

# Faculty of Engineering

## Introduction to the Faculty of Engineering

Excellence in teaching and research combine to make the Faculty of Engineering at the University of Melbourne a world leader in engineering education. This is highlighted by the number and quality of high level research centres and the success of its graduates in the international market place.

The Faculty has been at the forefront of engineering education and research in Australia since 1855. It continues to foster and develop engineering creativity through design and innovation and by strengthening its industrial linkages and community interaction.

The Faculty is made up of six departments (two of which form the School of Electrical Engineering and Computer Science). All reflect the areas of expertise within the faculty. They are:

- Department of Chemical and Biomolecular Engineering
- Department of Civil and Environmental Engineering
- Department of Computer Science and Software Engineering
- Department of Electrical and Electronic Engineering
- Department of Geomatics
- Department of Mechanical and Manufacturing Engineering.

There are 12 special centres and cooperative research centres (CRCs) with which these departments are affiliated. They include:

- CRC for Bioproducts
- The G K Williams CRC for Extractive Metallurgy
- SRC for Particulate Fluids Processing
- CRC for Catchment Hydrology, Civil and Environmental Engineering
- Centre for Environmental Applied Hydrology
- International Technologies Centre (IDTC)
- Key Centre for Knowledge-based Systems, Computer Science and Software Engineering
- CRC for Australian Photonics
- CRC for Sensor Signal and Information Processing
- Centre for Ultra-Broadband Information Networks
- Centre for Geographic Information Systems Modelling, Geomatic Engineering
- Australian Centre for Renewable Energy.

The faculty offers a diverse range of single and combined degrees within all the departments listed above. The BE(IT) and all its combined degrees, represents an Information Technology stream of the Bachelor of Engineering. The degree name that will appear on the testamur remains Bachelor of Engineering. The BE (ENG MGT) and BE (BIOMEDICAL) also represent distinct streams of Engineering. The degree name testamur remains BE.

They are:

- **BE** Bachelor of Engineering (engineering streams available are chemical, chemical and biomolecular, civil, environmental and mechanical)
- **BE(IT)** Bachelor of Engineering (engineering information technology streams available are computer, electrical and software)
- **BE(ENG MGT)** Bachelor of Engineering (engineering streams available are chemical, civil, environmental, mechanical, computer, electrical and software)
- **BE(BIOMEDICAL)** Bachelor of Engineering (biomedical engineering streams available are biocellular, bioinformatics, biomechanical, biosignals)
- **BE/BSc** Bachelor of Engineering/Bachelor of Science (engineering streams available are chemical, civil, environmental and mechanical)
- **BE(IT)/BSc** Bachelor of Engineering/ Bachelor of Science (engineering information technology streams available are computer, electrical, software)
- **BE/BCom** Bachelor of Engineering/Bachelor of Commerce (engineering streams available are chemical, civil, environmental and mechanical)
- **BE(IT)/BCom** Bachelor of Engineering/Bachelor of Commerce (engineering information technology streams available are computer, electrical, software)
- **BA/BE** Bachelor of Arts/Bachelor of Engineering (engineering streams available are chemical, civil, environmental and mechanical)
- **BA/BE(IT)** Bachelor of Arts/Bachelor of Engineering (engineering information technology streams available are computer, electrical, software)

- **LLB/BE** Bachelor of Laws/Bachelor of Engineering (engineering streams available are chemical, civil, environmental and mechanical)
- **LLB/BE(IT)** Bachelor of Laws/Bachelor of Engineering (engineering information technology streams available are computer, electrical, software)
- **BGeoIT** Bachelor of Geographic Information Technology
- **BGeomE** Bachelor of Geomatic Engineering
- **BA/BGeomE** Bachelor of Arts/Bachelor of Geomatic Engineering
- **BGeomE/BSc** Bachelor of Geomatic Engineering/Bachelor of Science
- **BGeomE/BIS** Bachelor of Geomatic Engineering/Bachelor of Information Systems
- **BGeomE/BPD** Bachelor of Geomatic Engineering/Bachelor of Planning and Design (Property and Construction)
- **LLB/BGeomE** Bachelor of Laws/Bachelor of Geomatic Engineering
- **BCS** Bachelor of Computer Science
- **LLB/BCS** Bachelor of Laws/Bachelor of Computer Science
- **BE/BCS** Bachelor of Engineering (Mechatronics)/Bachelor of Computer Science
- **DipGIS** Diploma of Geographic Information Systems

The single degrees BE, BE(IT), BE(ENG MGT), BE(BIOMEDICAL), and BGeomE require 400 points over four years. The single degrees BCS and BGeoIT require 300 points over three years. The combined degrees of BE and BGeomE with law require a total of 600 points over six years. All other combinations with BE, BGeomE or BCS require a total of 500 points over five years. The DipGIS is a one year undergraduate concurrent diploma.

