelor of Science component and Learning Area studies in the Bachelor of Teaching component.

Students will normally only be able to complete one science major as the maximum science points available in the BSc/BTeach is 250 points.

Teaching component

150 points comprising:

- 125 points of compulsory subjects in the Bachelor of Teaching;
- two Learning Area studies (12.5 points each).

These Learning Area Studies must include *at least one of* the following: Chemistry, Mathematics (Core), Mathematics (Additional), Physics.

Students may include *at most one of* the following Learning Area Studies: Science, Information Technology.

Course structure

A representative year-by-year structure is summarised below. The balance between 100-, 200- and 300-level science subjects is flexible within the limits of the Bachelor of Science requirements listed above. Students should ensure that subjects taken in Year 2 will satisfy the pre-requisites for the Learning Areas commencing in Year 3.

First year	Points
Science subjects	
100-level science subjects including 25 point sequences of study in *each of* chemistry, mathematics *and/or* statistics, physics	75
Additional 100-level science subjects which may include computer science	25
Total	**100**

Second year	Points
Science subjects	
200-level science subjects	75
Teaching subjects	
482-101 Education Policy, Schools & Society *(p.3)*	12.5
483-122 Language in Education *(p.3)*	6.25
485-113 Computers and the Classroom *(p.3)*	6.25
Total	**100**

Third year	Points
Science subjects	
300-level science subjects	37.5
Teaching subjects	
460-102 School Experience & Practice Teaching 1T *(p.3)*	12.5
First Learning Area study	12.5
Second Learning Area study	12.5
476-100 Learning & Teaching *(p.2)*	12.5
476-101 Curriculum & Assessment *(p.2)*	12.5
Total	**100**

Fourth year	Points
Science subjects	
300-level science subjects	37.5
Teaching subjects	
460-203 School Experience & Practice Teaching 2T *(p.4)*	12.5
460-204 Internship *(p.5)*	25
476-203 Teaching: Professional Perspectives *(p.5)*	12.5
Plus either	
460-424 Research Project *(p.7)*	12.5
or	
460-427 Honours Project *(p.8)*	12.5
Total	**100**

School experience requirements

Bachelor of Teaching students complete a minimum of 45 days of supervised practice teaching in schools plus an extended internship in final year. Bachelor of Science/Bachelor of Teaching students should note that they are expected to meet their practicum commitments where these may occur in semester breaks at the same time as some science subjects are offered on an intensive basis.

Semester dates

In 2005, students in year 3 of the Bachelor of Science/Bachelor of Teaching course begin classes in the week beginning 21 February.

Details of semester dates and school experience placements are available from the School Experience and Professional Practice Unit.

Honours

Students who wish to complete a Bachelor of Science (Degree with Honours) undertake the additional honours year as a final fifth year after fourth year of the combined program. Students planning to apply for entry into the Bachelor of Science (Degree with Honours) should refer to *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)* for further details.

Students who wish to complete the Bachelor of Teaching (Honours) within third and fourth year will be able to apply in the same way as all other Bachelor of Teaching students. Refer to *Honours (p.2)* for further details.

Part-time studies

Part-time studies are available in the first two years of the combined course (the science component) but not in third and fourth year (the teaching component).

Internal transfer into the Bachelor of Science/ Bachelor of Teaching

University of Melbourne students who have completed at least 87.5 points can apply for the combined course by completing an internal transfer form on the University's Student Information System (SIS) at <https://sis.unimelb.edu.au/>. Admission to the combined course is also possible after second year, provided that the prerequisite subjects for two teaching areas have been completed.

Selection will be based on academic merit and will be conditional upon appropriate selection of later year science subjects to meet prerequisites for the student's intended teaching areas.

Note that it may not be possible to gain credit towards the combined course for all prior Bachelor of Science subjects due to the specific course structure required for the BSc component of the combined course.

Course planning information for the BSc, BASc and BSc combined courses

Points

The Bachelor of Science, BASc and combined courses, are organised on a points system. Students must complete a minimum number and type of points to satisfy the requirements of each course.

Every subject taught in the faculty has a points value that is determined by the workload associated with that subject. Accordingly, the faculty awards points for the successful completion of each subject. The points a student will receive if they successfully complete a particular subject are noted in the Handbook entry for that subject.

Science and non-science subjects

The distinction between *science* and *non-science* subjects is relevant to all students enrolled in the BSc, BASc and BSc combined degree courses, as these courses require the accumulation of a certain number of science points. Non-science subjects cannot be counted towards the science component of a BSc combined course or the BASc.

Students enrolled in the BSc/BIS course cannot receive science credit for any information systems subjects. For these students, all information systems subjects count towards the information systems component.

Most subjects listed in the Faculty of Science entry of this Handbook are available for science credit, but there are important exceptions including the following.

- Some subjects offered by the Department of Information Systems are non-science subjects. In the information systems entry (see page 1), the science or non-science status of each subject is clearly stated.
- Some subjects offered by the Department of Mathematics and Statistics, and the School of Earth Sciences that are only available to engineering students. If a subject does not earn science credit, it is labelled as non-science in the subject description.

Any subject that does not appear in the Faculty of Science section of this Handbook is a non-science subject.

Year levels of non-science subjects

A non-science subject that is available at more than one level must be taken at the lower level by Bachelor of Science students, unless written approval is obtained from the Faculty of Science for the subject to be taken at the higher level.

Course planning

All students are responsible for their own learning and their course. Faculty advisers and members of individual departments are experienced and willing to assist in planning courses, but it remains the student's responsibility to integrate the advice and make the final selection of subjects. Departments offer a number of course plans, based around the majors, which students can refer to.

First-year course planning

Students selected into courses offered by the faculty are invited to attend introductory information sessions at the University. At these sessions students will be given important information about course requirements, majors available and the enrolment process. Shortly afterwards, students meet with a faculty adviser to plan their first year of study. The course plan that is authorised will reflect the student's current areas of interest and allow for flexibility in future studies.

Course planning in later years

A student's subject selection is a balance between previous studies and achievements, career choice, personal interest, course requirements, and a desire to obtain a basic scientific education at the tertiary level. Sometimes, however, practical considerations such as timetabling or quota restrictions can impose limitations.

Students should refer to this Handbook in the first instance. The section *Planning a science major (p.11)* outlines recommended course plans for the various majors.

Students requiring further information may obtain course advice from student advisers in the Faculty Office. Students may also discuss course options with members of academic staff who are designated as first-year coordinators and departmental course advisers.

Students are required to submit a course plan for the following year if they will be continuing with their study. Departmental course advisers assist in planning courses. This usually occurs in Semester 2, and students will be advised of course planning arrangements for the following year by mail or email. Course plans are submitted on the Student Information System at <http://sis.unimelb.edu.au>. All course plans must be approved by the faculty.

Course plans are applications for selection into subjects. Once a course plan has been submitted, no further action is required unless a student fails a prerequisite subject, misses entry into quota-restricted subjects or wishes to alter their course plan. In these cases, the student should seek advice from the faculty office.

Overloads in Semester 1 and 2

50 points per semester is regarded as a normal full-time enrolment. A workload in excess of 50 points per semester is an overload. 25 points is a normal full-time enrolment for the Summer Semester.

The faculty will normally only allow students to enrol in up to 62.5 points per semester if they have:

- successfully completed at least 37.5 points in the previous semester;
- no fails in the previous semester; and
- an average of at least H2B (ie. 70 per cent) for all subjects attempted in the previous semester.

In cases where a student was on leave in the previous semester, the faculty will consider the workload attempted and results achieved in the most recent semester in which the student was undertaking subjects.

The average of at least H2B requirement may be waived if an overload of 62.5 points will enable the student to complete course requirements at the end of the semester. Requests to enrol in more than 62.5 points per semester will be considered on a case-by-case basis.

The faculty will not accept or consider requests to overload in:

- Semester 1 2005 until the Semester 2 2004 results have been released;
- Semester 2 2005 until the Semester 1 2005 results have been released.

Late changes to subjects

The subject descriptions listed in this Handbook are correct at the time of printing, however the University retains the right to suspend or change the details of any subject, see *Changes to subjects/courses (p.4)*.

Quota subjects

Some of the subjects offered by the Faculty of Science are termed 'quota subjects' or 'quota-restricted subjects'. These are usually laboratory or fieldwork subjects where the capacity to large enrolments is limited by available resources. Often, but not always, the demand for these subjects exceeds the number of places available in them. In order for departments to ensure that a subject is not over-subscribed, a quota restriction will apply to that subject.

Selection process

Selection into quota subjects is based on academic merit. Students will be expected to have satisfied prerequisites and corequisites where applicable.

Re-enrolling students

Most students are selected automatically on the basis of grades obtained in previous subjects. For selection into 200-level subjects, the results obtained in the best 75 science points at 100-level are considered. For 300-level subjects, the results obtained in the best 75 science points at 200-level are considered. Allowance may be made to vary this for combined course students who have completed less than 75 science points.

Non-science subjects are not considered when allocating places in quota subjects.

The teaching department offering the quota subject offers the remaining places. Places in each subject will be offered in accordance with an applicant's rank on the waiting list and until all places available in the subject have been filled.

New and resuming students

New and resuming students will be ranked, together with re-enrolling students, in order of merit following an evaluation of their results in previous studies.

Non-award course students may fill any remaining places in quota restricted subjects after the selection of all award course students.

Enrolment process

Students need to indicate their wish to be considered for a place in quota subjects on their course plan. There are a number of rounds of offers into quota restricted subjects before the start of the academic year. Students will automatically be considered for the quota subjects they have listed on their course plan in rounds two and three if they are not offered a place in round one. In July of each year, a 'top-up' of places in Semester 2 quota subjects occurs. Students who have not previously applied for a place in Semester 2 quota subjects will need to submit the appropriate form to the Faculty of Science Office before the application deadline.

Students who are offered places in quota subjects will be notified by mail. Round one quota offers will be included on the authorised enrolment record. Confirmation of the enrolment will signify acceptance of the place in the quota subjects. Failure to confirm the enrolment may jeopardise the place in quota subjects.

For rounds two and three of quota subject selection, students will receive a letter of offer. Students offered a place in quota subjects in rounds two and three will need to confirm acceptance of the place before the specified date to secure their place. This is another example of the importance of students ensuring their postal address details held by the Faculty of Science remain up to date.

For administrative reasons, offers of specific subjects to students are made at set times prior to the commencement of the subject. The faculty over-fills the quota and allows subject changes to correct the over-enrolment. One student withdrawing from a particular subject does not mean, therefore, that a place will automatically become available for another student.

Quota subjects for 2005

A list of the quota subjects for 2005 will be available from the Faculty Office and on the Faculty web site at the time of course planning for 2005.

First-year packages

First-year science students are encouraged to consider undertaking one of the following first-year packages. These packages have been created to assist first-year students choose a cohesive combination of subjects that allow them to undertake later year subjects in related study disciplines.

Please note that the completion of a first-year package is not a course requirement.

In the description of the first-year packages listed below, it is assumed that first year students undertake four subjects per semester.

Life sciences

		Points
This package leads to 200-level studies in biological, biomedical and biotechnological sciences: botany, genetics, zoology, ecology, anatomy and cell biology, biochemistry and molecular biology, microbiology and immunology, pharmacology, physiology and pathology.		
Biology		
650-141	Biology of Cells and Organisms *(p.1)*	12.5
650-142	Genetics & The Evolution of Life *(p.1)*	12.5
Chemistry		
One of:		
610-141	Chemistry A *(p.2)*	12.5
610-121	Chemistry A (Advanced Studies Program) *(p.2)*	12.5
and one of:		
610-142	Chemistry B *(p.2)*	12.5
610-122	Chemistry B (Advanced Studies Program) *(p.2)*	12.5
Plus		
Four additional subjects		50
Total		**100**

Note:

- 610-171 Fundamentals of Chemistry *(p.3)* is available as an alternative chemistry subject in Semester 1 for students who have not completed VCE Chemistry.
- Students seeking to major in psychology should select 512-120 Introductory Experimental Psychology 1 *(p.1)* and 512-121 Social, Develop. & Clinical Psychology 1 *(p.1)*.

Physical sciences

		Points
This package leads to 200-level studies in physics, mathematics and statistics, chemistry and computer science.		
Mathematics and statistics		
One of:		
620-141	Mathematics A *(p.6)*	12.5
620-121	Mathematics A (Advanced) *(p.5)*	12.5
and one of:		
620-143	Applied Mathematics *(p.6)*	12.5
620-123	Applied Mathematics (Advanced) *(p.5)*	12.5
620-113	Applied Mathematics (Advanced Plus) *(p.5)*	12.5
and one of:		
620-142	Mathematics B *(p.6)*	12.5
620-122	Mathematics B (Advanced) *(p.5)*	12.5
Plus at least one of chemistry, physics or computer science		
Chemistry		
One of:		
610-141	Chemistry A *(p.2)*	12.5
610-121	Chemistry A (Advanced Studies Program) *(p.2)*	12.5
and one of:		
610-142	Chemistry B *(p.2)*	12.5
610-122	Chemistry B (Advanced Studies Program) *(p.2)*	12.5
Physics		
One of:		
640-121	Physics A (Adv) *(p.2)*	12.5
640-141	Physics A *(p.2)*	12.5
640-161	Physics: Principles & Applications A *(p.3)*	12.5
and one of:		
640-122	Physics B (Adv) *(p.2)*	12.5
640-142	Physics B *(p.3)*	12.5
640-162	Physics: Principles & Applications B *(p.3)*	12.5
Computer science		
One of		
433-171	Introduction to Programming *(p.17)*	12.5
433-151	Introduction to Programming (Advanced) *(p.16)*	12.5
and one of		
433-172	Algorithmic Problem Solving *(p.17)*	12.5
433-152	Algorithmic Problem Solving (Advanced) *(p.17)*	12.5
Plus		
Additional subjects to complete 100 points at 100-level points		
Total		**100**

Note:

- 610-171 Fundamentals of Chemistry *(p.3)* is available as an alternative chemistry subject in Semester 1 for students who have not completed VCE Chemistry.

Earth sciences and Geography

		Points
This package leads to 200-level studies in Earth sciences, Geography, Chemistry and Biology.		
Two subjects from either earth sciences or geography		
Earth sciences		
625-101	Earth Sciences - The Global Environment *(p.1)*	12.5
625-102	Understanding Planet Earth *(p.1)*	12.5
625-103	The Atmosphere and Oceans *(p.2)*	12.5
Geography and environmental studies		
121-110	Famine in the Modern World *(p.2)*	12.5
121-171	Environmental Change *(p.2)*	12.5
121-172	Global Ecology and Biodiversity *(p.2)*	12.5
Plus two of chemistry, physics, mathematics and statistics, or biology		
Chemistry		
One of:		
610-141	Chemistry A *(p.2)*	12.5
610-121	Chemistry A (Advanced Studies Program) *(p.2)*	12.5
and one of:		
610-142	Chemistry B *(p.2)*	12.5
610-122	Chemistry B (Advanced Studies Program) *(p.2)*	12.5
Physics		
One of:		
640-121	Physics A (Adv) *(p.2)*	12.5
640-141	Physics A *(p.2)*	12.5
640-161	Physics: Principles & Applications A *(p.3)*	12.5
640-176	The Solar System and the Cosmos *(p.4)*	12.5
and one of:		
640-122	Physics B (Adv) *(p.2)*	12.5
640-142	Physics B *(p.3)*	12.5
640-162	Physics: Principles & Applications B *(p.3)*	12.5
640-177	Stars and Galaxies *(p.4)*	12.5
Mathematics and statistics		
620-160	Experimental Design & Data Analysis *(p.7)*	12.5

Earth sciences and Geography		Points
620-161	Introductory Mathematics *(p.7)*	12.5
Biology		
650-141	Biology of Cells and Organisms *(p.1)*	12.5
650-142	Genetics & The Evolution of Life *(p.1)*	12.5
Plus		
Two additional subjects		25
Total		**100**

Note:

- 610-171 Fundamentals of Chemistry *(p.3)* is available as an alternative chemistry subject in Semester 1 for students who have not completed VCE Chemistry.
- Students who have completed VCE Specialist Mathematics 3/4 or equivalent will not normally be permitted to enrol in 620-161. These students should instead consider undertaking 620-141 Mathematics A *(p.6)* or 620-121 Mathematics A (Advanced) *(p.5)*.

Environmental sciences		Points
This package leads to a major in environmental science in conjunction with another major		
Biology		
650-141	Biology of Cells and Organisms *(p.1)*	12.5
650-142	Genetics & The Evolution of Life *(p.1)*	12.5
Chemistry		
One of:		
610-141	Chemistry A *(p.2)*	12.5
610-121	Chemistry A (Advanced Studies Program) *(p.2)*	12.5
and one of:		
610-142	Chemistry B *(p.2)*	12.5
610-122	Chemistry B (Advanced Studies Program) *(p.2)*	12.5
Mathematics and statistics		
620-160	Experimental Design & Data Analysis *(p.7)*	12.5
Plus one of:		
Earth Sciences		
625-101	Earth Sciences - The Global Environment *(p.1)*	12.5
Geography and environmental studies		
Plus		
Two additional subjects		25.0
Total		**100**

Note:

- 610-171 Fundamentals of Chemistry *(p.3)* is available as an alternative chemistry subject in Semester 1 for students who have not completed VCE Chemistry.
- Students wishing to pursue studies in environmental sciences may alternatively take the physical sciences package and enrol in 620-142 Mathematics B *(p.6)* and 620-143 Applied Mathematics *(p.6)* or 620-160 Experimental Design & Data Analysis *(p.7)* in second year.

Majors

Majors

All students commencing the BSc, BASc or a BSc combined course in 1999 and beyond are expected to complete a science major which will be included on an academic transcript.

A science major is defined as 50 points at 300-level in a discipline.

The psychology major is the clear exception to this rule. The biotechnology major is also comprised of less than 50 points at 300-level, but it can only be undertaken in conjuction with another life sciences major.

To major, students complete one of the science majors listed below. Students may not complete alternative combinations of subjects to major or co-major, unless written approval is obtained from the Associate Dean (Academic Programs), Faculty of Science.

Planning a science major

The 100-level and 200-level subjects included in the descriptions of majors listed below are suggested subjects only.

Students are not required to undertake particular subjects at these levels to complete a science major (except for psychology), but should be aware that these 100-level and 200-level subjects have been recommended by the contact department as subjects leading towards the science major. Please note: these identified 100-level and 200-level subjects do not always satisfy prerequisite requirements for the 300-level subjects.

The most appropriate way to plan a course of study towards a science major is to select a major, identify the core and elective subjects forming part of that major (ie. specific 300-level subjects), check the detailed subject descriptions of each of those 300-level subjects for their prerequisites, and select these 100-level and 200-level prerequisite subjects. Students should begin to consider a major when planning their 200-level subjects.

Students are permitted to complete more than one science major, however to do so requires completion of 50 points at 300-level in each discipline. Up to the equivalent of one 12.5 point subject at 300-level can be counted towards both science majors where applicable. Students must complete a minimum of 87.5 points at 300-level to be awarded two science majors. A maximum of two science majors will be identified on a student's transcript. Students qualifying for more than two majors will need to nominate the two science majors to appear on their transcript.