The Faculty Office within the Faculty of Engineering houses the Dean, who is responsible for the academic leadership of the Faculty and the General Manager, who is responsible for the administration of the Faculty. It also houses the Assistant Dean (Undergraduate Studies) who, as the director of first-year studies, is responsible for managing the academic programs of first-year engineering students.

The academic services section within the Faculty Office is of importance to students for:

- information
- engineering notice boards
- advice about any aspect of the course
- changing the subjects in which students are enrolled
- applying for special consideration
- informing Faculty staff about any situation that may interrupt a student's studies.

## Objectives of the Faculty

The general objectives of the Faculty of Engineering are:

- to present undergraduate programs to meet the requirements of the engineering, computing and geomatics professions;
- to pursue research and higher degree programs in strategic, applied and basic research of direct relevance to national engineering and community objectives;
- to offer continuing education programs for the professions in accordance with the guidelines of the Institution of Engineers Australia, the Australian Computer Society and the Institution of Surveyors Australia Inc.

While these objectives focus upon the essential nature of the Faculty's courses, they should be read in light of the attributes the University of Melbourne expects all its graduates to have.

The University of Melbourne is a research-intensive university that attaches the very highest priority to undergraduate education and seeks to stimulate, nurture and develop graduates of the finest international calibre.

Those more general and essential attributes that all Melbourne graduates are expected to have include:

- profound respect for truth and intellectual integrity;
- capacity for independent critical thought and self-directed learning;
- intellectual curiosity and creativity, including an understanding of the philosophical and methodological bases of research activity;
- open to new ideas and unconventional critiques of received wisdom;

- ability and self-confidence to comprehend complex concepts, to express them lucidly, whether orally or in writing, and to confront unfamiliar problems;
- international awareness and an openness to the world, based on understanding and appreciation of social and cultural diversity and respect for individual human rights and dignity;
- leadership capacity, including a willingness to engage in constructive public discourse, to accept social and civic responsibilities and to speak out against prejudice, injustice and the abuse of power.

Other attributes expected of all University of Melbourne graduates, but more specific to graduates in engineering, are included in the objectives listed in the engineering course descriptions.

## General information for students in the Engineering Faculty

### Computer facilities

Engineering Computer Resources (ECR) is a Faculty of Engineering facility providing computer laboratories for access to electronic mail, the University intranet, the wider internet, generic software and specialised engineering software. The primary focus of ECR is support for undergraduate teaching through tutorial and practical classes held in the laboratories as well as casual access for all students and staff of the faculty.

ECR has six laboratories and a full-time staff of five. The six laboratories contain 130 PC workstations using *Windows* or *Linux*, as well as 35 *Silicon Graphics* workstations. Two PC laboratories, with a total of 56 workstations and a small multimedia laboratory containing three PCs and four *Unix* workstations, are available 24 hours a day, seven days per week. In peak usage periods all laboratories are available for extended hours in the evenings and on weekends. The full-time staff includes three systems managers/programmers and two help desk and support staff.

All students and staff within the Faculty can base their primary email access at ECR, with suitable forwarding or redirection to other mail systems on or off campus. Internet browsing to any web sites specifically associated with course-related, engineering material is available in all laboratories.

### Part-time study options

Engineering, geomatic engineering and associated combined programs have been designated as full-time courses. Students wishing to undertake part-time study should apply at the Engineering Faculty Office, where each case will be considered on an individual basis.

The Bachelor of Computer Science is available as a part-time course (six years part time). It should be noted, however, that there are no evening classes available.

### Overload/high achievers

A full-time course load normally consists of 100 credit points per year or 50 points per semester. Generally, first-year course plans of more than 50 points per semester will not be approved. Any application to overload must satisfy the overload policy guidelines as stated at <http://www.eng.unimelb.edu.au/courses/ugrad/courseplanning/overloadpolicy.html>.

High-achieving students in later years who wish to accelerate their progress by taking an overload must also satisfy the overload policy guidelines as stated at the above mentioned URL.

### Contact and non-contact hours

Students will be expected to undertake additional study (ie. outside the stated contact hours) of at least one hour for each hour of contact in all Faculty of Engineering subjects within their course.

### Honours degrees

Honours degrees in engineering and geomatic engineering are awarded on the basis of performance in the course. Honours degrees in the Bachelor of Geographic Information Technology, Bachelor of Computer Science, Bachelor of Science, Bachelor of Commerce and Bachelor of Arts require an additional year of study. Please refer to the Faculty of Law section of the Handbook, page 3, for information about the Bachelor of Laws with honours.

### Credit for previous study

Please see *Credit for previous study* (p.4).

Please note that studies undertaken more than 10 years ago may not be considered for credit.

### Community Access Program (CAP) subjects

Please see *Community Access Program (for enrolled students)* (p.4).

Please note that if you later wish to credit your CAP studies to an award course taken on a fee-paying basis, you will be required to pay the difference between the CAP fees charged at the time you took the subjects and the current cost of an Australian fee place at the time of your award course enrolment. Payment of these costs will be required for each subject in which credit is granted. Information regarding tuition fees can be viewed at <http://www.services.unimelb.edu.au/admissions/coursefees/>

### MUPHAS (Melbourne University Program for High-Achieving Students) credit

Students may be eligible for credit towards their degree if they have completed subjects in Year 12 through MUPHAS. They may also be awarded credit for approved subjects taken in Year 12 as part of another university's extension program. A maximum of 50 points credit at first-year level will be awarded for MUPHAS or other extension program subjects. For information about the MUPHAS program students should consult their school's career library or ring the MUPHAS office at the University on +61 3 8344 5538.

### Lateral entry

Other than overseas students, all applicants for selection into second or later years of the course(s) must lodge an application with VTAC (Victorian Tertiary Admissions Centre). Overseas students should apply direct to the International Centre at the University of Melbourne.

Mid-year entry is for full-fee paying places only. Applicants for Australian full-fee places must apply to the faculty direct. Overseas students must apply to the International Centre.

With the exception of overseas students, all applications for the Bachelor of Computer Science (Honours) must be submitted through the University's domestic web application at <https://sis.unimelb.edu.au/cgi-bin/course-application.pl>. Mid-year entry is possible, and both Australian fee places and Commonwealth supported places are available to local applicants. Overseas students must apply to the International Centre. Please refer to the BCS (Hons) homepage at <http://www.cs.mu.oz.au/course/honours/> for more detailed information regarding the application process.

### Professional recognition

The Bachelor of Engineering and the Bachelor of Geomatic Engineering are professional degrees, that is, graduates can obtain professional recognition by joining Engineers Australia or the Institution of Surveyors Australia Inc. These institutions will only accredit courses if certain subjects are studied, hence all engineering courses in each department will have compulsory subjects to be studied at each year level.

### Student support schemes

#### First-year transition program

To assist students in making the transition from secondary to tertiary studies, all departments in the Faculty provide a series of lectures and/or workshops outlining techniques whereby successful adjustments to university life and enhancement of academic and study skills may be achieved. The transition program is either embedded into a core first-year subject or separately timetabled. A unique feature of the program is an on-line assessment (Engineering Study Skills Assessment - ESSA) that gives students a general overview of their academic abilities as they embark upon their studies.

#### Engineering mentoring scheme

The Faculty's Engineering mentoring scheme forms a major part of the Engineering Faculty's equity and diversity strategy. This scheme provides a support network for students at all year levels, with a particular focus on the transition from secondary school to university and university to the workforce. Participants can therefore choose to be mentored by more experienced students or people working in industry with a wide variety of backgrounds and experiences.

Mentoring is primarily one-on-one, with participants matched according to discipline interest. The aim of the relationship is to provide advice, support and encouragement. While pairs are free to choose where, when and how often they meet, the Faculty regularly organises events for participants.

For further information and/or registration, please contact the Mentoring Officer on +61 3 8344 6869, visit the web site at <http://www.eng.unimelb.edu.au/mentor> or visit the Faculty Office.

#### Study groups

Study groups can help you have a successful and happy first year at the University of Melbourne. Study groups are run by students for students. Each study group consists of eight to ten students who are studying the same stream of engineering. The purpose of the study group is to provide a forum for discussion of things that arise in lectures, tutorials, pracs, exercises, essays and exams.

If you are a first year student in the Faculty of Engineering, there is an opportunity to join a study group for the stream of engineering you are in. Study

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groups can help to increase students' understanding of the subjects they are studying, improve their grades and provide a network of people who have similar interests.