With one exception, students will only be eligible to be awarded a science major in biotechnology, environmental science or history and philosophy of science if they have already satisfied the requirement of a second appropriate science major. Students enrolled in a BSc combined degree with either the Faculty of Engineering or the Institute of Land and Food Resources are able to complete a single science major in environmental science. Science students in all other courses cannot qualify for a major in more than one of biotechnology, environmental science or history and philosophy of science.

Note: Students who commenced their course before 1999 do not need to complete a major.

Science majors available:

ANATOMY

Teaching departments: Anatomy and Cell Biology, Physiology, Zoology.

Anatomy		Points
Contact: Department of Anatomy and Cell Biology		
First year		
Life sciences package		
Second year		
50 points		
516-201	Cell Biology: Tissues and Organs *(p.1)*	12.5
516-204	Anatomy 1 *(p.1)*	12.5
516-207	Anatomy 2 *(p.2)*	12.5
516-209	Introductory Neuroscience *(p.2)*	12.5
Third year (major)		
50 points		
516-304	Functional and Applied Anatomy *(p.2)*	12.5
516-305	Neuroscience: Systems & Higher Functions *(p.3)*	12.5
516-308	Advanced Studies in Human Anatomy *(p.3)*	12.5
plus one of:		
516-302	Developmental Biology *(p.2)*	12.5
516-306	Developmental Neurobiology *(p.3)*	12.5

Anatomy		Points
516-307	Research Project *(p.3)*	12.5
536-308	Physiology of Muscle & Exercise *(p.4)*	12.5

Note: the topic of the Research Project must be related to the major discipline.

BIOCHEMISTRY AND MOLECULAR BIOLOGY

Biochemistry and molecular biology is a useful major on its own, but it also complements many other fields of study particularly well. On the departmental web site <http://www.biochemistry.unimelb.edu.au/> are example course plans describing how a major in biochemistry and molecular biology can be combined with study in other disciplines to create particular areas of specialisation including biochemical basis of disease, biochemistry of drug design and function, bioinformatics, functional genomics, metabolism and nutrition, molecular biotechnology, molecular cell biology, molecular immunology, neuroscience, and structural biology of macromolecules.

Teaching department: Biochemistry and Molecular Biology

Biochemistry and molecular biology		Points
Contact: Department of Biochemistry and Molecular Biology		
First year		
Any first year package that includes two 100-level chemistry subjects		
Second year		
37.5 points		
521-211	Biochemistry & Molecular Biology Part A *(p.1)*	12.5
521-220	Techniques in Protein & Gene Technology *(p.2)*	12.5
521-212	Biochemistry & Molecular Biology Part B *(p.2)*	12.5
Third year (major)		
50 points		
At least one of:		
521-301	Protein Structure, Design & Engineering *(p.2)*	12.5
521-302	Functional Genomics *(p.2)*	12.5
Plus at least one of:		
521-321	Gene Technology & Protein Expression *(p.4)*	12.5
521-322	Protein Biochemistry and Proteomics *(p.4)*	12.5
Additional subjects can be chosen from:		
521-303	Molecular Aspects of Cell Biology *(p.3)*	12.5
521-304	Hormone & Neurotransmitter Biochemistry *(p.3)*	12.5
521-305	Biochemistry of Metabolism & Nutrition *(p.3)*	12.5
521-307	Biomolecular Structure & Bioinformatics *(p.3)*	12.5

BIOTECHNOLOGY

The biotechnology major is only available when completed in conjunction with a life sciences major in one of anatomy, biochemistry and molecular biology, botany, cell biology, chemistry, genetics, immunology, microbiology, neuroscience, pathology, pharmacology, physiology or zoology.

Teaching departments: Anatomy and Cell Biology, Biochemistry and Molecular Biology, Botany, Chemistry, Genetics, Microbiology and Immunology, Pathology, Pharmacology, History and Philosophy of Science, Zoology.

Biotechnology		Points
Contact: Biotechnology coordinator		
Dr Ed Newbigin, School of Botany		
First year		
Life sciences package		
Second year		
200-level subjects leading towards a life sciences major in one of anatomy, biochemistry and molecular biology, botany, cell biology, chemistry, genetics, immunology, microbiology, neuroscience, pathology, pharmacology, physiology or zoology.		
Students **must** also take:		
600-205	Biotechnology in Practice *(p.1)*	12.5
600-205 has prerequisites - refer to subject description. Students also need to fulfil prerequisite requirements for the life sciences major and the elective subjects towards the biotechnology major.		
Third year (major)		
37.5 points		

To qualify for a science major in biotechnology, students must have completed 600-205 Biotechnology in Practice **and** be completing a life sciences major from the list above. In addition, students must take at least 37.5 points of elective 300-level biotechnology subjects from the lists on (see page 1). At least 25 points of these 37.5 points must be from a department different to that responsible for teaching the student's other major. Practical subjects totalling 25 points must be included, either within the life science major or the biotechnology major.

In accordance with Faculty of Science policy on the award of two majors, a minimum of 87.5 points of 300-level science subjects is required for the award of a life science major and the biotechnology major.

For additional detail on the structure of the biotechnology major, See Biotechnology (see page 1).

BOTANY

Teaching department: Botany.

Botany		Points
Contact: School of Botany		
First year		
Life sciences package		
Second year		
Up to 50 points		
200-level botany subjects		
Note: Check 300-level subjects for prerequisites to be completed at 200-level.		
Third year (major)		
50 points selected from:		
121-030	Applied Ecology *(p.6)*	25
606-301	Applied Ecology (Theory) *(p.2)*	12.5
606-302	Marine Botany *(p.2)*	25
606-303	Systematics of Plants and Fungi *(p.3)*	12.5
606-304	Environmental Plant Physiology *(p.3)*	12.5
606-306	Plant Molecular Biology & Biotechnology *(p.3)*	12.5
606-309	Frontiers of Cell Biology *(p.3)*	12.5
606-310	Field Botany *(p.3)*	12.5
600-311	Research Project A *(p.1)*	12.5
600-312	Research Project B *(p.1)*	12.5

Note: Students may only choose one of 121-030 or 606-301; and only one of 600-311 or 600-312.

Note: the topic of the Research Project must be related to the major discipline.

CELL BIOLOGY

Teaching departments: Anatomy and Cell Biology, Biochemistry and Molecular Biology, Botany, Genetics, Physiology, Zoology.

Cell biology		Points
Contact: School of Botany		
First year		
Life sciences package		
Second year		
50 points		
200-level science subjects		
(Check 300-level subjects for pre-requisites to be completed at 200-level)		
Third year (major)		
50 points selected from:		
516-302	Developmental Biology *(p.2)*	12.5
516-306	Developmental Neurobiology *(p.3)*	12.5
521-303	Molecular Aspects of Cell Biology *(p.3)*	12.5
606-306	Plant Molecular Biology & Biotechnology *(p.3)*	12.5
606-309	Frontiers of Cell Biology *(p.3)*	12.5
652-303	Developmental and Cellular Genetics *(p.2)*	12.5
516-307	Research Project *(p.3)*	12.5
600-311	Research Project A *(p.1)*	12.5
600-312	Research Project B *(p.1)*	12.5

Note: Students may only choose one of 516-307, 600-311 or 600-3132 and the topic of the Research Project must be related to the major discipline.

CHEMISTRY

Teaching department: Chemistry

Chemistry		Points
Contact: School of Chemistry		
First year		
Any first-year package which includes two 100-level chemistry subjects		
Second year		
50 points selected from:		
610-210	Light, Matter & Chemical Change A *(p.3)*	12.5
(or 610-211 plus 610-215)		18.75
610-220	Organic Chemistry *(p.3)*	12.5
(or 610-221 plus 610-225)		18.75
610-240	Inorganic and Bio-inorganic Chemistry A *(p.4)*	12.5
(or 610-241 plus 610-245)		18.75
610-260	Analysis in Chemical and Life Sciences *(p.5)*	12.5
Third year (major)		

Chemistry

Points

50 points selected from 300-level chemistry subjects and including a minimum of two of the following core branches of chemistry (List A) plus a minimum of one of the following key chemistry subjects (List B) - noting that some combinations from List A and List B are mutually exclusive.

LIST A (core branches of chemistry - choose a minimum of two branches)

Physical chemistry

Either both:

610-311 Physical Chemistry IIIB *(p.5)* 12.5
610-315 Physical Chemistry Practical III *(p.5)* 6.25

or

610-310 Physical Chemistry IIIA *(p.5)* 12.5

Organic chemistry

Either both:

610-321 Organic Chemistry IIIB *(p.6)* 12.5
610-325 Organic Chemistry Practical III *(p.6)* 6.25

or

610-320 Organic Chemistry IIIA *(p.6)* 12.5

Inorganic chemistry

Either both:

610-341 Inorganic Chemistry IIIB *(p.7)* 12.5
610-345 Inorganic Chemistry Practical III *(p.7)* 6.25

or

610-340 Inorganic Chemistry IIIA *(p.7)* 12.5

Analytical and environmental chemistry

610-360 Analytical & Environmental Chemistry *(p.7)* 12.5

LIST B (key chemistry subjects - choose a minimum of one)

610-310 Physical Chemistry IIIA *(p.5)* 12.5
610-311 Physical Chemistry IIIB *(p.5)* 12.5
610-320 Organic Chemistry IIIA *(p.6)* 12.5
610-321 Organic Chemistry IIIB *(p.6)* 12.5
610-340 Inorganic Chemistry IIIA *(p.7)* 12.5
610-341 Inorganic Chemistry IIIB *(p.7)* 12.5
610-360 Analytical & Environmental Chemistry *(p.7)* 12.5

COMPUTER SCIENCE

This science major is not available to students enrolled in the software engineering stream of the BE/BSc or the BE(IT)/BSc. These students will be required to complete a major in an alternative science discipline.

Teaching department: Computer Science and Software Engineering.

Computer science

Points

Contact: Department of Computer Science and Software Engineering

First year

Any first-year package including

One of:

433-171 Introduction to Programming *(p.17)* 12.5
433-151 Introduction to Programming (Advanced) *(p.16)* 12.5

and one of:

433-172 Algorithmic Problem Solving *(p.17)* 12.5
433-152 Algorithmic Problem Solving (Advanced) *(p.17)* 12.5

plus at least 25 points of mathematics and statistics

Second year

50 points

433-252 Software Engineering Principles & Tools *(p.17)* 12.5
433-253 Algorithms and Data Structures *(p.17)* 12.5
433-254 Software Design *(p.18)* 12.5
433-255 Logic and Computation *(p.18)* 12.5

Third year (major)

50 points selected from:

433-303 Artificial Intelligence *(p.18)* 12.5
433-313 Computer Design *(p.18)* 12.5
433-330 Theory of Computation *(p.18)* 12.5
433-332 Operating Systems *(p.18)* 12.5
433-341 Software Engineering Process & Practice *(p.19)* 12.5
433-351 Database Systems *(p.19)* 12.5
433-353 Networks and Communications *(p.20)* 12.5
433-361 Programming Language Implementation *(p.20)* 12.5
433-371 Interactive System Design *(p.20)* 12.5
433-380 Graphics and Computation *(p.20)* 12.5
433-385 Modelling, Analysis and Visualisation *(p.20)* 12.5

CONSERVATION AND AUSTRALIAN WILDLIFE

Teaching departments: Botany, Zoology.

Conservation and Australian wildlife

Points

Contact: Department of Zoology

First year

Life sciences package including:

620-160 Experimental Design & Data Analysis *(p.7)* 12.5
650-111 Biology of Australian Flora & Fauna *(p.1)* 12.5

Second year

50 points selected from:

606-202 Plant Biodiversity *(p.1)* 12.5
606-204 Ecology: Communities and Ecosystems *(p.1)* 12.5
606-207 Flora of Victoria *(p.2)* 12.5
654-202 Vertebrate Structure and Function *(p.1)* 12.5
654-203 Animal Physiology *(p.2)* 12.5
654-204 Ecology: Individuals and Populations *(p.2)* 12.5
654-207 Australian Wildlife Biology *(p.2)* 12.5

Third year (major)

50 points

606-310 Field Botany *(p.3)* 12.5
654-308 Conservation Biology *(p.3)* 12.5
654-309 Field Biology of Marsupials & Monotremes *(p.4)* 12.5
654-319 Biology of Marsupials and Monotremes *(p.4)* 12.5

EARTH SCIENCES

Teaching department: Earth Sciences.

Geology

Points

Contact: School of Earth Sciences

First year

Earth sciences package

Second year

25 points

625-222 Minerals and Magmas *(p.2)* 12.5
625-223 Field Geology *(p.3)* 12.5

Third year (major)

50 points

625-301 Structural Geology & Geodynamics *(p.3)* 12.5
625-302 Sedimentary Geology *(p.3)* 12.5

Plus two of:

625-303 Geochemistry & Petrogenesis *(p.3)* 12.5
625-304 Applied Geophysics *(p.4)* 12.5
625-305 Economic Geology *(p.4)* 12.5
625-307 Hydrogeology & Environmental Management *(p.4)* 12.5
625-308 Digital Geoscience *(p.4)* 12.5
625-313 Advanced Field Geology *(p.4)* 12.5
600-311 Research Project A *(p.1)* 12.5
600-312 Research Project B *(p.1)* 12.5

Note: the topic of the Research Project must be related to the major discipline.

Atmosphere and ocean sciences

Points

Contact: School of Earth Sciences

First year

Earth sciences package including mathematics 620-141, 620-142 and 620-143 or equivalent.

Second year

25 points

625-227 Weather and Climate Systems *(p.3)* 12.5
625-228 Atmospheric Environment Processes *(p.3)* 12.5

Third year (major)

50 points

625-331 Atmosphere-Ocean Interaction *(p.5)* 25
625-332 Climate: Mechanisms & Variability *(p.5)* 25

Environmental earth sciences

Points

(can be taken with an Environmental science major)

Contact: School of Earth Sciences

First year

Earth sciences package

Second year

25 points

625-203 Dangerous Earth *(p.2)* 12.5
625-223 Field Geology *(p.3)* 12.5

Third year (major)

50 points

625-301 Structural Geology & Geodynamics *(p.3)* 12.5
625-302 Sedimentary Geology *(p.3)* 12.5
625-307 Hydrogeology & Environmental Management *(p.4)* 12.5

Environmental earth sciences Points

plus one of:

625-303	Geochemistry & Petrogenesis *(p.3)*	12.5
625-304	Applied Geophysics *(p.4)*	12.5
625-305	Economic Geology *(p.4)*	12.5
625-308	Digital Geoscience *(p.4)*	12.5
625-313	Advanced Field Geology *(p.4)*	12.5
600-311	Research Project A *(p.1)*	12.5
600-312	Research Project B *(p.1)*	12.5

Note: the topic of the Research Project must be related to the major discipline.

ECOLOGY

Teaching departments: Botany, Zoology, Anthropology, Geography and Environmental Studies.

Ecology Points

Contact: Botany, Zoology, Anthropology, Geography and Environmental Studies

First year

Life sciences package including

650-111	Biology of Australian Flora & Fauna *(p.1)*	12.5

Second year

50 points

606-204	Ecology: Communities and Ecosystems *(p.1)*	12.5
654-204	Ecology: Individuals and Populations *(p.2)*	12.5

Plus two of:

121-018	Geomorphology *(p.3)*	12.5
606-201	Plant Structure and Function *(p.1)*	12.5
606-202	Plant Biodiversity *(p.1)*	12.5
606-207	Flora of Victoria *(p.2)*	12.5
654-201	Invertebrate Structure and Function *(p.1)*	12.5
654-207	Australian Wildlife Biology *(p.2)*	12.5

Third year (major)

50 points selected from:

121-030	Applied Ecology *(p.6)*	25
121-033	Environmental Hydrology A *(p.6)*	25
121-029	Environmental Hydrology B *(p.5)*	12.5
606-301	Applied Ecology (Theory) *(p.2)*	12.5
606-304	Environmental Plant Physiology *(p.3)*	12.5
654-302	Experimental Marine Ecology *(p.2)*	12.5
654-312	Marine Ecology *(p.4)*	12.5

ENVIRONMENTAL SCIENCE

Available as a single major only to students enrolled in a BSc combined degree with either the Faculty of Engineering or the Institute of Land and Food Resources.

For students enrolled in any other BSc program or the BASc, the environmental science major is only available when completed in conjunction with a second science major. The second science major cannot be biotechnology or history and philosophy of science. In accordance with Faculty of Science policy on the award of two majors, a minimum of 87.5 points of 300-level science subjects is required for the award of the environmental science major and a second science major.

Teaching departments: Botany, Chemistry, Earth Sciences, Anthropology, Geography and Environmental Studies, Mathematics and Statistics, Zoology.

Environmental science Points

Contact: Environmental Science Coordinator

Dr Mick Keough, Department of Zoology

First year

Environmental science package

Second year

37.5 points

620-270	Applied Statistics *(p.10)*	12.5
610-280	Environmental Chemistry *(p.5)*	12.5

Plus one of:

606-204	Ecology: Communities and Ecosystems *(p.1)*	12.5
654-204	Ecology: Individuals and Populations *(p.2)*	12.5

Third year (major)

50 points

600-303	Environmental Risk Assessment *(p.1)*	12.5
600-301	Problem Solving in Environmental Science *(p.1)*	12.5

plus two of:

121-029	Environmental Hydrology B *(p.5)*	12.5
121-033	Environmental Hydrology A *(p.6)*	25
451-312	GIS & Remote Sensing for Enviro Science *(p.7)*	12.5
606-301	Applied Ecology (Theory) *(p.2)*	12.5

Environmental science Points

121-030	Applied Ecology *(p.6)*	25
610-360	Analytical & Environmental Chemistry *(p.7)*	12.5
620-371	Linear Models *(p.13)*	12.5
625-307	Hydrogeology & Environmental Management *(p.4)*	12.5
654-308	Conservation Biology *(p.3)*	12.5

GENETICS

Teaching department: Genetics.

Genetics Points

Contact: Department of Genetics

First year

Life sciences package

Second year

37.5 points

652-214	Principles of Genetics *(p.1)*	12.5
652-215	Genes and Genomes *(p.1)*	12.5
652-216	Molecular & General Genetics Practical *(p.1)*	12.5

Third year (major)

50 points

652-304	Genetic Analysis *(p.2)*	12.5
652-302	Molecular Genetics *(p.2)*	12.5

Plus two of:

652-301	Genomes and Evolution *(p.2)*	12.5
652-303	Developmental and Cellular Genetics *(p.2)*	12.5
652-305	Human Genetics *(p.2)*	12.5
652-306	Experimental Genetics *(p.2)*	12.5
600-312	Research Project B *(p.1)*	12.5

Note: the topic of the Research Project must be related to the major discipline.

GEOGRAPHY

Teaching departments: Anthropology, Geography and Environmental Studies.

Geography Points

Contact: Departments of Anthropology, Geography and Environmental Studies

First year

Earth sciences package including geography

Second year

37.5 points selected from:

121-017	Society and Environments *(p.3)*	12.5
121-018	Geomorphology *(p.3)*	12.5
121-021	Environmental Politics and Management *(p.3)*	12.5
121-022	Development and Urban Environments *(p.3)*	12.5
121-222	Field Class in Geography *(p.4)*	12.5
121-229	Geographical Thought *(p.5)*	12.5

Third year (major)

50 points selected from:

121-028	Sustainable Development *(p.4)*	12.5
121-310	Fluvial Geomorphology *(p.6)*	12.5
121-030	Applied Ecology *(p.6)*	25
121-458	Australian Quaternary Environments *(p.7)*	25
121-033	Environmental Hydrology A *(p.6)*	25
121-071	Coastal Geomorphology *(p.6)*	12.5

HISTORY AND PHILOSOPHY OF SCIENCE

The history and philosophy of science major is only available when completed in conjunction with a second science major. The second science major cannot be biotechnology or environmental science.