### Students at risk program

Students enrolled in BE, BGeomE, BGeoIT, BCS or combined courses within the Faculty, who have performed significantly below expectation in Semester 1, may be invited to attend a students at risk interview. The purpose of these interviews is to establish why students are not performing up to their ability and to give advice as to how they might repair the situation.

First-year student-at-risk interviews are conducted within the Engineering Faculty Office; later-year students are interviewed by their department.

For further information contact the Transition Officer, Faculty of Engineering, on (03) 8344 4941 or email: <paoneill@unimelb.edu.au>.

### Students with a number of failures

Students who fail 50 per cent or more of their course in a semester or fail the same subject twice or more, may have their case examined by a Faculty Unsatisfactory Progress Committee. This Committee considers each student's case individually and each student is given the chance to explain the reasons for his or her poor performance, in writing and/or in an interview with the committee. The Committee is first and foremost concerned with the problems the student may have faced during the year and what he/she proposes to do about these problems to ensure that they do not recur.

The outcome of the Unsatisfactory Progress Committee's review will depend very much on the nature and degree of the 'unsatisfactory progress', the legitimacy of the problems, the submission the student makes to the Committee and the extent to which the student can demonstrate that he/she can overcome the problems that have affected his/her study.

In some cases the Unsatisfactory Progress Committee will allow the student to continue with their enrolment, repeating failed subjects where appropriate. The Committee may enforce a number of restrictions on enrolment, including limiting the number of points studied in any one year and in some cases recommend to the University's Academic Board that the student be suspended from the course.

If a student is suspended from the course, he/she will not be re-admitted until he/she has demonstrated academic rehabilitation by successfully completing other tertiary studies.

## Further study options

The Faculty of Engineering is at the forefront of engineering education and research in Australia and is continually seeking to foster and develop engineering creativity through design and innovation. Postgraduate programs include:

- masters by research in computer science, geomatic engineering, engineering science and applied science, the latter two in the areas of electrical engineering, mechanical and manufacturing engineering, civil engineering, environmental engineering, chemical engineering, computer science and geographic information systems (through the Master of Applied Science only);
- masters by coursework in engineering science and applied science in the areas of development technologies, environmental engineering and geographic information systems (through the Master of Applied Science only) and include the recently developed range of innovative 12-month postgraduate programs in environmental engineering, energy technology, water resources management, development technology, utilities management, software systems engineering and telecommunications;
- doctorates in all engineering disciplines;
- graduate certificates, graduate and postgraduate diplomas in a number of disciplines. (These often are taken as a pathway to a masters degree by students whose undergraduate degrees would normally preclude direct entry into a masters program.)

Students with excellent results in their undergraduate studies who are offered a full-time place in postgraduate research courses (masters or doctorate) may be eligible for a scholarship. **There are no scholarships for coursework postgraduate study in the Faculty of Engineering.**

Postgraduate course requirements are set out in the *Faculty of Engineering Research and Graduate Programs Handbook*, on the web at <<http://www.eng.unimelb.edu.au>> or contact the postgraduate office by email <[eng-info@unimelb.edu.au](mailto:eng-info@unimelb.edu.au)>.

## Careers

Engineering graduates from the University of Melbourne find interesting and varied employment, reflecting the breadth and value of the courses offered and the University's close links with industry, especially in manufacturing.

Fields in which graduates are employed include aeronautical research, drainage and water supply, environmental engineering, process and design for on- and off-shore refineries, oil exploration, equipment design and safety testing,

supervising manufacturing production and operations, construction, project management, system design and computer programming, research and design for civil and mining structures, commercial building, road and bridge infrastructure, quality control, telecommunications research, retail and consulting, technical training, marketing and market analysis, the food industry, pharmaceutical industry, mineral processing and extractive metallurgy industry and the plastics industry.

Chemical and Biomolecular engineering graduates with a BE degree may find positions in the extractive metallurgy and mineral industries, chemical industries, paper and food industries, petrochemical and oil industries, and as environmental engineers in waste prevention and treatment. In addition, graduates are employed in commerce and non-engineering related positions.

Civil graduates with a BE degree are employed as civil, structural, and design engineers, geotechnical engineers, traffic engineers, transport planning engineers and site supervisors.

Electrical and computer engineering graduates with a BE degree are employed as electrical, electronic, control systems and design engineers, computer systems administrators, biomedical engineers, telecommunications engineers, project and laboratory managers, specialist sales engineers, consulting engineers and consultants on implementation of business solutions.