Teaching department: History and Philosophy of Science.

History and philosophy of science (HPS) Points

Contact: Department of History and Philosophy of Science

First year

Any first-year package

Second year

37.5 points

Three HPS subjects earning science points

Third year (major)

50 points

Four 300-level HPS subjects earning science points 50

The seven HPS subjects taken at second and third year must include a subject in two of the following areas: history of science, philosophy of science, and sociology of science.

In accordance with Faculty of Science policy on the award of two majors, a minimum of 87.5 points of 300-level science subjects is required for the

award of the history and philosophy of science major and a second science major.

IMMUNOLOGY

Teaching department: Microbiology and Immunology.

Immunology

Points

Contact: Department of Microbiology and Immunology

First year

Life sciences package

Second year

37.5 points of theory and 12.5 points of practical 200-level subjects from microbiology and immunology, biochemistry and molecular biology, genetics, pathology, physiology or anatomy and cell biology.

Third year (major)

50 points selected from:

526-304	Principles of Immunology *(p.2)*	12.5
526-305	Medical and Applied Immunology *(p.2)*	12.5
526-326	Projects: Immunology *(p.3)*	12.5
526-324	Immunological Techniques *(p.3)*	12.5

Students who have been unable to obtain a place in 526-326 may be permitted, only with prior approval from the Immunology major coordinators, to replace 526-326 in the major with an alternative 12.5 point 300-level subject taught in the department.

MARINE BIOLOGY

Teaching departments: Botany, Chemistry, Anthropology, Geography and Environmental Studies, Zoology.

Marine biology

Points

Contact: Department of Zoology

First year

Life sciences package including

650-111	Biology of Australian Flora & Fauna *(p.1)*	12.5

Second year

37.5 points selected from:

606-203	Phytoplankton and Seaweeds of Australia *(p.1)*	12.5
654-201	Invertebrate Structure and Function *(p.1)*	12.5
654-204	Ecology: Individuals and Populations *(p.2)*	12.5

Third year (Major)

50 points selected from:

121-071	Coastal Geomorphology *(p.6)*	12.5
606-302	Marine Botany *(p.2)*	25
610-360	Analytical & Environmental Chemistry *(p.7)*	12.5
654-302	Experimental Marine Ecology *(p.2)*	12.5
654-306	Marine Zoology *(p.3)*	12.5
654-312	Marine Ecology *(p.4)*	12.5
600-311	Research Project A *(p.1)*	12.5
600-312	Research Project B *(p.1)*	12.5

Note: the topic of the Research Project must be related to the major discipline.

Note: Only one of 600-311 and 600-312 can be counted towards this major. Only one of 610-360 and 121-071 can be counted towards this major.

MATHEMATICS AND STATISTICS

Teaching departments: Mathematics and Statistics, Physics.

Applied mathematics

Points

Contact: Department of Mathematics and Statistics

First year

Physical sciences package including three mathematics subjects

Second year

37.5 points

One of:

620-231	Vector Analysis *(p.9)*	12.5
620-233	Vector Analysis (Advanced) *(p.9)*	12.5

Plus one of:

620-232	Mathematical Methods *(p.9)*	12.5
620-234	Mathematical Methods (Advanced) *(p.9)*	12.5

Plus one of:

620-221	Real and Complex Analysis *(p.8)*	12.5
620-252	Analysis *(p.9)*	12.5

Third year (major)

50 points

620-331	Applied Partial Differential Equations *(p.11)*	12.5

Plus three of:

620-332	Integral Transforms & Asymptotics *(p.11)*	12.5
[03]620-341	Dynamical Systems and Chaos	12.5

Applied mathematics

Points

620-342	Industrial & Applied Mathematics *(p.12)*	12.5
620-352	Graph Theory *(p.12)*	12.5
620-353	Discrete Mathematics *(p.12)*	12.5
620-381	Computational Mathematics *(p.13)*	12.5

Note: 620-331, 620-332 and 620-342 are prerequisites for honours-level studies in applied mathematics.

Pure mathematics

Points

Contact: Department of Mathematics and Statistics

First year

Physical sciences package including three mathematics subjects

Second year

37.5 points

One of:

620-231	Vector Analysis *(p.9)*	12.5
620-233	Vector Analysis (Advanced) *(p.9)*	12.5

Plus

620-222	Linear and Abstract Algebra *(p.8)*	12.5

Plus one of:

620-221	Real and Complex Analysis *(p.8)*	12.5
620-252	Analysis *(p.9)*	12.5

Third year (major)

50 points

Three of:

620-311	Metric Spaces *(p.11)*	12.5
620-312	Linear Analysis *(p.11)*	12.5
620-321	Algebra *(p.11)*	12.5
620-322	Topology *(p.11)*	12.5

Plus either the fourth of the subjects listed above or one of:

620-351	Number Theory *(p.12)*	12.5
620-352	Graph Theory *(p.12)*	12.5
620-353	Discrete Mathematics *(p.12)*	12.5

Note: 620-311, 620-312, 620-321 and 620-322 are prerequisities for honours-level studies in pure mathematics.

Statistics

Points

Contact: Department of Mathematics and Statistics

First year

Any package which includes 620-141 and at least two of 620-131, 620-142 and 620-143 (or advanced versions)

Second year

37.5 points

620-201	Probability *(p.8)*	12.5
620-202	Statistics *(p.8)*	12.5

Plus one of:

620-221	Real and Complex Analysis *(p.8)*	12.5
620-252	Analysis *(p.9)*	12.5
620-270	Applied Statistics *(p.10)*	12.5

Note: 620-221 and 620-252 have the prerequisites 620-142 and 620-143; 620-270 has the pre-requisite 620-131 or 620-160.

Third year (major)

50 points

620-301	Stochastic Modelling *(p.10)*	12.5
620-371	Linear Models *(p.13)*	12.5

Plus two of:

620-302	Chance and Options Pricing *(p.10)*	12.5
620-372	Applied Statistical Inference *(p.13)*	12.5
620-374	Sampling and Forecasting *(p.13)*	12.5
620-381	Computational Mathematics *(p.13)*	12.5
[03]620-382	Biostatistics	12.5

Note: 620-381 has the prerequisites 620-131, 620-142 and 620-143.

Operations research

Points

Contact: Department of Mathematics and Statistics

First year

Any package which includes 620-141 and 620-142 (or advanced versions)

Second year

37.5 points

620-261	Introduction to Operations Research *(p.10)*	12.5
620-262	Decision Making *(p.10)*	12.5

Plus one of:

620-201	Probability *(p.8)*	12.5
620-221	Real and Complex Analysis *(p.8)*	12.5
620-222	Linear and Abstract Algebra *(p.8)*	12.5

Operations research

Points

620-231 Vector Analysis *(p.9)* 12.5
620-233 Vector Analysis (Advanced) *(p.9)* 12.5
620-252 Analysis *(p.9)* 12.5
Note: 620-221, 620-231, 620-233 and 620-252 have the prerequisite 620-143.
Third year (major)
50 points
620-361 Operations Research: Techniques *(p.12)* 12.5
620-362 Applied Operations Research *(p.12)* 12.5
Plus any two 300-level subjects offered by the Department of Mathematics and Statistics 25

Financial mathematics

Points

Contact: Department of Mathematics and Statistics
First year
Physical sciences package including three mathematics subjects
Plus at least one of:
620-131 Scientific Programming & Simulation *(p.5)* 12.5
433-151 Introduction to Programming (Advanced) *(p.16)* 12.5
433-171 Introduction to Programming *(p.17)* 12.5
Second year
37.5 points
620-261 Introduction to Operations Research *(p.10)* 12.5
620-201 Probability *(p.8)* 12.5
620-202 Statistics *(p.8)* 12.5
It is strongly recommended that the following commerce subjects be taken as non-science electives (subject to course requirements).
300-203 Financial Mathematics I *(p.1)* 12.5
300-204 Financial Mathematics II *(p.1)* 12.5
Third year (major)
50 points
620-301 Stochastic Modelling *(p.10)* 12.5
620-302 Chance and Options Pricing *(p.10)* 12.5
620-381 Computational Mathematics *(p.13)* 12.5
Plus one of:
620-361 Operations Research: Techniques *(p.12)* 12.5
620-371 Linear Models *(p.13)* 12.5
620-374 Sampling and Forecasting *(p.13)* 12.5

Mathematical physics

Points

Contact: Department of Mathematics and Statistics
First year
Physical sciences package including physics and three mathematics subjects
Second year
50 points
One of:
620-231 Vector Analysis *(p.9)* 12.5
620-233 Vector Analysis (Advanced) *(p.9)* 12.5
Plus one of:
620-232 Mathematical Methods *(p.9)* 12.5
620-234 Mathematical Methods (Advanced) *(p.9)* 12.5
Plus one of:
640-223 Quantum Mechanics & Thermal Physics(Adv) *(p.4)* 12.5
640-243 Quantum Mechanics & Thermal Physics *(p.5)* 12.5
Plus one of:
640-225 Electromagnetism & Relativity (Adv) *(p.4)* 12.5
640-245 Electromagnetism & Relativity *(p.5)* 12.5
Third year (major)
50 points
620-331 Applied Partial Differential Equations *(p.11)* 12.5
Plus one of:
620-332 Integral Transforms & Asymptotics *(p.11)* 12.5
[03]620-341 Dynamical Systems and Chaos 12.5
620-342 Industrial & Applied Mathematics *(p.12)* 12.5
620-353 Discrete Mathematics *(p.12)* 12.5
Plus one of
640-321 Quantum Mechanics (Adv) *(p.6)* 12.5
640-341 Quantum Mechanics *(p.7)* 12.5
Plus one of
640-322 Thermal Physics (Adv) *(p.7)* 12.5
640-342 Thermal Physics *(p.7)* 12.5
Note: 620-332 has the prerequisite 620-221 or 620-252.

Discrete mathematics

Points

Contact: Department of Mathematics and Statistics
First year
Physical sciences package including three mathematics subjects and 620-131
Second year
25 points
Any two 200-level subjects offered by the Department of Mathematics and Statistics
Third year
50 points
620-352 Graph Theory *(p.12)* 12.5
620-353 Discrete Mathematics *(p.12)* 12.5
Plus at least one of:
620-351 Number Theory *(p.12)* 12.5
620-381 Computational Mathematics *(p.13)* 12.5
Plus (if only one of 620-351 and 620-381 is included)
Any other 300-level subject offered by the Department of Mathematics and Statistics 12.5

MICROBIOLOGY

Teaching department: Microbiology and Immunology.

Microbiology

Points

Contact: Department of Microbiology and Immunology
First year
Life sciences package
Second year
25 points
526-201 Principles of Microbiology & Immunology *(p.1)* 12.5
526-221 Practical Microbiology *(p.1)* 12.5
Third year (major)
50 points
526-321 Molecular Microbiology Techniques *(p.3)* 12.5
526-327 Projects: Microbiology *(p.4)* 12.5
Plus two of:
526-301 Microbial Cells and Genomes *(p.2)* 12.5
526-302 Microbial Biotechnology *(p.2)* 12.5
526-313 Medical Microbiology: Cellular Pathogens *(p.3)* 12.5
526-314 Medical Microbiology: Viruses *(p.3)* 12.5
Students who have been unable to obtain a place in either 526-321 or 526-327 may be permitted, only with prior approval from the Microbiology major coordinators, to replace either 526-321 or 526-327 in the major with an alternative 12.5 point 300-level subject taught in the department.

NEUROSCIENCE

Teaching departments: Anatomy and Cell Biology, Biochemistry and Molecular Biology, Botany, Pharmacology, Physiology, Zoology.

Neuroscience

Points

Contact: Department of Anatomy and Cell Biology
First year
Life sciences package
Second year
50 points
516-209 Introductory Neuroscience *(p.2)* 12.5
Plus 37.5 points from:
516-201 Cell Biology: Tissues and Organs *(p.1)* 12.5
521-211 Biochemistry & Molecular Biology Part A *(p.1)* 12.5
534-201 Pharmacology *(p.1)* 12.5
536-201 Principles of Physiology *(p.1)* 12.5
Third year (major)
50 points
516-305 Neuroscience: Systems & Higher Functions *(p.3)* 12.5
536-303 The Brain: Neurophysiology of Behaviour *(p.3)* 12.5
Plus two of:
516-306 Developmental Neurobiology *(p.3)* 12.5
516-307 Research Project *(p.3)* 12.5
521-304 Hormone & Neurotransmitter Biochemistry *(p.3)* 12.5
534-302 Neuropharmacology *(p.1)* 12.5
536-302 Molecular Neurophysiology *(p.3)* 12.5
654-305 Experimental Animal Behaviour *(p.3)* 12.5

Behavioural neuroscience

Points

Contact: Department of Anatomy and Cell Biology
First year
Life sciences package plus
512-120 Introductory Experimental Psychology 1 *(p.1)* 12.5

Behavioural neuroscience Points

512-121 Social, Develop. & Clinical Psychology 1 *(p.1)* 12.5
Second year
50 points
512-224 Cognitive Psychology 2 *(p.2)* 12.5
512-222 Behavioural Neuroscience 2 *(p.1)* 12.5
Plus either both
536-201 Principles of Physiology *(p.1)* 12.5
536-211 Physiology:Control of Body Function *(p.2)* 12.5
or both
654-201 Invertebrate Structure and Function *(p.1)* 12.5
654-202 Vertebrate Structure and Function *(p.1)* 12.5
Third year (major)
50 points
536-303 The Brain: Neurophysiology of Behaviour *(p.3)* 12.5
516-305 Neuroscience: Systems & Higher Functions *(p.3)* 12.5
512-350 Brain, Cognition and Behaviour 3 *(p.3)* 12.5
Plus one of:
512-330 Human Psychophysiology 3 *(p.2)* 12.5
512-335 Advanced Cognition 3 *(p.3)* 12.5

PATHOLOGY

Teaching department: Pathology.

Pathology Points

Contact: Department of Pathology
First year
Life sciences package
Second year
50 points
531-201 Basic Principles of Pathology-Science *(p.1)* 12.5
521-211 Biochemistry & Molecular Biology Part A *(p.1)* 12.5
521-212 Biochemistry & Molecular Biology Part B *(p.2)* 12.5
521-220 Techniques in Protein & Gene Technology *(p.2)* 12.5
Third year (major)
50 points
531-301 Cellular Basis of Disease *(p.1)* 12.5
531-302 Techniques for Investigation of Disease *(p.2)* 12.5
531-303 Molecular/Genetic Basis of Disease-Lect *(p.2)* 12.5
531-304 Molecular/Genetic Basis of Disease-Prac *(p.2)* 12.5

PHARMACOLOGY

Teaching departments: Pharmacology, Physiology, Biochemistry and Molecular Biology, Chemistry.

Pharmacology Points

Contact: Department of Pharmacology
First year
Life sciences package
Second year
50 points
534-201 Pharmacology *(p.1)* 12.5
Plus 37.5 points from:
521-211 Biochemistry & Molecular Biology Part A *(p.1)* 12.5
521-212 Biochemistry & Molecular Biology Part B *(p.2)* 12.5
521-220 Techniques in Protein & Gene Technology *(p.2)* 12.5
536-201 Principles of Physiology *(p.1)* 12.5
536-211 Physiology:Control of Body Function *(p.2)* 12.5
536-202 Physiology (General Practical) *(p.2)* 6.25
610-220 Organic Chemistry *(p.3)* 12.5
610-221 Organic & Bio-organic Chemistry *(p.4)* 12.5
610-225 Organic Chemistry Practical *(p.4)* 6.25
Third year (major)
50 points
534-301 Cellular and Molecular Pharmacology *(p.1)* 25
Plus either
534-304 Pharmacology of Therapeutic Substances *(p.2)* 25
or two of:
534-302 Neuropharmacology *(p.1)* 12.5
534-305 Toxicology *(p.2)* 12.5
534-306 Drug Discovery *(p.2)* 12.5
534-311 Drug Development Techniques *(p.2)* 12.5
516-307 Research Project *(p.3)* 12.5

Note: approval from the Head of Department is required for 516-307 to count towards the pharmacology major and must be obtained prior to commencing the subject.

PHYSICS

Teaching departments: Physics, Mathematics and Statistics.

Physics Points

Contact: School of Physics
First year
Physical sciences package including 100-level physics
Second year
50 points
One of:
640-223 Quantum Mechanics & Thermal Physics(Adv) *(p.4)* 12.5
640-243 Quantum Mechanics & Thermal Physics *(p.5)* 12.5
and one of:
640-225 Electromagnetism & Relativity (Adv) *(p.4)* 12.5
640-245 Electromagnetism & Relativity *(p.5)* 12.5
and
640-299 Laboratory Work *(p.6)* 12.5
Plus one of:
640-237 Astrophysics & Optics II *(p.5)* 12.5
640-234 Further Classical & Quantum Mechanics *(p.4)* 12.5
640-251 Instrumentation for Scientists *(p.5)* 12.5
Corequisites
One of
620-231 Vector Analysis *(p.9)* 12.5
620-233 Vector Analysis (Advanced) *(p.9)* 12.5
Plus one of
620-232 Mathematical Methods *(p.9)* 12.5
620-234 Mathematical Methods (Advanced) *(p.9)* 12.5
Third year (major)
50 points
One of
640-321 Quantum Mechanics (Adv) *(p.6)* 12.5
640-341 Quantum Mechanics *(p.7)* 12.5
Plus one of:
640-393 Laboratory Work *(p.9)* 12.5
640-394 Laboratory Work *(p.9)* 12.5
640-364 Computational Physics *(p.9)* 12.5
Plus two other 300-level physics subjects

Students considering undertaking Honours in Physics should refer to the *Physics honours program (p.14)* section of the BSc (Honours) entry for suggested 300-level subjects.

Mathematical physics Points

Contact: Department of Mathematics and Statistics
See description of mathematical physics course structure page 15.

PHYSIOLOGY

Teaching departments: Physiology, Anatomy and Cell Biology, Biochemistry and Molecular Biology, Botany, Zoology.

Physiology Points

Contact: Department of Physiology
First year
Life sciences package
Note: Please read prerequisites for 200-level physiology.
Second year
31.25 points of physiology subjects selected from the following
536-201 Principles of Physiology *(p.1)* 12.5
536-202 Physiology (General Practical) *(p.2)* 6.25
536-233 Research-based & Integrative Physiology *(p.2)* 12.5
536-211 Physiology:Control of Body Function *(p.2)* 12.5
Third year (major)
50 points selected from the following
536-301 Integrative Physiology: Heart & Kidney *(p.3)* 12.5
536-302 Molecular Neurophysiology *(p.3)* 12.5
536-303 The Brain: Neurophysiology of Behaviour *(p.3)* 12.5
536-308 Physiology of Muscle & Exercise *(p.4)* 12.5
536-311 Molecular/Cellular Basis of Physiology *(p.4)* 12.5
preferably including one of
536-304 Seminars & Experimental Physiology *(p.4)* 12.5
516-307 Research Project *(p.3)* 12.5

Note: the topic of the Research Project must be related to the major discipline.

PSYCHOLOGY

Teaching department: Behavioural Science

A major study in psychology, accredited by the Australian Psychological Society (APS), consists of a minimum of ten subjects and 125 points. The 50

points at 300-level definition of a science major is waived in this instance. Science students will instead need to complete a minimum of 50 science points at 300-level. Refer to *Psychology as a major (p.10)* for further information.

All subjects accredited as counting towards the psychology major are considered science subjects.

Psychology Points

Contact: School of Behavioural Science

See description of psychology as a major course structure page 10.

VISION SCIENCE

Teaching department: Optometry and Vision Sciences.

Vision science Points

Contact: Department of Optometry and Vision Sciences

First year

Life sciences package or physical sciences package including the subjects

655-111 Vision: How The Eye Sees The World *(p.1)* 12.5

655-152 Optics: From Rainbows to Digital Imaging *(p.1)* 12.5

Second year

50 points

655-201 Anatomy & Histology of the Eye *(p.1)* 12.5

655-221 Human Visual Functions *(p.2)* 12.5

655-210 Optical Design and Ophthalmic Metrology 12.5

655-222 Visual Processing and Control *(p.2)* 12.5

Plus at least one of:

521-211 Biochemistry & Molecular Biology Part A *(p.1)* 12.5

521-212 Biochemistry & Molecular Biology Part B *(p.2)* 12.5

620-270 Applied Statistics *(p.10)* 12.5

516-209 Introductory Neuroscience *(p.2)* 12.5

531-201 Basic Principles of Pathology-Science *(p.1)* 12.5

536-211 Physiology:Control of Body Function *(p.2)* 12.5

Third year (major)

50 points selected from:

655-311 Optical Design and Ophthalmic Metrology *(p.3)* 12.5

655-341 Ocular Histopathology *(p.3)* 12.5

655-028 Foundations of Visual Neuroscience *(p.2)* 12.5

655-321 Practical Problems in Vision *(p.3)* 12.5

655-351 Ophthalmic Lenses and Dispensing *(p.3)* 12.5

600-311 Research Project A *(p.1)* 12.5

600-312 Research Project B *(p.1)* 12.5

655-311 will not be offered after 2005. In 2006 is will be replaced by the 200-level subject, 655-210. Student may only gain credit for one of these two subjects.

Students may only choose one of 600-311 or 600-312 to contribute to the vision science major. The topic of the Research Project must be related to the major discipline.

ZOOLOGY

Teaching department: Zoology

Zoology Points

Contact: Department of Zoology

First year

Life sciences packages, including:

650-111 Biology of Australian Flora & Fauna *(p.1)* 12.5

Second year

50 points

654-201 Invertebrate Structure and Function *(p.1)* 12.5

654-202 Vertebrate Structure and Function *(p.1)* 12.5

654-203 Animal Physiology *(p.2)* 12.5

654-204 Ecology: Individuals and Populations *(p.2)* 12.5

Third year (major)

50 points which must include 25 points selected from one of the following pairs of subjects:

Both

654-302 Experimental Marine Ecology *(p.2)* 12.5

654-312 Marine Ecology *(p.4)* 12.5

Or both

654-304 Reproduction *(p.2)* 12.5

516-302 Developmental Biology *(p.2)* 12.5

Or both

654-305 Experimental Animal Behaviour *(p.3)* 12.5

654-315 Animal Behaviour *(p.4)* 12.5

Or both

654-309 Field Biology of Marsupials & Monotremes *(p.4)* 12.5

Zoology Points

654-319 Biology of Marsupials and Monotremes *(p.4)* 12.5

Plus 25 points selected from any of the above subjects and/or the following:

654-306 Marine Zoology *(p.3)* 12.5

654-307 Evolution and the Human Condition *(p.3)* 12.5

654-308 Conservation Biology *(p.3)* 12.5

Compensatory passes

Compensatory passes (CP) allow students enrolled in a Faculty of Science course who have failed in certain subjects to receive credit points for the subject that was failed under the following conditions:

Table 2: A CP can only be awarded for the following sequential subject pairs

	Semester 1 subject	Semester 2 subject
Biology	650-141	650-142
	650-131	650-132
Chemistry	610-051	610-052
Geomatics	451-100	451-101
Physics	640-121	640-122
	640-141	640-142
	640-151	640-152
	640-161	640-162

- CPs are normally only available for the sequential subject pairs listed in Table 2 *(p.18)*;
- CPs only apply for the first two semesters of a student's enrolment in a science course;
- a maximum of 25 points may be awarded as compensatory passes (ie. a CP can be awarded for no more than two subjects);
- CPs are only available if a student obtains a mark of 45-49% in the failed subject AND a combined average mark of at least 50% is obtained in both subjects forming the sequential pair;
- a mark of 45-49% in the Semester 1 subject of a sequential pair will enable a student to enrol in the Semester 2 subject of the pair in order to seek a CP;
- CPs are awarded at the end of the academic year and will appear as a letter grade NCP with the fail mark on academic transcripts;
- a student may choose not to accept a CP, for example, in order to repeat the failed subject;
- CPs in chemistry are only available for 610-051 and 610-052 in the Bachelor of Biomedical Science course;
- CPs will be accepted as prerequisites for the 200-level subjects offered by the following departments:

  Anatomy and Cell Biology; Botany; Environmental Science; Geomatics; Genetics; Anthropology, Geography and Environmental Studies; Optometry and Vision Sciences; Pharmacology; Physics; Zoology.

  Physiology will only accept CPs in physics 640-121 and 640-122 or 640-141 and 640-142.

Bachelor of Biomedical Science (BBiomedSc)

This course aims to produce flexible and well-informed graduates with specific training in a wide range of biomedical applications of the basic sciences. The course provides strategic training in the fundamentals of state-of-the-art biomedical science and a unique blend of genome science, whole animal systems biology and bioinformatics.

The Bachelor of Biomedical Science course is jointly offered by the Faculty of Science and the Faculty of Medicine, Dentistry and Health Sciences. The course is administered by the Faculty of Science, with the academic business of the degree program being implemented on the advice of the Joint Faculty Biomedical Science Course Advisory Committee. Enquiries regarding selection, subject changes, course planning and other course-related matters should be directed to the Faculty of Science Office.

Course objectives

Upon completion of the course, students will:

- have a broad knowledge of science across a range of disciplines, with a high level of understanding and appreciation in specialist areas of the biomedical sciences;

- have an appreciation of integrated cellular tissue and whole body systems, particularly in the context of the new age of cell and molecular biology, genetic manipulation, rational drug design and therapeutics;
- have an appreciation of comparative biology and the value of a range of single cell organisms (eg. yeasts) as model systems for investigating biomedically-relevant cellular processes;
- have well developed skills in bioinformatics (computational molecular biology) and state-of-the-art laboratory techniques of biomedical relevance;
- when solving scientific problems:
  - be capable of applying appropriate knowledge,
  - be able to access relevant information particularly through the use of information technology and traditional libraries,
  - understand the principles of project and experimental design,
  - have a capacity to apply practical skills, technology and computational systems;
- be able to communicate the results of their studies in written and oral form and through computer-based presentations;
- have experience in teamwork and leadership;
- have an appreciation of the historical background and evolution of scientific concepts; and
- have an awareness of bioethics, particularly in the context of areas such as the new genetics and animal cloning investigations.

Attributes of the Bachelor of Biomedical Science graduate

In biomedical science at the University of Melbourne we expect to educate our students in the fundamental skill of transforming information into knowledge. This outcome is fully consistent with the University's general ambition for our graduates, and emphasises the transferability of the skills practised in science.

Throughout their course, students will find that many of the abilities that they develop are shared, valued, and applicable to activities in all walks of life. In particular, these are the skills that are essential to providing leadership to the biomedical science industries of the Australian economy and culture.

Bachelor of Biomedical Science graduates have concentrated knowledge across the range of biomedical discipline areas, as well as particular areas of specialisation. The integrated nature of the course means that they are able to apply this knowledge readily to different issues, problems or workplaces. They are also able to see beyond specific discipline boundaries and can evaluate and integrate new information and ideas readily into their existing knowledge base.

Having undertaken laboratory and tutorial classes, biomedical science graduates are adept at activity planning as well as the application of theory to practice. They are well versed in a variety of state-of-the-art laboratory techniques of biomedical relevance as well as skills in bioinformatics. Many graduates will have been exposed to laboratory research in research institutes associated with the University. They are not only able to work independently on basic research projects, but are also familiar with professional work cultures and readily adapt to new organisations. In additional they are aware of the bioethical issues surrounding areas such as new genetics and animal cloning investigations.

The scientific training of these graduates gives them strong cognitive skills and they are able to:

- observe, record and evaluate data or evidence appropriately;
- deal with complex data sets and apply their strong numerical competence to identify and analyse key factors and components;
- make effective use of information to identify and solve problems; and
- synthesise and integrate disparate elements into a meaningful whole.

Graduates take these skills further in the creative realm, formulating hypotheses that can be tested for validity. They are used to extrapolating from the known to the unknown and are comfortable working with analogues rather than needing to deal with literal situations. They understand the need to question and clarify before developing a response to a particular issue or problem, enabling them to analyse critically.

Science disciplines value clear reporting. Consequently, the biomedical science graduate has developed skills of efficient and effective communication of ideas and results, whether in the accepted modes of scientific report writing or through more informal oral presentations. Graduates recognise the need to present information and ideas in an effective written form that is appropriate to the purpose and the reader.

The need to manage the multiplicity of tasks (lectures, laboratory and assignment work), means that biomedical science graduates are aware of the need to structure and manage time effectively and efficiently, to retain balance, and to prioritise their activities. They are able to juggle several tasks simultaneously, take responsibility for their own work, independently or within a group, and to plan their schedule appropriately.

Duration

The Bachelor of Biomedical Science course requires a minimum of three years full-time study, or the equivalent on a part-time basis.

Course requirements

A minimum (and maximum) of 300 points must be obtained comprising:

- 125 points of core subjects;
- 75 points of subjects specified in one of eight specialist streams at the 300-level; and
- 100 points from selected science subjects including 25 points of prescribed 100-level physics, 12.5 points of prescribed 100-level mathematics and 12.5 points of prescribed 100-level statistics. Science subjects are any subjects listed in the Faculty of Science entry of this Handbook, except those specifically labelled as non-science.

The selection of subjects outside the core subjects at the 200- and 300-levels of the course will depend on the requirements of the individual specialist stream of interest to the student. The design of the 300-level streams requires that students select the necessary prerequisite(s) at the 200-level. In addition to the two 200-level generic core subjects, students must take 200-level subjects in individual discipline areas currently offered in the BSc course. A requirement of no more than two 12.5-point prerequisite subjects (total of 25 points) within any one discipline at the 200-level exists for any 300-level subjects offered with the BBiomedSc degree. With this provision, a student will be able to select from at least two possible streams at the third-year level.

Due to the multidisciplinary content of the 200-level Integrated Biomedical Science generic core subjects, students enrolled in the BBiomedSc degree will be excluded from the following 200-level science subjects:

516-201 Cell Biology: Tissues and Organs *(p.1)*

521-211 Biochemistry & Molecular Biology Part A *(p.1)*

521-212 Biochemistry & Molecular Biology Part B *(p.2)*

521-220 Techniques in Protein & Gene Technology *(p.2)*

606-205 Plant Cell Biology *(p.2)*

536-201 Principles of Physiology *(p.1)*

536-202 Physiology (General Practical) *(p.2)*

536-211 Physiology:Control of Body Function *(p.2)*

652-215 Genes and Genomes *(p.1)*

Table 3: Bachelor of Biomedical Science course structure

Year	Semester 1	Semester 2
First year 100-level	650-131 Biomed: Molecules, Cells & Organisms *(p.1)* [1]	650-132 Biomed: Genetics & Biodiversity *(p.1)* [1]
	610-051 Chemistry (Biomedical Science A) *(p.1)*[1]	610-052 Chemistry (Biomedical Science B) *(p.1)*[1]
	640-151 Physics for Biomedical Science A *(p.2)* or 640-121 Physics A (Adv) *(p.2)*	640-152 Physics for Biomedical Science B *(p.2)* or 640-122 Physics B (Adv) *(p.2)*
	620-151 Introduction to Biomedical Mathematics *(p.2)* or a mainstream mathematics subject.	620-152 Introduction to Biomedical Statistics *(p.2)* or a second mathematics subject (statistics must be taken at second year).
Second year 200-level	521-213 Integrated Biomedical Science I *(p.3)*[1]	536-250 Integrated Biomedical Science II *(p.3)*[1]
	Choice of additional approved subjects totalling 50 points selected from existing science subjects according to intended specialisation at 300-level.	
Third year 300-level	521-308 Genome Science *(p.3)*[1]	536-350 Genes to Phenotype:Control & Integration *(p.3)* [1]
	Choice of one of eight specialist streams totalling 75 points. Each stream includes a stream-specific core of four subjects and a choice of two electives from an approved list of 300-level science subjects (see below).	

1. Compulsory core subject

Approved electives

In addition to the prescribed subjects forming one of the specialist streams, students may choose approved science subjects at 200-level and 300-level according to the intended specialisation at 300-level.

Approved science subjects are subjects offered in the disciplines of anatomy and cell biology, biochemistry and molecular biology, botany, chemistry, genetics, mathematics and statistics, microbiology and immunology, pathology, pharmacology, physics, physiology and zoology.

Specialist streams

The following specialist streams are available. Course structures may be subject to minor modifications.

- Stream 1: Functional, computational and applied genomics
- Stream 2: Physiological genomics
- Stream 3: Biotechnology and therapeutics
- Stream 4: Molecular biology of the cell in health and disease
- Stream 5: Reproductive and developmental biology
- Stream 6: Neuroscience
- Stream 7: Microorganisms, infection and immunity
- Stream 8: Biomedical physics and chemistry

In the course structures lised below, the total points listed to be completed under each year level is 100. Where appropriate, additional subjects must be completed to make up this total.

Stream 1: Functional, computational and applied genomics

Coordinators: Associate Professor Ian van Driel, Associate Professor J Camakaris

Students completing this stream will achieve an understanding of the organisation and expression of the human genome, and other eukaryotic and prokaryotic genomes, obtain insight into the human proteome project (HPP), and acquire valuable skills in several areas of molecular biology, functional genomics, proteomic techniques, genetic analysis, computational genomics (bioinformatics), and analysis of protein structure, function and post-translational modifications. Basic knowledge will be integrated with applications such as gene mapping and discovery, gene therapy, biotechnology, and understanding the molecular basis of genetic diseases and cancer. This stream provides an excellent grounding for careers in basic science, medical research, proteomics, bioinformatics and biotechnology. Employment and post-graduate study opportunities will exist in university departments, research institutes (eg. Bio21 Institute) and hospitals, and in the biotechnology, pharmaceutical and bioinformatics industries.

Second year (Stream 1A: Functional and applied genomics)		Points
Note: the compulsory 200-level subjects serve as sufficient prerequisites for all 300-level subjects, except for 526-301 which requires 526-201 or 526-205, and 531-301 which requires 531-201.		
Semester 1		
521-213	Integrated Biomedical Science I *(p.3)*	25
652-214	Principles of Genetics *(p.1)*	12.5
Plus		
An approved 200-level science subject which may be:		
526-201	Principles of Microbiology & Immunology *(p.1)*	12.5
Semester 2		
536-250	Integrated Biomedical Science II *(p.3)*	25
652-216	Molecular & General Genetics Practical *(p.1)*	12.5
Plus		
An approved 200-level science subject which may be:		
526-205	Microbes: Infections and Responses *(p.1)*	12.5
531-201	Basic Principles of Pathology-Science *(p.1)*	12.5
534-201	Pharmacology *(p.1)*	12.5
Total		**100.0**

Third year		Points
Semester 1		
521-308	Genome Science *(p.3)*	12.5
Stream specific core		
652-302	Molecular Genetics *(p.2)*	12.5
652-304	Genetic Analysis *(p.2)*	12.5
Electives - choose one of:		
521-301	Protein Structure, Design & Engineering *(p.2)*	12.5
521-303	Molecular Aspects of Cell Biology *(p.3)*	12.5
521-321	Gene Technology & Protein Expression *(p.4)*	12.5
526-301	Microbial Cells and Genomes *(p.2)*	12.5
531-301	Cellular Basis of Disease *(p.1)*	12.5
652-305	Human Genetics *(p.2)*	12.5
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
521-302	Functional Genomics *(p.2)*	12.5
Plus one of:		
521-322	Protein Biochemistry and Proteomics *(p.4)*	12.5
531-303	Molecular/Genetic Basis of Disease-Lect *(p.2)*	12.5
652-301	Genomes and Evolution *(p.2)*	12.5
652-303	Developmental and Cellular Genetics *(p.2)*	12.5
Electives - choose one of:		
516-302	Developmental Biology *(p.2)*	12.5
521-307	Biomolecular Structure & Bioinformatics *(p.3)*	12.5
521-322	Protein Biochemistry and Proteomics *(p.4)*	12.5
531-303	Molecular/Genetic Basis of Disease-Lect *(p.2)*	12.5
606-306	Plant Molecular Biology & Biotechnology *(p.3)*	12.5
652-301	Genomes and Evolution *(p.2)*	12.5
652-303	Developmental and Cellular Genetics *(p.2)*	12.5
652-306	Experimental Genetics *(p.2)*	12.5
Total		**100.0**

Second year (Stream 1B: Proteomics and computational genomics)		Points
Semester 1		
521-213	Integrated Biomedical Science I *(p.3)*	25
652-214	Principles of Genetics *(p.1)*	12.5
Plus		
An approved 200-level science subject		12.5
Semester 2		
536-250	Integrated Biomedical Science II *(p.3)*	25
652-216	Molecular & General Genetics Practical *(p.1)*	12.5
Plus		
An approved 200-level science subject		12.5
Note: 531-201 is a prerequisite for 531-301.		

Third year		Points
Semester 1		
521-308	Genome Science *(p.3)*	12.5
Stream specific core		
521-301	Protein Structure, Design & Engineering *(p.2)*	12.5
Electives - choose two of:		
521-303	Molecular Aspects of Cell Biology *(p.3)*	12.5
521-305	Biochemistry of Metabolism & Nutrition *(p.3)*	12.5
521-321	Gene Technology & Protein Expression *(p.4)*	12.5
526-301	Microbial Cells and Genomes *(p.2)*	12.5
531-301	Cellular Basis of Disease *(p.1)*	12.5
652-305	Human Genetics *(p.2)*	12.5
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
521-307	Biomolecular Structure & Bioinformatics *(p.3)*	12.5
521-322	Protein Biochemistry and Proteomics *(p.4)*	12.5
Electives - choose one of:		
521-302	Functional Genomics *(p.2)*	12.5
521-304	Hormone & Neurotransmitter Biochemistry *(p.3)*	12.5
526-302	Microbial Biotechnology *(p.2)*	12.5
534-306	Drug Discovery *(p.2)*	12.5
606-306	Plant Molecular Biology & Biotechnology *(p.3)*	12.5
652-301	Genomes and Evolution *(p.2)*	12.5

Stream 2: Physiological genomics

Coordinator: Professor S Harrap

This stream is for students wishing to enter the rapidly expanding world of physiological genomics. This new post-genomic discipline defines the function of genes in living tissues. Physiological genomics is important in tracing the effects of newly discovered genes and mutations and provides insights into new means of preventing or treating genetic diseases. It combines molecular and physiological skills in the context of complex living systems. Students will develop an understanding of the interactions that characterise the integrated and coordinated way in which genetic codes are translated into the function of cells, tissues, organs and the organism. With the emerging application of genomic discoveries, graduates could consider careers in basic science as well as clinical research. Employment opportunities exist in university academic departments, research institutes, hospitals, the pharmaceutical industry and biotechnology companies.

Second year	Points
Note: Students should take care in selecting 200-level subjects so that prerequisites for intended 300-level subjects will be met.	
Semester 1	
521-213 Integrated Biomedical Science I *(p.3)*	25
Plus	
25 points of approved 200-level science subjects	
Semester 2	
536-250 Integrated Biomedical Science II *(p.3)*	25
Plus	
25 points of approved 200-level science subjects	
Total	**100.0**

Third year	Points
Semester 1	
521-308 Genome Science *(p.3)*	12.5
Stream specific core	
536-301 Integrative Physiology: Heart & Kidney *(p.3)*	12.5
536-308 Physiology of Muscle & Exercise *(p.4)*	12.5
Electives - choose one of:	
516-307 Research Project *(p.3)*	12.5
521-305 Biochemistry of Metabolism & Nutrition *(p.3)*	12.5
534-302 Neuropharmacology *(p.1)*	12.5
600-311 Research Project A *(p.1)*	12.5
Semester 2	
536-350 Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core	
536-311 Molecular/Cellular Basis of Physiology *(p.4)*	12.5
Electives - choose two of:	
516-302 Developmental Biology *(p.2)*	12.5
516-307 Research Project *(p.3)*	12.5
521-302 Functional Genomics *(p.2)*	12.5
521-304 Hormone & Neurotransmitter Biochemistry *(p.3)*	12.5
536-302 Molecular Neurophysiology *(p.3)*	12.5
536-304 Seminars & Experimental Physiology *(p.4)*	12.5
600-312 Research Project B *(p.1)*	12.5
652-303 Developmental and Cellular Genetics *(p.2)*	12.5
Total	**100.0**

Stream 3: Biotechnology and therapeutics

Coordinator (Biotechnology): Dr D Tribe

Coordinator (Therapeutics): Associate Professor A Stewart

Coordinators (Drug Technology): Professor C Schiesser, Associate Professor A Stewart

Within Stream 3 there are three themes of study which are designed to provide insight into the rapidly developing interdisciplinary approaches that are providing new molecular innovations to improve our quality of life. Biotechnology is concerned with the commercial development and production of new agents, whereas pharmacology is concerned with the discovery and mechanism of action of such agents. Graduates with research training in these areas could be destined for a career in the pharmaceutical industry or in regulatory affairs. Research opportunities also exist in universities, research institutes, hospitals and an increasing number of start-up biotechnology companies.

The biotechnology theme will provide students with an understanding of the wide range of tools and techniques that are being used to manipulate genes, manage cell growth, and control enzyme catalysis for the creation of new products and manufacturing processes. It also provides familiarity with the ongoing conceptual advances and scientific innovations that are driving the continued expansion of biotechnology. Students may choose subjects that constitute a plant biotechnology substream.

The therapeutics theme will provide students with an understanding of the principles of pharmacology, which is the science of drug action at the molecular and physiological level. New developments in methods of drug discovery will be described and students will be given practical experience in the skills used by pharmacologists to unravel the mechanisms by which drugs produce their effects. Other topics include the study of the toxic actions of drugs and other environmental chemicals and the way that the body breaks down and eliminates such chemicals.

The drug technology theme will provide students with theory and practical experience in the drug development operations of the pharmaceutical industry. Rational design of pharmaceuticals at the molecular level is replacing previous 'hit and miss' random screening methods. Contemporary techniques in combinatorial chemistry, high-throughput analysis and computer-based rational drug design techniques (based on molecular structure) will be covered.

Second year (Stream 3A: Biotechnology)	Points
Note: Students should take care in selecting 200-level subjects so that prerequisites for intended 300-level subjects will be met. For example, 531-301 requires 531-201; 606-304 requires 606-201; 652-303 requires 652-214 and 300-level pharmacology subjects require 534-201.	
Semester 1	
521-213 Integrated Biomedical Science I *(p.3)*	25
526-201 Principles of Microbiology & Immunology *(p.1)*	12.5
Note: 526-201 or 526-205 are alternative prerequistes for the 300-level stream specific core subjects, 526-301 and 526-302.	
Plus	
An approved 200-level science subjects which may be:	
606-201 Plant Structure and Function *(p.1)*	12.5
610-260 Analysis in Chemical and Life Sciences *(p.5)*	12.5
Semester 2	
536-250 Integrated Biomedical Science II *(p.3)*	25
Plus	
25 points of approved 200-level science subjects which may include:	
526-205 Microbes: Infections and Responses *(p.1)*	12.5
Note: 526-201 or 526-205 are alternative prerequistes for the 300-level stream specific core subjects, 526-301 and 526-302.	
534-201 Pharmacology *(p.1)*	12.5
531-201 Basic Principles of Pathology-Science *(p.1)*	12.5
606-202 Plant Biodiversity *(p.1)*	12.5
Total	**100.0**

Students intending to undertake 300-level conservation biology, which covers effects of genetically modified organisms should take the prerequisite 654-204 Ecology: Individuals and Populations *(p.2)*.

Third year	Points
Semester 1	
521-308 Genome Science *(p.3)*	12.5
Stream specific core	
521-301 Protein Structure, Design & Engineering *(p.2)*	12.5
526-301 Microbial Cells and Genomes *(p.2)*	12.5
Electives - choose one of:	
521-303 Molecular Aspects of Cell Biology *(p.3)*	12.5
521-305 Biochemistry of Metabolism & Nutrition *(p.3)*	12.5
521-321 Gene Technology & Protein Expression *(p.4)*	12.5
531-301 Cellular Basis of Disease *(p.1)*	12.5
534-302 Neuropharmacology *(p.1)*	12.5
536-301 Integrative Physiology: Heart & Kidney *(p.3)*	12.5
606-304 Environmental Plant Physiology *(p.3)*	12.5
606-309 Frontiers of Cell Biology *(p.3)*	12.5
610-332 Bio-organic Chemistry *(p.6)*	12.5
Semester 2	
536-350 Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core	
521-322 Protein Biochemistry and Proteomics *(p.4)*	12.5
526-302 Microbial Biotechnology *(p.2)*	12.5
Electives - choose one of:	
521-302 Functional Genomics *(p.2)*	12.5
521-304 Hormone & Neurotransmitter Biochemistry *(p.3)*	12.5
521-307 Biomolecular Structure & Bioinformatics *(p.3)*	12.5
531-303 Molecular/Genetic Basis of Disease-Lect *(p.2)*	12.5
534-305 Toxicology *(p.2)*	12.5
534-306 Drug Discovery *(p.2)*	12.5
536-302 Molecular Neurophysiology *(p.3)*	12.5
536-311 Molecular/Cellular Basis of Physiology *(p.4)*	12.5
606-306 Plant Molecular Biology & Biotechnology *(p.3)*	12.5
652-303 Developmental and Cellular Genetics *(p.2)*	12.5
Total	**100.0**

Second year (Stream 3B: Therapeutics)	Points
Note: Students should take care in selecting 200-level subjects so that prerequisites for intended 300-level subjects will be met. For example, 526-301 requires 526-201 or 526-205; 531-301 requires 531-201; 652-303 requires 652-214 and 300-level pharmacology subjects require 534-201.	
Semester 1	
521-213 Integrated Biomedical Science I *(p.3)*	25
Plus	
25 points of approved 200-level science subjects which may include:	
526-201 Principles of Microbiology & Immunology *(p.1)*	12.5
606-201 Plant Structure and Function *(p.1)*	12.5

Second year (Stream 3B: Therapeutics) Points

610-260 Analysis in Chemical and Life Sciences *(p.5)* 12.5

Semester 2

536-250 Integrated Biomedical Science II *(p.3)* 25

534-201 Pharmacology *(p.1)* 12.5

Plus

An approved 200-level science subject which may be:

526-205 Microbes: Infections and Responses *(p.1)* 12.5

531-201 Basic Principles of Pathology-Science *(p.1)* 12.5

606-202 Plant Biodiversity *(p.1)* 12.5

Total **100.0**

Third year Points

Semester 1

521-308 Genome Science *(p.3)* 12.5

Stream specific core

534-301 Cellular and Molecular Pharmacology *(p.1)* 25

Electives - choose one of:

516-307 Research Project *(p.3)* 12.5

521-301 Protein Structure, Design & Engineering *(p.2)* 12.5

521-303 Molecular Aspects of Cell Biology *(p.3)* 12.5

521-305 Biochemistry of Metabolism & Nutrition *(p.3)* 12.5

521-321 Gene Technology & Protein Expression *(p.4)* 12.5

526-301 Microbial Cells and Genomes *(p.2)* 12.5

531-301 Cellular Basis of Disease *(p.1)* 12.5

534-302 Neuropharmacology *(p.1)* 12.5

536-301 Integrative Physiology: Heart & Kidney *(p.3)* 12.5

536-302 Molecular Neurophysiology *(p.3)* 12.5

606-304 Environmental Plant Physiology *(p.3)* 12.5

606-309 Frontiers of Cell Biology *(p.3)* 12.5

610-332 Bio-organic Chemistry *(p.6)* 12.5

Semester 2

536-350 Genes to Phenotype:Control & Integration *(p.3)* 12.5

Stream specific core

25 points of pharmacology subjects from the following:

534-304 Pharmacology of Therapeutic Substances *(p.2)* 25

534-305 Toxicology *(p.2)* 12.5

534-306 Drug Discovery *(p.2)* 12.5

534-311 Drug Development Techniques *(p.2)* 12.5

Electives - choose one of:

516-307 Research Project *(p.3)* 12.5

521-302 Functional Genomics *(p.2)* 12.5

521-304 Hormone & Neurotransmitter Biochemistry *(p.3)* 12.5

521-307 Biomolecular Structure & Bioinformatics *(p.3)* 12.5

531-303 Molecular/Genetic Basis of Disease-Lect *(p.2)* 12.5

534-305 Toxicology *(p.2)* 12.5

534-306 Drug Discovery *(p.2)* 12.5

534-311 Drug Development Techniques *(p.2)* 12.5

536-311 Molecular/Cellular Basis of Physiology *(p.4)* 12.5

606-306 Plant Molecular Biology & Biotechnology *(p.3)* 12.5

652-303 Developmental and Cellular Genetics *(p.2)* 12.5

Total **100.0**

Second year (Stream 3C: Drug technology) Points

Note: Students should take care in selecting 200-level subjects so that prerequisites for required 300-level subjects will be met. For example, 610-320 and 610-332 require 610-220 and 300-level pharmacology subjects require 534-201.

Semester 1

521-213 Integrated Biomedical Science I *(p.3)* 25

610-220 Organic Chemistry *(p.3)* 12.5

Plus

An approved 200-level science subject which may be:

610-260 Analysis in Chemical and Life Sciences *(p.5)* 12.5

Semester 2

536-250 Integrated Biomedical Science II *(p.3)* 25

534-201 Pharmacology *(p.1)* 12.5

Plus

An approved 200-level science subject which may be:

610-210 Light, Matter & Chemical Change A *(p.3)* 12.5

610-240 Inorganic and Bio-inorganic Chemistry A *(p.4)* 12.5

Total **100.0**

Third year Points

Semester 1

521-308 Genome Science *(p.3)* 12.5

Stream specific core

Third year Points

534-301 Cellular and Molecular Pharmacology *(p.1)* 25

Electives - choose one of:

610-332 Bio-organic Chemistry *(p.6)* 12.5

610-310 Physical Chemistry IIIA *(p.5)* 12.5

610-340 Inorganic Chemistry IIIA *(p.7)* 12.5

(Approval from stream 3C coordinators is required to enrol in 610-310 or 610-340)

Semester 2

536-350 Genes to Phenotype:Control & Integration *(p.3)* 12.5

Stream specific core

610-320 Organic Chemistry IIIA *(p.6)* 12.5

Electives - choose two of:

534-306 Drug Discovery *(p.2)* 12.5

534-311 Drug Development Techniques *(p.2)* 12.5

610-399 Chemical Research Project *(p.7)* 12.5

534-305 Toxicology *(p.2)* 12.5

610-360 Analytical & Environmental Chemistry *(p.7)* 12.5

Note: Approval from stream 3C coordinators is required to enrol in 534-305 or 610-360.

Total **100.0**

In addition to satisfactorily completing the core subjects, students are required to complete a minimum of 37.5 points of 300-level chemistry and 37.5 points of 300-level pharmacology.

Stream 4: Molecular biology of the cell in health and disease

Coordinator: Associate Professor P Whitington

The subjects in this stream deal with the link between gene function and phenotype at all levels of organisation - from cells to organisms. This link is pivotal to applying recent advances in our understanding of the human genome to the solution of medical problems. Students will emerge from this stream with a sound understanding of the genetic and molecular basis for normal cell and tissue function. They will also appreciate how cellular processes can be disrupted as a result of inherited or environmentally induced mutations, inappropriate diet or infection. This stream provides an ideal grounding for careers in biomedical research into human diseases such as cancer, diabetes, hypertension etc. as well as basic research in cell and developmental biology. It opens up employment opportunities in university departments, research institutes and biotechnology companies developing diagnostic and therapeutic products.

Second year Points

Note: Students should take care in selecting 200-level subjects so that prerequisites for intended 300-level subjects will be met. For example: 526-301 requires 526-201 or 526-205; 531-301 requires 531-201; 652-303 and 652-305 require 652-214; 652-304 requires 652-214 and 652-216.

Semester 1

521-213 Integrated Biomedical Science I *(p.3)* 25

Plus

25 points of approved 200-level science subjects which may include:

526-201 Principles of Microbiology & Immunology *(p.1)* 12.5

Semester 2

536-250 Integrated Biomedical Science II *(p.3)* 25

Plus

25 points of approved 200-level science subjects which may include:

526-205 Microbes: Infections and Responses *(p.1)* 12.5

531-201 Basic Principles of Pathology-Science *(p.1)* 12.5

Total **100.0**

Third year Points

Semester 1

521-308 Genome Science *(p.3)* 12.5

Stream specific core

521-303 Molecular Aspects of Cell Biology *(p.3)* 12.5

606-309 Frontiers of Cell Biology *(p.3)* 12.5

Electives - choose one of:

516-307 Research Project *(p.3)* 12.5

521-301 Protein Structure, Design & Engineering *(p.2)* 12.5

521-321 Gene Technology & Protein Expression *(p.4)* 12.5

526-301 Microbial Cells and Genomes *(p.2)* 12.5

526-304 Principles of Immunology *(p.2)* 12.5

531-301 Cellular Basis of Disease *(p.1)* 12.5

531-302 Techniques for Investigation of Disease *(p.2)* 12.5

536-304 Seminars & Experimental Physiology *(p.4)* 12.5

652-302 Molecular Genetics *(p.2)* 12.5

652-304 Genetic Analysis *(p.2)* 12.5

Third year		Points
652-305	Human Genetics *(p.2)*	12.5
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
516-302	Developmental Biology *(p.2)*	12.5
Plus one of		
521-302	Functional Genomics *(p.2)*	12.5
531-303	Molecular/Genetic Basis of Disease-Lect *(p.2)*	12.5
652-303	Developmental and Cellular Genetics *(p.2)*	12.5
Electives - choose one of:		
516-307	Research Project *(p.3)*	12.5
521-302	Functional Genomics *(p.2)*	12.5
521-304	Hormone & Neurotransmitter Biochemistry *(p.3)*	12.5
521-322	Protein Biochemistry and Proteomics *(p.4)*	12.5
526-305	Medical and Applied Immunology *(p.2)*	12.5
531-303	Molecular/Genetic Basis of Disease-Lect *(p.2)*	12.5
531-304	Molecular/Genetic Basis of Disease-Prac *(p.2)*	12.5
536-302	Molecular Neurophysiology *(p.3)*	12.5
536-304	Seminars & Experimental Physiology *(p.4)*	12.5
536-311	Molecular/Cellular Basis of Physiology *(p.4)*	12.5
652-303	Developmental and Cellular Genetics *(p.2)*	12.5
Total		**100.0**

The elective 516-307 may be taken in Semester 1 or Semester 2, but not both.

Stream 5: Reproductive and developmental biology

Coordinators: Dr Andrew Pask and Dr Mary Familari

Reproductive and developmental biology are two rapidly expanding fields offering many exciting opportunities for graduates at the forefront of biotechnology. These areas have numerous clinical applications such as in vitro fertilization (IVF), development of new contraceptives and the newest field embryonic stem cell technology which holds enormous therapeutic potential for the repair of diseased and damaged tissues. This stream is designed to give students a broad background in the genetics, molecular and cellular basis of diverse topics including reproduction, embryonic and fetal development in human, and other animal models. It covers the genetic and cellular events of: 1. development of egg to embryo; 2. pregnancy; 3. lactation; 4. birth and birth defects; 5. sexual differentiation; 6. fertility and control strategies for the prevention of HIV; and 7 cloning and stem cell research. This stream is taught by leading researchers in the fields of reproduction, sexual differentiation and embryonic development using state-of-the-art molecular and genetic technologies. This stream also provides a good background for those students interested in the application of assisted reproductive technology for the conservation of endangered species. The electives have been chosen to allow students to further focus on areas that particularly interest them and can lead to Honours and postgraduate research. This stream opens up employment opportunities in three broad areas: in biomedical research, biotechnology and agricultural industries. Graduates are well qualified for employment in fertility clinics; assisted reproductive technology and biotechnology companies such as IVF Australia; veterinary and agricultural industries such as CSIRO, Environment Australia, Natural Resources and Environment, Parks Victoria and Victorian Institute of Animal Sciences. There are numerous large research centers in Victoria whose medical research focuses on aspects of reproduction and stem cell biology that offer many employment opportunities as well as opportunities for Honours and post-graduate study.

Second year		Points
Note: Students should take care in selecting 200-level subjects so that prerequisites for intended 300-level subjects will be met.		
Semester 1		
521-213	Integrated Biomedical Science I *(p.3)*	25
Plus		
25 points of approved 200-level science subjects which may include:		
654-207	Australian Wildlife Biology *(p.2)*	12.5
652-214	Principles of Genetics *(p.1)*	12.5
652-216	Molecular & General Genetics Practical *(p.1)*	12.5
Semester 2		
536-250	Integrated Biomedical Science II *(p.3)*	25
Plus		
25 points of approved 200-level science subjects which may include:		
654-202	Vertebrate Structure and Function *(p.1)*	12.5
654-203	Animal Physiology *(p.2)*	12.5
652-216	Molecular & General Genetics Practical *(p.1)*	12.5
Total		**100.0**

Third year		Points
Note: A number of 300-level subjects have specified 200-level prerequisites.		
Semester 1		
521-308	Genome Science *(p.3)*	12.5
Stream specific core		
606-309	Frontiers of Cell Biology *(p.3)*	12.5
Electives		
25 points of approved 300-level science subjects which may include:		
516-306	Developmental Neurobiology *(p.3)*	12.5
521-303	Molecular Aspects of Cell Biology *(p.3)*	12.5
600-311	Research Project A *(p.1)*	12.5
652-302	Molecular Genetics *(p.2)*	12.5
652-305	Human Genetics *(p.2)*	12.5
654-307	Evolution and the Human Condition *(p.3)*	12.5
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
516-302	Developmental Biology *(p.2)*	12.5
654-304	Reproduction *(p.2)*	12.5
Electives		
12.5 points of approved 300-level science subjects which may include:		
531-303	Molecular/Genetic Basis of Disease-Lect *(p.2)*	12.5
536-311	Molecular/Cellular Basis of Physiology *(p.4)*	12.5
600-312	Research Project B *(p.1)*	12.5
Total		**100.0**

Stream 6: Neuroscience

Coordinator: Professor A Goodwin

Understanding the human brain is one of the pre-eminent scientific challenges of the 21st century. Neuroscience is a broad discipline and in this stream is addressed over a wide range from the molecular and cellular mechanisms underlying neural function to complex behaviours such as thought and language. The range of subjects offered aims to provide students with insight into the molecular and cellular mechanisms fundamental to neural function; an understanding of how neurons form the building blocks of the nervous system, how they transmit information, communicate with each other, form elementary circuits, and store information; an appreciation of the fundamentals of systems underlying sensory perception; an understanding of how the nervous system initiates and controls movements of the body; an appreciation of the plasticity of the nervous system, how it adapts to changing environments, how it ages, how nerve injuries may be repaired or may lead to irreversible damage; insight into how drugs and diseases affect the nervous system. A neuroscience background leads to career opportunities in scientific and medical research in university departments, research institutes, hospitals; and to broader opportunities in drug companies, and in bioengineering companies (diagnostic and therapeutic equipment, robotics).

Second year		Points
Semester 1		
521-213	Integrated Biomedical Science I *(p.3)*	25
Plus		
25 points of approved 200-level science subjects.		
Semester 2		
536-250	Integrated Biomedical Science II *(p.3)*	25
534-201	Pharmacology *(p.1)*	12.5
516-209	Introductory Neuroscience *(p.2)*	12.5
Total		**100.0**

Third year		Points
Semester 1		
521-308	Genome Science *(p.3)*	12.5
Stream specific core		
534-302	Neuropharmacology *(p.1)*	12.5
536-303	The Brain: Neurophysiology of Behaviour *(p.3)*	12.5
Electives - choose one of:		
516-306	Developmental Neurobiology *(p.3)*	12.5
516-307	Research Project *(p.3)*	12.5
654-305	Experimental Animal Behaviour *(p.3)*	12.5
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
516-305	Neuroscience: Systems & Higher Functions *(p.3)*	12.5
521-304	Hormone & Neurotransmitter Biochemistry *(p.3)*	12.5
Electives - choose one of:		
516-302	Developmental Biology *(p.2)*	12.5

Third year		Points
516-307	Research Project *(p.3)*	12.5
536-302	Molecular Neurophysiology *(p.3)*	12.5
536-304	Seminars & Experimental Physiology *(p.4)*	12.5
Total		**100.0**

The elective 516-307 may be taken in Semester 1 or Semester 2, but not both.

Stream 7: Microorganisms, infection and immunity

Coordinators: Professor J McCluskey and Ms S Uren

Infectious diseases are the major world wide cause of morbidity and mortality. The Stream 7 core subjects provide a deep understanding of the diverse agents of infection (bacteria, viruses, fungi and parasites), and the many diseases they cause. The molecular basis of the ability of various microorganisms to cause disease (pathogenesis) will be discussed, together with strategies to interrupt this process, including the development of new antibiotics and other agents. The immunology component of the course allows students to become familiar with the way the immune system responds to defend the body against infections. Techniques to boost the immune response by the development of novel vaccines and other interventions are explored. As well, the immunology subjects provide an understanding of the mechanisms operating in response to tumours, transplants, and in allergies and autoimmune diseases. Stream 7 electives have been chosen to allow students to further focus on areas of particular interest to them. This stream opens up employment opportunities in the areas of medical microbiological and immunological diagnostics, food science, biotechnology (including medical and veterinary vaccine and therapeutics development and production), and basic research into a range of microorganisms (including those bacteria and viruses which cause diarrhoea, HIV, influenza and tuberculosis), microbial genetics and pathogenesis. The depth of the immunological content of the course allows students to continue to explore the immune system by research into such diverse areas as allergies, autoimmune diseases including diabetes and arthritis, transplantation and cancer immunology.

Second year		Points
Note: 526-201 and 526-205 are alternative prerequisites for the 300-level core subjects.		
Semester 1		
521-213	Integrated Biomedical Science I *(p.3)*	25
526-201	Principles of Microbiology & Immunology *(p.1)*	12.5
Plus		
An approved 200-level science subject which may be:		
526-221	Practical Microbiology *(p.1)*	12.5
(526-221 is strongly recommended)		
Semester 2		
536-250	Integrated Biomedical Science II *(p.3)*	25
526-205	Microbes: Infections and Responses *(p.1)*	12.5
Plus		
An approved 200-level science subject		12.5
(526-221, if not taken in Semester 1, is strongly recommended)		
Total		**100.0**

Within stream 7 there are three sub-streams available at 300-level:

- Stream 7A: Combined Microbiology and Immunology
- Stream 7B: Microbiology
- Stream 7C: Immunology

At third-year level, at least one (12.5 points) of the four practical subjects offered (526-321, 526-324, 526-326, 526-327) must be selected.

Third year (Stream 7A: Combined microbiology and immunology)		Points
Semester 1		
521-308	Genome Science *(p.3)*	12.5
Stream specific core		
526-304	Principles of Immunology *(p.2)*	12.5
526-313	Medical Microbiology: Cellular Pathogens *(p.3)*	12.5
Electives - choose one of:		
526-301	Microbial Cells and Genomes *(p.2)*	12.5
526-321	Molecular Microbiology Techniques *(p.3)*	12.5
526-324	Immunological Techniques *(p.3)*	12.5
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
526-314	Medical Microbiology: Viruses *(p.3)*	12.5
Plus one of		
526-305	Medical and Applied Immunology *(p.2)*	12.5
526-327	Projects: Microbiology *(p.4)*	12.5
Electives - choose one of:		
526-302	Microbial Biotechnology *(p.2)*	12.5
526-305	Medical and Applied Immunology *(p.2)*	12.5

Third year (Stream 7A: Combined microbiology and immunology)		Points
526-326	Projects: Immunology *(p.3)*	12.5
Total		**100.0**

Note: The choice of the Semester 2 electives 526-305 and 526-326 depends of student's stream specific core choice.

Third year (Stream 7B: Microbiology)		Points
Semester 1		
521-308	Genome Science *(p.3)*	12.5
Stream specific core		
526-313	Medical Microbiology: Cellular Pathogens *(p.3)*	12.5
Plus		
526-304	Principles of Immunology *(p.2)*	12.5
or		
526-321	Molecular Microbiology Techniques *(p.3)*	12.5
or another subject approved by the stream 7 coordinators		
Electives - choose one of:		
526-301	Microbial Cells and Genomes *(p.2)*	12.5
526-304	Principles of Immunology *(p.2)*	12.5
526-321	Molecular Microbiology Techniques *(p.3)*	12.5
526-324	Immunological Techniques *(p.3)*	12.5
or another subject approved by the stream 7 coordinators		
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
526-314	Medical Microbiology: Viruses *(p.3)*	12.5
526-327	Projects: Microbiology *(p.4)*	12.5
Electives - choose one of:		
526-302	Microbial Biotechnology *(p.2)*	12.5
526-305	Medical and Applied Immunology *(p.2)*	12.5
or another subject approved by the stream 7 coordinators		
Total		**100.0**

Third year (Stream 7C: Immunology)		Points
Semester 1		
521-308	Genome Science *(p.3)*	12.5
Stream specific core		
526-304	Principles of Immunology *(p.2)*	12.5
526-324	Immunological Techniques *(p.3)*	12.5
Electives - choose one of:		
526-301	Microbial Cells and Genomes *(p.2)*	12.5
526-313	Medical Microbiology: Cellular Pathogens *(p.3)*	12.5
or another subject approved by the stream 7 coordinators		
Semester 2		
536-350	Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core		
526-305	Medical and Applied Immunology *(p.2)*	12.5
526-326	Projects: Immunology *(p.3)*	12.5
Electives - choose one of:		
526-314	Medical Microbiology: Viruses *(p.3)*	12.5
526-302	Microbial Biotechnology *(p.2)*	12.5
or another subject approved by the stream 7 coordinators		
Total		**100.0**

Stream 8: Biomedical physics and chemistry

Coordinator (Physics): Associate Professor Ann Roberts

Coordinator (Chemistry): Professor Carl Schiesser

Second year		Points
Note: for other physics and chemistry subject options at 200-level, consult course coordinator or stream coordinators. Those students interested in 200- and 300-level physics units should see the physics stream coordinator as soon as possible in the first year of study to get advice on the recommended corequisite mathematics subjects.		
Semester 1		
521-213	Integrated Biomedical Science I *(p.3)*	25
Plus		
25 points of approved 200-level chemistry and/or physics subjects which may include:		
610-220	Organic Chemistry *(p.3)*	12.5
610-260	Analysis in Chemical and Life Sciences *(p.5)*	12.5
640-223	Quantum Mechanics & Thermal Physics(Adv) *(p.4)*	12.5
640-243	Quantum Mechanics & Thermal Physics *(p.5)*	12.5
(plus corequisite mathematics subject where applicable)		
Semester 2		
536-250	Integrated Biomedical Science II *(p.3)*	25

Second year	Points
Plus	
25 points of approved 200-level chemistry and/or physics subjects which may include:	
610-240 Inorganic and Bio-inorganic Chemistry A *(p.4)*	12.5
(plus corequisite mathematics subject where applicable)	
Total	**100.0**

Third year	Points
Semester 1	
521-308 Genome Science *(p.3)*	12.5
Stream specific core	
Select three of:	
521-301 Protein Structure, Design & Engineering *(p.2)*	12.5
521-321 Gene Technology & Protein Expression *(p.4)*	12.5
610-332 Bio-organic Chemistry *(p.6)*	12.5
610-340 Inorganic Chemistry IIIA *(p.7)*	12.5
640-321 Quantum Mechanics (Adv) *(p.6)*	12.5
640-341 Quantum Mechanics *(p.7)*	12.5
Additional 300-level chemistry and physics subjects may be made available.	
Semester 2	
536-350 Genes to Phenotype:Control & Integration *(p.3)*	12.5
Stream specific core	
Select three of:	
521-307 Biomolecular Structure & Bioinformatics *(p.3)*	12.5
521-322 Protein Biochemistry and Proteomics *(p.4)*	12.5
534-305 Toxicology *(p.2)*	12.5
534-306 Drug Discovery *(p.2)*	12.5
610-320 Organic Chemistry IIIA *(p.6)*	12.5
640-353 Atomic, Molecular & Solid State Physics *(p.8)*	12.5
640-364 Computational Physics *(p.9)*	12.5
Additional 300-level chemistry and physics subjects may be made available.	
Total	**100.0**

Course planning

First-year course planning

Students selected into the Bachelor of Biomedical Science course are invited to attend introductory information sessions at the University prior to enrolment. At these sessions students will be given important information about course requirements, disciplines available and the enrolment process. Students then meet with a faculty adviser to plan their first year of study. As shown in the *Course requirements (p.19)*, the first year of the course comprises:

- 50 points of compulsory core subjects (biology and chemistry);
- 25 points of physics subjects; and
- 12.5 points of mathematics and 12.5 points of statistics.

Course planning in later years

In addition to completing the four compulsory core subjects at second and third year, students will study additional subjects according to their intended specialisation at third year.

Students requiring further information may obtain course advice from student advisers in the Faculty of Science Office, the course coordinator and from academic staff in relevant departments.

During Semester 2 each year, a course planning exercise is conducted, during which students are provided with the opportunity to meet with academic staff to discuss their course plan for the following year. Students are notified by mail of the relevant dates and procedures for this exercise.

Course plans are applications for selection into subjects and must be approved by the faculty. No further action is required unless a student fails a prerequisite subject, misses entry into quota-restricted subjects or wishes to alter their course plan. In these cases, the student should seek advice from the Faculty of Science Office.

Quota subjects

Students enrolled in the Bachelor of Biomedical Science course receive automatic entry to the compulsory core subjects of the degree - provided prerequisite requirements are satisfied. Quotas may exist on the additional subjects chosen at second and third year. Please refer to *Quota subjects (p.9)* for information regarding selection into quota subjects.

Honours program

Students planning to apply for entry into the honours program (fourth-year studies) should refer to the Bachelor of Science (Degree with Honours) section (see page 1) for further details.

Course coordinators

Professor M-J Gething, Department of Biochemistry and Molecular Biology

Dr MA Perugini, Department of Biochemistry and Molecular Biology

Bachelor of Information Systems (BIS)

The degree in information systems focuses on the design, specification, and creation of information systems, and on the human and organisational arrangements needed to use information systems to achieve organisational goals. To cover these increasingly interrelated topics, the course offers study in five key areas: information systems, information technology, organisations, analytical skills, and professional competencies.

Bachelor of Information Systems graduates find employment in a variety of professional roles, ranging from the very technical to the very business oriented, in public and private organisations.

Attributes of the Bachelor of Information Systems graduates

Specific capabilities will be developed through work in the five key areas of the course.

Information systems

This is the central theme of the course: information systems collect, process, store, and distribute information so that it can be used to make decisions, to keep track of resources, and to plan for the future. Particular focus is placed on imagining, specifying, designing, justifying, building, implementing, managing, and using information systems to add value in organisations.

Information technology

An understanding of the potential of information technology to add value is essential to the successful implementation and use of information systems. Students will become familiar with computer hardware and software, telecommunications, databases and data structures, information technology architectures, and information technology infrastructures. Practical experience in these areas will help students learn how to assess the current and future capability of information technology.

Organisations

To implement information systems efficiently and effectively in organisations requires the ability to analyse and understand organisational functions, processes, environments, characteristics, and cultures. This organisational perspective on information systems, and its relationship to the technical perspective developed in the information technology theme, is a distinguishing characteristic of the Bachelor of Information Systems course.

Analytical skills

Effective design, development, and implementation of information systems in organisations requires a broad range of analytical skills, including data classification and modelling, information mapping and representation, systems analysis and design, and statistics. These and other analytical skills are essential for understanding, and communicating about, complex organisational situations and the potential and performance of information systems.

Professional competencies

Graduates will, in the course of their jobs, work with people across a broad spectrum of technical and business interests and skills. Success in these interactions will require a well-developed set of personal competencies, including listening, collecting and synthesising information, writing, presenting, and working in teams.

Professional Skills Program (PSP)

Students enrolled in the Bachelor of Information Systems (BIS), BCom/BIS, BSc/BIS, BGeomE/BIS or the Diploma in Information Systems are able to participate in the Professional Skills Program. It covers a range of communication, professional and analytical skills that develop and enhance personal attributes seen as critical by employers, over and above their degree. The program is provided at no cost to those enrolled in the various Information Systems courses.

The PSP aims to prepare students for the information systems workplace by teaching skills in communication, teamwork, leadership, writing, presenting in public, problem solving and more. Upon successful completion of the PSP, students will be awarded a certificate that will confirm their valuable professional skills.

It is made up of three subjects taught over three semesters and 33 hours in total. The PSP subjects are not compulsory but provide very strong advantages in areas relevant to careers and employment.

615-103 comprises an introduction to a range of professional skills including communication in different environments and situations as well as conflict resolution and negotiation. In 615-203, students develop and enhance skills in teamwork and collaboration along with decision making, leadership and handling differences. The final subject 615-303, covers advanced presentation

skills, employment and commercial expectations and transition into a business environment.

Objectives of the course

The objective of the Bachelor of Information Systems course is to prepare students to be part of teams that imagine, specify, design, justify, build, implement, manage and use information systems. To accomplish this objective, graduates must understand how to use information technology, including hardware, software, and telecommunications, as a conduit for the value-added information content of formal organisational systems. This understanding is based on a solid theoretical grounding in both technology and organisations, as well as on experience working both individually and in teams to apply the theory to practice.

Upon completion of the Bachelor of Information Systems course, students should:

- understand how people use information and information systems;
- understand the business value of information and information systems in organisations;
- understand the organisational settings in which information systems are used, including major business functions and processes;
- have familiarity with, and some experience in, studying large, complex information systems;
- understand, and be able to specify, the technical aspects of an information system;
- be able to build small information systems;
- be familiar with a range of techniques, standards, and tools for building and using large information systems in an organisational setting;
- be able to participate in imagining, designing, justifying, implementing, and managing large information systems;
- have professional competencies for effective work in organisations, including listening, writing, researching, analysing, presenting, and working in teams; and
- know how to operate ethically within society's legal framework.

Duration

The Bachelor of Information Systems course normally requires three years of full-time study, and may be taken part time.

Course requirements

Students must complete a minimum (and maximum) of 300 points of approved studies, comprising:

- 187.5 points of core subjects in information systems at 100, 200, and 300-level;
- 25 points of information systems elective subjects at 300-level;
- One business-oriented subject (12.5 points) chosen from the following:
  - 306-108 Accounting Transactions and Analysis *(p.1)* (note that this subject has prerequisites)
  - 316-101 Introductory Macroeconomics *(p.1)* (note that this subject has prerequisites)
  - 316-102 Introductory Microeconomics *(p.1)*
  - 333-101 Finance 1 *(p.1)* (note that this subject has prerequisites)
  - 325-101 Managing People and Organisations *(p.1)*
  - 325-102 Business in the Global Economy *(p.1)*
  - 732-103 Principles of Business Law *(p.1)*
- 75 points of elective subjects including 37.5 to 50 points at 200 or 300-level;

Students may not undertake more than 112.5 points at 100-level towards this course.

Core information systems subjects

100-level

615-110 Foundations of Information Systems *(p.1)*

615-140 Technologies for Information Systems *(p.1)*

615-145 Concepts in Software Development I *(p.1)*

615-150 Organisational Processes *(p.2)*

615-160 Tools of Analysis *(p.2)*

200-level

615-230 Database Concepts *(p.2)*

615-237 Telecommunications Concepts *(p.2)*

615-240 Concepts in Software Development II *(p.2)*

615-245 Systems Analysis and Design *(p.3)*

615-251 Organisational Analysis and Change *(p.3)*

615-252 Electronic Commerce *(p.3)*

300-level

615-346 Information Systems Architecture *(p.4)*

(or 615-347 Business Systems Design *(p.4)*)

615-355 Legal & Ethical Frameworks *(p.5)*

615-372 Project Management *(p.6)*

615-373 Industrial Project *(p.6)*

Electives

Students need to complete six elective subjects (75 points): of these, up to 37.5 points can be taken at 100-level; and the remaining points must be subjects at 200-level or greater.

Students are encouraged to take electives that broaden their degree studies.

Table 4: BIS course plan - example

Yr	Sem	Subjects			
1	1	**615-110**	**615-140**	One business-oriented subject from the list above	Elective
	2	**615-145** *(615-140)*	**615-150**	**615-160** *(Corequisite 615-145 or 433-171, or equivalent)*	Elective
2	1	**615-240** *(615-145)*	**615-251** *(615-110)*	**615-230** *(615-145)*	Elective
	2	**615-245** *(615-230, 615-240)*	**615-252** *(615-150)*	**615-237** *(50 points of 100-level IS subjects)*	Elective at 200-level or greater
3	1	**615-347 or 615-346** *(615-245)*	**615-372** *(50 points of 200-level IS subjects)*	Information systems elective at 300-level	Elective at 200-level or greater
	2	**615-355** *(62.5 points of 200-level IS subjects)*	**615-373** *(615-372; Corequisite 615-346 or 615-347)*	Information systems elective at 300-level	Elective at 200-level or greater

Note: Prerequisites for subjects are noted in italics where appropriate

Combined courses involving the Bachelor of Information Systems

Information Systems in combination with other disciplines creates attractive professional opportunities in a number of areas. The following Bachelor of Information Systems combined courses are available:

- *Bachelor of Commerce/Bachelor of Information Systems (BCom/BIS) (p.26)*
- *Bachelor of Science/Bachelor of Information Systems (BSc/BIS) (p.28)*
- *Bachelor of Geomatic Engineering/Bachelor of Information Systems (p.29)*

Bachelor of Commerce/Bachelor of Information Systems (BCom/BIS)

The combined Bachelor of Commerce/Bachelor of Information Systems course provides a course of study for students who want to understand information systems from a technological perspective, the organisational contexts in which these systems are developed, and the business environments which determine how the systems can be used to create value. Graduates of this course should readily find employment across a spectrum of knowledge-intensive careers, including accounting, consulting, and general management.

Course objectives

As for the Bachelor of Commerce (see *Attributes of a commerce graduate (p.2)*) and the Bachelor of Information Systems (page 26).

It will be possible within the outlines of the BCom/BIS course to achieve either the approved undergraduate course of the Institute of Chartered Accountants in Australia (ICA) or the required subjects for associate status with CPA Australia.

Attributes of the Bachelor of Commerce/Bachelor of Information Systems graduate

In commerce/information systems at the University of Melbourne, we expect to educate our students with the fundamental skill of managing information,

its transformation into knowledge and being able to integrate this knowledge into a business environment. These outcomes are fully consistent with the University's general ambition for our graduates, and emphasise the transferability of the skills practised in commerce and information systems.

Throughout their course, students will find that many of the abilities that they develop are shared by, and so are valued by and are applicable to, activities in all walks of life. In particular, these are the skills that are essential to providing leadership to the business and information-technology base of the Australian economy and culture.

Bachelor of Commerce/Bachelor of Information Systems graduates have strong information technology skills with an awareness of the business environment. These graduates are able to:

- synthesise information from a range of sources, evaluate this, and add new ideas to their existing knowledge;
- make effective use of information to identify and solve problems;
- work independently or in teams;
- understand and fit into a work organisation's culture;
- view and understand an organisation's wider business picture and position;
- understand the commercial environment and recognise and define issues or problems within it;
- understand the issues involved in the design, specification, and creation of information systems; and
- understand the human and organisational arrangements needed to use information systems to achieve organisational goals.

From their training in information systems, graduates have five streams of knowledge and skills: information systems, information technology, organisations, analytical skills, and professional competencies.

These graduates comprehend the larger picture of how information systems collect, process, store, and distribute information so that it can be used to make decisions, keep track of resources, and plan for the future. In particular, they can imagine, specify, design, justify, build, implement, manage and use information systems to add value in a wide variety of public and private organisations.

They are familiar and comfortable working with computer hardware and software, telecommunications, databases and data structures, information technology architectures, and information technology infrastructures. They have practical experience in these areas enabling them to assess the current and future capability of information technology. They therefore know the potential of information technology to add value in an organisation, knowledge that is vital to the successful implementation and use of information systems.

A distinguishing characteristic of the Bachelor of Information Systems graduate is their ability to analyse and evaluate the organisational environment and its impact on information systems. They are able to implement information systems efficiently and effectively in organisations analyse and understand the functions, processes, environments, characteristics and cultures that give rise to a complete organisation.

Graduates also have a broad range of analytical skills, including data classification and modeling, information mapping and representation, systems analysis and design, and statistics. These and other analytical skills are essential for understanding, and communicating about, complex organisational situations and the potential and performance of information systems, to ensure that effective design, development, and implementation of information systems in organisations occurs.

Having been trained in professional skills within their program of study, graduates are able to interact effectively with people across the broad spectrum of technical and business interests and skills. The program gives graduates a set of personal competencies, including listening, collecting and synthesising information, writing, presenting, and working in teams, which are vital in any organisational context.

Their studies in commercial disciplines enable graduates to accept and deal with a level of uncertainty in problem solving and decision making, particularly when access to information is limited.

The need to manage the multiplicity of tasks (lectures, laboratory and assignment work), means that commerce/information systems graduates are aware of the need to structure and manage time effectively and efficiently, to retain balance and to prioritise their activities. They are able to juggle several tasks simultaneously, take responsibility for their own work, independently or within a group, and to plan their schedule appropriately.

Duration

The Bachelor of Commerce/Bachelor of Information Systems course normally requires five years of full-time study, and may also be taken part-time.

Course requirements

Students must complete a minimum (and maximum) of 500 points. Within the 500 points, students must ensure that they satisfy the requirements of both the commerce component and the information systems component as specified below.

Commerce component

A minimum of 200 commerce points is required, which must include:

- 50-125 points at the 100-level;
- at least 50 points at the 300-level;
- the following compulsory subjects:

  316-101 Introductory Macroeconomics *(p.1)*

  316-102 Introductory Microeconomics *(p.1)*

  316-130 Quantitative Methods 1 *(p.1)*

  325-201 Organisational Behaviour *(p.1)*[1]

  and one of:

  316-205 Introductory Econometrics *(p.1)*

  316-206 Quantitative Methods 2 *(p.1)*

  325-210 Managerial Decision Analysis *(p.2)*

  325-212 Market Research *(p.2)*

The 200 commerce points must be chosen from subjects taught by departments in the Faculty of Economics and Commerce, or subjects with a 732 prefix taught by the Faculty of Law.

Information systems component

A minimum of 212.5 points of information systems subjects is required, which must include

- 175 points of core subjects or approved alternate subjects; and
- 37.5 points of information systems elective subjects, including 25 points at 300-level.

Core information systems subjects:

100-level

615-110 Foundations of Information Systems *(p.1)*

615-140 Technologies for Information Systems *(p.1)*

615-145 Concepts in Software Development I *(p.1)*

615-150 Organisational Processes *(p.2)*

200-level

615-230 Database Concepts *(p.2)*

615-237 Telecommunications Concepts *(p.2)*

615-240 Concepts in Software Development II *(p.2)*

615-245 Systems Analysis and Design *(p.3)*

615-251 Organisational Analysis and Change *(p.3)*

615-252 Electronic Commerce *(p.3)*

300-level

615-346 Information Systems Architecture *(p.4)*

(or 615-347 Business Systems Design *(p.4)*)

615-355 Legal & Ethical Frameworks *(p.5)*

615-372 Project Management *(p.6)*

615-373 Industrial Project *(p.6)*

In no case may students receive credit for both a core subject and its alternative.

Balance of points

The remaining 87.5 points may be taken from subjects offered by information systems, economics and commerce, or another faculty.

Table 5: BCom/BIS course plan - example

Yr	Sem	Subjects			
1	1	**615-110**	Commerce subject	Commerce subject	Commerce subject
	2	**615-150**	**615-140**	Commerce subject	Commerce subject
2	1	**615-145** (*615-140)*	**615-251** (*615-110)*	Commerce subject	Commerce subject
	2	**615-237** *(50 points of 100-level IS subjects)*	**615-252** *(615-150)*	Elective	Commerce subject
Note: Prerequisites for subjects are noted in italics where appropriate					

1. Students who commenced the Bachelor of Commerce /Bachelor of Information Systems prior to 2005 are not required to complete this subject.

Table 5: BCom/BIS course plan - example					
Yr	**Sem**	**Subjects**			
3	1	**615-240** *(615-145)*	**615-230** *(615-145)*	Elective	Commerce subject
	2	**615-245** *(615-230, 615-240)*	Information systems elective	Elective	Commerce subject
4	1	**615-347** or **615-346** *(615-245)*	Information systems elective at 300-level	Elective	Commerce subject
	2	**615-355** *(62.5 points of 200-level IS subjects)*	Elective	Commerce subject	Commerce subject
5	1	**615-372** *(50 points of 200-level IS subjects)*	Elective	Elective	Commerce subject
	2	**615-373** *(615-372; corequisite 615-346 or 615-347)*	Information systems elective at 300-level	Commerce subject	Commerce subject
Note: Prerequisites for subjects are noted in italics where appropriate					

Bachelor of Science/Bachelor of Information Systems (BSc/BIS)

The combined Bachelor of Science/Bachelor of Information Systems course provides a course of study for students who want to combine their training in a scientific discipline with the ability to imagine, design, build, and use information systems applications. As a knowledge-intensive discipline, science increasingly relies on these abilities as well as on specific content knowledge. The graduates of this course readily find employment across a spectrum of scientific careers, particularly those that involve the collection, analysis, reporting, and dissemination of data, and the technical and organisational skills to convert that data into useful information.

Course objectives

Upon completion of the course, students should:

- have a broad knowledge of science across a range of disciplines, with a higher level of understanding in one or more of those disciplines;
- understand how to use information technology, including hardware, software, databases and networks, as the technical foundation for other organisational systems;
- have a solid theoretical grounding in both information technology and organisations;
- have gained practical experience working both individually and in groups to turn scientific theory into practice;
- be able to combine their knowledge of information technology and science to recognise opportunities for the use of information systems;
- be able to locate, access, use, and add to the information necessary for the solution of scientific problems;
- be able to place a value on the information created, by themselves as individual scientists and by the organisations of which they are a part, so that this information may be appropriately managed; and
- be able to disseminate knowledge as required to their scientific peers, to the members of their organisations, and to the general public.

Attributes of the Bachelor of Science/Bachelor of Information Systems

In science/information systems at the University of Melbourne, we expect to educate our students in the fundamental skills of transforming information into knowledge and using technology to manage knowledge in organisations. These outcomes are fully consistent with the University's general ambition for our graduates, and emphasise the transferability of the skills practised in the science and in information systems.

The Bachelor of Science and Bachelor of Information Systems degrees aim to educate and train students in both science and information technology areas of study. Through their scientific training, these graduates have a broad knowledge of science across a range of disciplines, with a higher level of understanding in one or more of these disciplines. They also have an appreciation of the historical background and evolution of scientific concepts. They have the knowledge, skills and attitude to enable them to adapt to scientific, technological and social change and have a sense of intellectual curiosity and a desire for lifelong learning.

Through their training in information systems, these graduates also understand the issues involved in the design, specification, and creation of information systems, and the human and organisational arrangements needed to use information systems to achieve organisational goals.

Science/information systems graduates are particularly strong in their cognitive skills. They are able to:

- synthesise and evaluate information from a range of sources and add new ideas to their existing knowledge;
- observe, record and evaluate data or evidence appropriately;
- classify and model data, and undertake information mapping and representation;
- make effective use of information to identify and solve problems;
- synthesise and integrate disparate elements into a meaningful whole;
- analyse and evaluate the organisational environment and its impact on information systems;
- undertake systems analysis and design;
- implement information systems efficiently and effectively in organisations; and
- analyse and understand the functions, processes, environments, characteristics, and cultures that give rise to a complete organisation.

These and other analytical skills are essential for understanding, and effectively communicating with others on issues relating to complex organisational situations and the potential and performance of information systems. As information systems graduates they will have the skills necessary to:

- ensure that effective design, development, and implementation of information systems in organisations occurs;
- comprehend the larger picture of how information systems collect, process, store, and distribute information so that it can be used to make decisions, keep track of resources, and plan for the future; and
- imagine, specify, design, justify, build, implement, manage, and use information systems to add value in a wide variety of public and private organisations.

Graduates are familiar and comfortable working with computer hardware and software, telecommunications, databases and data structures, information technology architectures, and information technology infrastructures. They have practical experience in these areas enabling them to assess the current and future capability of information technology. They therefore know the potential of information technology to add value in an organisation, knowledge that is vital to the successful implementation and use of information systems.

Graduates in science/information systems are able to be creative in their approach to scientific or technology-related issues. They are used to formulating hypotheses which can be tested for validity. They can extrapolate from the known to the unknown and are comfortable working with analogues rather than needing to deal with literal situations.

The science and technology disciplines value clear reporting. Consequently, the science/information systems graduate has developed skills of efficient and effective communication of ideas and results, whether in the accepted modes of scientific and business report writing or through more informal oral presentations. Graduates recognise the need to present information and ideas in an effective written form that is appropriate to the purpose and the reader.

These graduates are adept at activity planning as well as the application of theory to practice. Some students will have found collaborative learning an efficient tool, while others will find their practical work enhanced by effective teamwork.

Through the need to manage the multiplicity of tasks (lectures, laboratory and assignment work) and the professional skills program these graduates have developed professional skills within their program of study. They:

- are aware of the need to structure and manage time effectively and efficiently;
- can retain balance and prioritise their activities;
- can juggle several tasks simultaneously;
- take responsibility for their own work, independently or within a group, and plan their schedule appropriately;
- are able to interact effectively with people across the broad spectrum of technical and business interests and skills; and
- have a set of personal competencies, including listening, collecting and synthesising information, writing, presenting, and working in teams, which are vital in any organisational context.

Duration

The Bachelor of Science/Bachelor of Information Systems combined course usually requires five years of full-time study, and may also be taken part-time.

Course requirements

Students must complete a minimum (and maximum) of 500 points. Within the 500 points students must ensure that they satisfy the requirements of both the science component and the information systems component as specified below.

Science component

A minimum of 237.5 science points is required, which must include:

- between 75 and 125 science points at the 100-level; and
- completion of 50 points of a prescribed science major at the 300-level.

There are no specific requirements at the 200-level.

Information systems subjects (subject prefix 615-) cannot count towards the science component of the BSc/BIS.

Students who first enrolled in the BSc/BIS course before 1999 must complete the requirements set out above, with the exception that they do not need to complete a prescribed science major, but rather 50 science points at the 300-level of subjects of their choice.

Students should refer to *Course planning information for the BSc, BASc and BSc combined courses (p.9)* for more information about majors and what constitutes science points.

Information systems component

A minimum of 212.5 points of information systems subjects is required, which must include:

- 175 points of core subjects or approved alternate subjects;
- One business-oriented subject (12.5 points) chosen from the following:
  - 306-108 Accounting Transactions and Analysis *(p.1)* (note that this subject has prerequisites),
  - 316-101 Introductory Macroeconomics *(p.1)* (note that this subject has prerequisites),
  - 316-102 Introductory Microeconomics *(p.1)*,
  - 333-101 Finance 1 *(p.1)* (note that this subject has prerequisites),
  - 325-101 Managing People and Organisations *(p.1)*,
  - 325-102 Business in the Global Economy *(p.1)*,
  - 732-103 Principles of Business Law *(p.1)*;
- 25 points of information systems elective subjects at 300-level.

Core information systems subjects:

100-level

615-110 Foundations of Information Systems *(p.1)*

615-140 Technologies for Information Systems *(p.1)*

615-145 Concepts in Software Development I *(p.1)*

615-150 Organisational Processes *(p.2)*

200-level

615-230 Database Concepts *(p.2)*

615-237 Telecommunications Concepts *(p.2)*

615-240 Concepts in Software Development II *(p.2)*

615-245 Systems Analysis and Design *(p.3)*

615-251 Organisational Analysis and Change *(p.3)*

615-252 Electronic Commerce *(p.3)*

300-level

615-346 Information Systems Architecture *(p.4)*

(or 615-347 Business Systems Design *(p.4)*)

615-355 Legal & Ethical Frameworks *(p.5)*

615-372 Project Management *(p.6)*

615-373 Industrial Project *(p.6)*

In no case may students receive credit for both a core subject and its alternative.

Balance of points

Students select Faculty of Science subjects to complete the remaining 50 points. Subject selection requires the completion of prerequisites and, in the case of quota restricted subjects, the offer of a place in the subject.

Students are required to include 615-160 Tools of Analysis *(p.2)* or any 100-level mathematics and statistics subject in the 50 points available.

BSc/BIS - computer science major

BSc/BIS students intending to complete a science major in computer science are directed to undertake 433-171 Introduction to Programming. This subject exempts them from enrolling in 615-145 Concepts in Software Development. Similarly, at 200-level, these students undertake 433-254 Software Design, which exempts them from 615-240 Concepts in Software Development II. Students granted exemptions for 615-145 and 615-240 must select alternative information systems electives to complete the minimum 212.5 points of information systems subjects.

Table 6: BSc/BIS course plan - example

Yr	Sem	Subjects			
1	1	**615-110**	One business-oriented subject from the list above	Science subject	Science subject
	2	**615-150**	**615-140**	Science subject	Science subject
2	1	**615-145** *(615-140)*	**615-251** *(615-110)*	Science subject	Science subject
	2	**615-237** *(50 points of 100-level IS subjects)*	**615-252** *(615-150)*	**615-160** *(corequisite 615-145 or 433-171, or equivalent)*	Science subject
3	1	**615-240** *(615-145)*	**615-230** *(615-145)*	Science subject	Science subject
	2	**615-245** *(615-230, 615-240)*	Science or Information systems elective	Science subject	Science subject
4	1	**615-347** or **615-346** *(615-245)*	Information systems elective at 300-level	Science subject	Science subject
	2	**615-355** *(62.5 points of 200-level IS subjects)*	Science or Information systems elective	Science subject	Science subject
5	1	**615-372** *(50 points of 200-level IS subjects)*	Science or Information systems elective	Science subject	Science subject
	2	**615-373** *(615-372; corequisite 615-346 or 615-347)*	Information systems elective at 300-level	Science subject	Science subject

Note: Prerequisites for subjects are noted in italics where appropriate

Bachelor of Geomatic Engineering/ Bachelor of Information Systems

Refer to *Bachelor of Geomatic Engineering/Bachelor of Information Systems (BGeomE/BIS) (p.9)*.

Course requirements

Refer to *Bachelor of Geomatic Engineering/Bachelor of Information Systems (BGeomE/BIS) (p.9)*.

Information systems component

A minimum of 212.5 points of information systems subjects is required, which must include:

- 175 points of core subjects or approved alternate subjects;
- One business-oriented subject (12.5 points) chosen from the following:
  - 306-108 Accounting Transactions and Analysis *(p.1)* (note that this subject has prerequisites),
  - 316-101 Introductory Macroeconomics *(p.1)* (note that this subject has prerequisites),
  - 316-102 Introductory Microeconomics *(p.1)*,
  - 333-101 Finance 1 *(p.1)* (note that this subject has prerequisites),
  - 325-101 Managing People and Organisations *(p.1)*,
  - 325-102 Business in the Global Economy *(p.1)*,
  - 732-103 Principles of Business Law *(p.1)*;
- 25 points of information systems elective subjects at 300-level.

Core information systems subjects:

100-level

615-110 Foundations of Information Systems *(p.1)*

615-140 Technologies for Information Systems *(p.1)*

615-145 Concepts in Software Development I *(p.1)*

615-150 Organisational Processes *(p.2)*

200-level

615-230 Database Concepts *(p.2)*

615-237 Telecommunications Concepts *(p.2)*

615-240 Concepts in Software Development II *(p.2)*

615-245 Systems Analysis and Design *(p.3)*

615-251 Organisational Analysis and Change *(p.3)*

615-252 Electronic Commerce *(p.3)*

300-level

615-346 Information Systems Architecture *(p.4)*

(or 615-347 Business Systems Design *(p.4)*)

615-355 Legal & Ethical Frameworks *(p.5)*

615-372 Project Management *(p.6)*

615-373 Industrial Project *(p.6)*

In no case may students receive credit for both a core subject and its alternative.

Diploma in Information Systems

The Diploma in Information Systems is designed to provide students with the core fundamentals of information systems while completing their undergraduate degree at the University of Melbourne.

The diploma usually consists of a three-year sequence of core information systems subjects, including programming, databases and telecommunications. The subjects are taken alongside the degree subjects and the diploma adds one year to the duration of the degree course.

Students seeking a more substantial background in information systems should consider applying for the Bachelor of Information Systems or a Bachelor of Information Systems combined degree.

Course objectives

Upon completion of the course, students should:

- know how to utilise, analyse, and create the information content of formal organisational systems;
- have a solid theoretical grounding in the role of information systems in organisations;
- have gained practical experience working both individually and in groups to turn theory into practice;
- have a basic awareness of the major activities involved in a variety of business functions;
- be able to combine their knowledge of systems and of organisations to recognise and exploit opportunities to create value through the effective design and implementation of information systems;
- be able to communicate effectively, and have the skills in written, oral and electronic communication that are necessary for the pursuit of a professional career; and
- have a capacity and motivation for continued learning.

Course requirements

Students must complete a minimum (and maximum) of 100 points, comprising five core subjects (62.5 points) and three elective subjects (37.5 points). All subjects undertaken as part of the course are taught by the Department of Information Systems.

Course structure		Points
Students must complete the following core subjects:*		
615-110	Foundations of Information Systems *(p.1)*	12.5
615-140	Technologies for Information Systems *(p.1)*	12.5
615-145	Concepts in Software Development I *(p.1)*	12.5
615-230	Database Concepts *(p.2)*	12.5
615-237	Telecommunications Concepts *(p.2)*	12.5
Plus three additional information systems subjects from the Department of Information Systems (subject prefix 615-)		37.5

**Students whose prior knowledge has exempted them from any of the core subjects should choose subjects from the list of available information systems subjects.*

Table 7: Diploma in Information Systems - recommended course map

Year	Sem	Subject	
1	1	37.5 points of undergraduate degree subjects	615-110 Foundations of Information Systems *(p.1)*
	2	37.5 points of undergraduate degree subjects	615-140 Technologies for Information Systems *(p.1)*
2	1	37.5 points of undergraduate degree subjects	615-145 Concepts in Software Development I *(p.1)*
	2	37.5 points of undergraduate degree subjects	615-237 Telecommunications Concepts *(p.2)*
3	1	37.5 points of undergraduate degree subjects	615-230 Database Concepts *(p.2)*
	2	37.5 points of undergraduate degree subjects	Information systems subject
4	1	37.5 points of undergraduate degree subjects	Information systems subject
	2	37.5 points of undergraduate degree subjects	Information systems subject

Bachelor of Optometry (BOptom)

Optometry is a professional discipline based on the optical and visual sciences. The practice of optometry involves the diagnosis and treatment of functional disorders and diseases of the eye and vision: the optometrist's job is to solve patients' visual problems. The practice of optometry is regulated by the Optometrists Registration Act in each state of Australia. Under these Acts the practice of optometry can be carried out only by those whose names appear on the register of optometrists. Graduates holding the Bachelor of Optometry degree of the University of Melbourne are qualified to be registered for the practice of optometry in each state and territory of Australia and in New Zealand.

Course objectives

This course's objectives are for graduates to:

- have a sound foundation in the physical, chemical, mathematical and biological sciences, and in particular have a good knowledge and understanding of human biology;
- understand the passage of light through lenses and optical systems (including the eye) and be able to predict and measure the nature and quality of optical images;
- have a thorough knowledge and understanding of the performance and function of the human visual system;
- understand the dysfunctions and diseases of the eye and visual system and know their genesis, natural course, treatment and prognosis;
- have acquired skill in the techniques necessary for the examination of the eye and the assessment of visual function;
- have developed skills in problem identification, in deciding on effective strategies to gather information for the resolution of these problems, in weighing evidence prudently and in making decisions and are able to apply these skills to scientific problems in the visual and clinical sciences as well as to particular problems presented by patients;
- have developed the interpersonal and communication skills necessary in relationships with patients and professional colleagues and for the communication of the results of scientific enquiries;
- are professionally competent in the practice of optometry and are able to gain registration by the appropriate professional body;
- have the knowledge, skill and attitude to enable adaptation to scientific, technological and social change, have a sense of intellectual curiosity and a desire for lifelong learning and a capacity to be creative and innovative; and
- have a strongly developed sense of professional and ethical responsibility for patients, colleagues and the community generally and are aware of the moral and legal responsibilities of professional practice.

Attributes of the Bachelor of Optometry graduate

Optometry is a professional discipline based on the optical and visual sciences. Optometry graduates from the University of Melbourne are qualified health professionals able to practice within Australia and in a number of other countries.

The optometry graduate has the knowledge, understanding and skills necessary to effectively practice in their profession. Accordingly, they

- have a thorough knowledge and understanding of the performance and function of the human visual system;

- understand the dysfunctions and diseases of the eye and visual system and know their genesis, natural course, treatment and prognosis; and
- have acquired skill in the techniques necessary for the examination of the eye and the assessment of visual function.

In addition, they have developed skills in problem identification, in deciding on effective strategies to gather information for the resolution of these problems, in weighing evidence prudently and in making decisions and are able to apply these skills to scientific problems in the visual and clinical sciences as well as to particular problems presented by patients.

Optometry graduates also have the interpersonal and communication skills necessary in relationships with patients and professional colleagues and for the communication of the results of scientific enquiries. They are professionally competent in the practice of optometry and are able to gain registration by the appropriate professional body. They have a strongly developed sense of professional and ethical responsibility for patients, colleagues and the community generally and are aware of the moral and legal responsibilities of professional practice.

In the longer term these graduates have the knowledge, skill and attitude to enable adaptation to scientific, technological and social change. They have a sense of intellectual curiosity and a desire for lifelong learning and a capacity to be creative and innovative. These attributes enable them to continue to develop their own professional abilities as well as contributing to the development of the profession as a whole and the understanding of the vision sciences.

Duration

For students commencing the Bachelor of Optometry after 2001 the course takes five years of full-time study incorporating a pre-optometry year followed by four years study of optometry.

For current students who commenced the course prior to 2002 the Bachelor of Optometry course is a four-year full-time program.

Course requirements (2005 intake)

The Bachelor of Optometry is a five-year course in which the first year covers the fundamental sciences (the pre-optometry year) and the remaining four years comprise the Bachelor of Optometry.

Pre-optometry year (1st year)		Points
650-141	Biology of Cells and Organisms *(p.1)*	12.5
650-142	Genetics & The Evolution of Life *(p.1)*	12.5
610-141	Chemistry A *(p.2)*	12.5
610-142	Chemistry B *(p.2)*	12.5
655-111	Vision: How The Eye Sees The World *(p.1)*	12.5
655-152	Optics: From Rainbows to Digital Imaging *(p.1)*	12.5
Plus one of:		
640-141	Physics A *(p.2)*	12.5
640-161	Physics: Principles & Applications A *(p.3)*	12.5
640-151	Physics for Biomedical Science A *(p.2)*	12.5
640-121	Physics A (Adv) *(p.2)*	12.5
Plus one of:		
640-142	Physics B *(p.3)*	12.5
640-162	Physics: Principles & Applications B *(p.3)*	12.5
640-152	Physics for Biomedical Science B *(p.2)*	12.5
640-122	Physics B (Adv) *(p.2)*	12.5
Total		**100**

Note: An alternative chemistry sequence for students who did not complete Year 12 Chemistry is available commencing with 610-171 Fundamentals of Chemistry *(p.3)*.

BOptom (2nd year)		Points
655-201	Anatomy & Histology of the Eye *(p.1)*	12.5
536-206	Physiology (Optometry) *(p.2)*	12.5
521-204	Biochemistry and the Eye *(p.1)*	12.5
655-221	Human Visual Functions *(p.2)*	12.5
531-202	Basic Principles of Pathology-Optometry *(p.1)*	12.5
620-2xx	Applied Statistics (Optometry)	12.5
655-210	Optical Design and Ophthalmic Metrology	12.5
655-222	Visual Processing and Control *(p.2)*	12.5
Total		**100**

BOptom (3rd year)		Points
534-307	Pharmacology (Optometry) *(p.2)*	12.5
655-328	Visual Neuroscience	12.5
655-341	Ocular Histopathology *(p.3)*	12.5
526-306	Microbiology and Immunology (Optometry) *(p.3)*	12.5
655-321	Practical Problems in Vision *(p.3)*	12.5
655-351	Ophthalmic Lenses and Dispensing *(p.3)*	12.5
BOptom (3rd year)		Points
655-330	Functional Disorders of Vision *(p.4)*	25
Total		**100**

BOptom (4th year)		Points
655-451	Contact Lenses *(p.5)*	12.5
655-461	Assessment of Ocular Disease *(p.5)*	12.5
655-422	Occupational Optometry, Visual Standards *(p.4)*	12.5
655-462	Therapeutic Management of Ocular Disease *(p.5)*	12.5
655-430	Clinical Optometry Practice *(p.4)*	25
655-441	Diagnosis of Ocular Disease I *(p.5)*	12.5
655-442	Diagnosis of Ocular Disease II *(p.5)*	12.5
Total		**100**

BOptom (5th year)	Points
655-510 General Optometry Practice	25
655-520 Contact Lens, Paediatric and Low Vision Practice	25
655-540 Ocular Disease Management	25
655-530 Project Studies in Vision Sciences	25
Total	**100**

The BOptom 5th year comprises 32 weeks.

Course requirements (2004 intake)

Pre-optometry year (1st year)		Points
650-141	Biology of Cells and Organisms *(p.1)*	12.5
650-142	Genetics & The Evolution of Life *(p.1)*	12.5
610-141	Chemistry A *(p.2)*	12.5
610-142	Chemistry B *(p.2)*	12.5
655-111	Vision: How The Eye Sees The World *(p.1)*	12.5
620-160	Experimental Design & Data Analysis *(p.7)*	12.5
Plus one of:		
640-141	Physics A *(p.2)*	12.5
640-161	Physics: Principles & Applications A *(p.3)*	12.5
640-151	Physics for Biomedical Science A *(p.2)*	12.5
640-121	Physics A (Adv) *(p.2)*	12.5
Plus one of:		
640-142	Physics B *(p.3)*	12.5
640-162	Physics: Principles & Applications B *(p.3)*	12.5
640-152	Physics for Biomedical Science B *(p.2)*	12.5
640-122	Physics B (Adv) *(p.2)*	12.5
Total		**100**

BOptom (2nd year)		Points
655-201	Anatomy & Histology of the Eye *(p.1)*	12.5
536-206	Physiology (Optometry) *(p.2)*	12.5
521-204	Biochemistry and the Eye *(p.1)*	12.5
655-221	Human Visual Functions *(p.2)*	12.5
531-202	Basic Principles of Pathology-Optometry *(p.1)*	12.5
620-270	Applied Statistics *(p.10)*	12.5
655-222	Visual Processing and Control *(p.2)*	12.5
655-219	Optics and Ophthalmic Metrology *(p.2)*	12.5
Total		**100**

BOptom (3rd year)		Points
534-307	Pharmacology (Optometry) *(p.2)*	12.5
655-341	Ocular Histopathology *(p.3)*	12.5
526-306	Microbiology and Immunology (Optometry) *(p.3)*	12.5
655-321	Practical Problems in Vision *(p.3)*	12.5
655-359	Ophthalmic Lenses & Optical Dispensing	12.5
655-330	Functional Disorders of Vision *(p.4)*	25
655-328	Visual Neuroscience	12.5
Total		**100**

BOptom (4th year)		Points
655-451	Contact Lenses *(p.5)*	12.5
655-461	Assessment of Ocular Disease *(p.5)*	12.5
655-422	Occupational Optometry, Visual Standards *(p.4)*	12.5
655-462	Therapeutic Management of Ocular Disease *(p.5)*	12.5
655-430	Clinical Optometry Practice *(p.4)*	25
655-441	Diagnosis of Ocular Disease I *(p.5)*	12.5
655-442	Diagnosis of Ocular Disease II *(p.5)*	12.5
Total		**100**

BOptom (5th year)	Points
655-510 General Optometry Practice	25
655-520 Contact Lens, Paediatric and Low Vision Practice	25
655-540 Ocular Disease Management	25

BOptom (5th year)		Points
655-530	Project Studies in Vision Sciences	25
Total		**100**

The BOptom 5th year comprises 32 weeks.

Course requirements (2002 and 2003 intake)

Pre-optometry year (1st year)		Points
650-141	Biology of Cells and Organisms *(p.1)*	12.5
650-142	Genetics & The Evolution of Life *(p.1)*	12.5
610-141	Chemistry A *(p.2)*	12.5
610-142	Chemistry B *(p.2)*	12.5
655-111	Vision: How The Eye Sees The World *(p.1)*	12.5
620-160	Experimental Design & Data Analysis *(p.7)*	12.5
Plus one of:		
640-141	Physics A *(p.2)*	12.5
640-161	Physics: Principles & Applications A *(p.3)*	12.5
640-151	Physics for Biomedical Science A *(p.2)*	12.5
640-121	Physics A (Adv) *(p.2)*	12.5
Plus one of:		
640-142	Physics B *(p.3)*	12.5
640-162	Physics: Principles & Applications B *(p.3)*	12.5
640-152	Physics for Biomedical Science B *(p.2)*	12.5
640-122	Physics B (Adv) *(p.2)*	12.5
Total		**100**

BOptom (2nd year)		Points
655-201	Anatomy & Histology of the Eye *(p.1)*	12.5
536-206	Physiology (Optometry) *(p.2)*	12.5
521-204	Biochemistry and the Eye *(p.1)*	12.5
655-221	Human Visual Functions *(p.2)*	12.5
531-202	Basic Principles of Pathology-Optometry *(p.1)*	12.5
655-028	Foundations of Visual Neuroscience *(p.2)*	12.5
655-202	Optical Systems *(p.2)*	12.5
655-222	Visual Processing and Control *(p.2)*	12.5
Total		**100**

BOptom (3rd year)		Points
534-307	Pharmacology (Optometry) *(p.2)*	12.5
655-311	Optical Design and Ophthalmic Metrology *(p.3)*	12.5
655-341	Ocular Histopathology *(p.3)*	12.5
526-306	Microbiology and Immunology (Optometry) *(p.3)*	12.5
655-321	Practical Problems in Vision *(p.3)*	12.5
655-351	Ophthalmic Lenses and Dispensing *(p.3)*	12.5
655-330	Functional Disorders of Vision *(p.4)*	25
Total		**100**

BOptom (4th year)		Points
655-451	Contact Lenses *(p.5)*	12.5
655-461	Assessment of Ocular Disease *(p.5)*	12.5
655-422	Occupational Optometry, Visual Standards *(p.4)*	12.5
655-462	Therapeutic Management of Ocular Disease *(p.5)*	12.5
655-430	Clinical Optometry Practice *(p.4)*	25
655-441	Diagnosis of Ocular Disease I *(p.5)*	12.5
655-442	Diagnosis of Ocular Disease II *(p.5)*	12.5
Total		**100**

BOptom (5th year)		Points
655-510	General Optometry Practice	25
655-520	Contact Lens, Paediatric and Low Vision Practice	25
655-540	Ocular Disease Management	25
655-530	Project Studies in Vision Sciences	25
Total		**100**

The BOptom 5th year comprises 32 weeks.

Course requirements (pre-2002 intake)

Students enrolled in the four-year Bachelor of Optometry course commencing prior to 2002 should refer to previous years' Handbooks for course structure and subject descriptions.

Extended Bachelor of Science Program

The Extended BSc Program has been specifically designed for international students who have completed secondary schooling outside Australia and at a level below that of the Victorian Certificate of Education (VCE). It provides a direct entry into the BSc course for students with high academic potential who do not meet the usual selection criteria for the Bachelor of Science degree.

The program extends the length of the Bachelor of Science course by one semester (equivalent to 50 points). Students must complete a total of 350 points to be awarded the Bachelor of Science.

The initial 18 months of the program consists of an integrated course of bridging material plus the first year of the Bachelor of Science. Students who have successfully completed the prescribed subjects of the bridging component will be able to transfer to the second year of the standard Bachelor of Science course at the end of the first 18 months.

Student advisers will tailor bridging programs for individual students. For the descriptions of bridging subjects in the Extended Bachelor of Science Program see page 1 and page 13.

Students should discuss their course plan with a student adviser before the start of each semester. This will assist with later year planning and issues related to prerequisites. The student adviser will help ensure that the student's subject selection is appropriate for their preferred later year studies.

Course structure

Course requirements are the same as for the Bachelor of Science (page 4) with the following exceptions:

- a minimum of 350 points are required, including 50 points of bridging subjects and electives;
- the extended 50 points of bridging subjects and electives will not be counted in the 125 point maximum of 100-level subjects, the 75 point minimum of science points at 100-level or the 25 point maximum of non-science points at first-year level; and
- the extended 50 points of bridging subjects and electives are not counted towards the minimum 237.5 science points required for the BSc.

The course structure normally depends on each student's English language proficiency (determined by IELTS score or equivalent). The following options refer to the 50 points of bridging subjects undertaken in the first 18 months in addition to 100 points of 100-level subjects.

IELTS score of 6.0		Points
Students with an IELTS score of 6.0 are normally required to undertake the following four subjects:		
175-120	Advanced ESL 1 *(p.1)*	12.5
620-081	Preliminary Mathematics A *(p.13)*	12.5
600-102	Intensive Academic Preparation (Science) *(p.1)*	12.5
plus one approved elective subject		12.5

IELTS score of 6.5		Points
Students with an IELTS score of 6.5 are normally required to undertake the following four subjects:		
600-102	Intensive Academic Preparation (Science) *(p.1)*	12.5
620-081	Preliminary Mathematics A *(p.13)*	12.5
plus two approved electives		25.0

Approved electives		Points
Approved electives that may be undertaken in a student's first semester:		
650-111	Biology of Australian Flora & Fauna *(p.1)*	12.5
610-141	Chemistry A *(p.2)*	12.5
Note: Prerequisite is completion of studies equivalent to VCE Chemistry.		
625-102	Understanding Planet Earth *(p.1)*	12.5
625-103	The Atmosphere and Oceans *(p.2)*	12.5
640-177	Stars and Galaxies *(p.4)*	12.5
Approved electives that may be undertaken in a student's second semester:		
610-142	Chemistry B *(p.2)*	12.5
Note: Prerequisite is 610-141		
620-160	Experimental Design & Data Analysis *(p.7)*	12.5
Note: Prerequisite is 620-081		
620-082	Preliminary Mathematics B *(p.14)*	12.5
Note: Prerequisite is 620-081		

Bachelor of Science (Degree with Honours)

Refer to *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)*.