Software engineering graduates with a BE degree are in demand in most sectors, including the telecommunications industry, manufacturing and finance, as well as in the specialised software industry. There is also considerable international demand for graduates with software engineering skills.

Environmental engineers with a BE degree from the University of Melbourne have careers in the application of engineering technology to the management of water and land resources. Typical employers are consulting firms, government authorities and research institutions.

Mechanical graduates with a BE degree are employed as manufacturing and process engineers, marketing engineers, automotive design engineers, operations coordinators, aeronautics researchers, installation designers for sub-sea equipment, researchers in biomechanics, modellers of air pollution sources and robot and vision system engineers.

Biomedical Engineering graduates may find employment in hospitals, industry, research and educational institutions working in areas such as drug discovery, molecular genetics, drug technology, genomics, proteomics, neuroscience, bioethics and genetic engineering.

Computer science graduates are employed as programmers, research scientists, consultants and systems engineers. Employers include government and private organisations.

Modern geomatic engineering professionals are employed in such fields as computerised mapping, satellite remote sensing for environmental monitoring, precise satellite positioning and navigation, land development and computer-based land information systems, cadastral surveying, utility management through geographic information systems, precise surveying for engineering construction, natural resource mapping and management, environmental planning and industrial measurement using machine and robot vision systems.

## Planning your BE, BE(IT), BGeomE, BGeoIT, or BCS degree

### Bachelor of Engineering (BE)

#### Course structure

The Bachelor of Engineering is a four-year full-time course. The degree is offered in the Departments of Chemical and Biomolecular Engineering, Civil and Environmental Engineering, Mechanical and Manufacturing Engineering. Full-time BE degree course students take approximately a quarter of their workload for the degree each year for four years. Within limits and with approval, more or less than 100 credit points may be earned in any one year. To be awarded the degree of Bachelor of Engineering, students must normally have passed 400 points.

To satisfy course requirements students must take the set of core engineering subjects prescribed for the branch of engineering being studied. This will include the professional study requirements in one of chemical engineering, chemical and biomolecular engineering, civil engineering, environmental engineering and, mechanical engineering. For the course structure please go to the *Faculty of Engineering (p.1)* section of the handbook and select the appropriate stream.

#### Course objectives

This course has as its objectives that graduates should:

- have a sound fundamental understanding of the scientific principles underlying technology;
- have acquired the educational and professional standards of the professional institutions and boards with which the faculty's courses are accredited;

- possess a broad knowledge base of their chosen discipline and of other disciplines so as to facilitate effective communication with those other professionals with whom engineers routinely communicate;
- understand the basic principles underlying the management of physical, human and financial resources;
- have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems for further development professionally and for meeting future changes in technology;
- possess analytical, problem-solving and, where relevant, design skills, including those appropriate for sustainable development;
- have verbal and written communication skills that enable them to contribute substantially to society;
- have acquired a sense of professional ethics and responsibility towards the profession and the community;
- have an appreciation of the interpersonal and management skills required by engineers in undertaking professional activities; and
- understand the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development.

### Bachelor of Engineering (Information Technology) (BE(IT))

#### Course structure

The Bachelor of Engineering(IT) is a four-year full-time course. The degree is offered in the School of Electrical, Computer Science and Software Engineering. Full-time BE degree course students take approximately a quarter of their workload for the degree each year for four years. Within limits and with approval, more or less than 100 credit points may be earned in any one year. To be awarded the degree of Bachelor of Engineering, students must normally have passed 400 points.

To satisfy course requirements students must take the set of core engineering subjects prescribed for the branch of engineering being studied. This will include the professional study requirements in one of computer, electrical or software engineering. For the course structure please go to the *Faculty of Engineering (p.1)* section of the handbook and select the appropriate stream.

#### Course objectives

The course objectives are identical to those listed above for the BE.

### Bachelor of Engineering (Engineering Management) (BE(ENG MGT))

#### Course structure

The Bachelor of Engineering (Engineering Management) is a four-year full-time course. This degree is offered in the streams of chemical, civil, environmental, mechanical, electrical, computer and software engineering. Full-time BE degree course students take approximately a quarter of their workload for the degree each year for four years. Within limits and with approval, more or less than 100 credit points may be earned in any one year. To be awarded the degree of Bachelor of Engineering, students must normally have passed 400 points. This course cannot be combined with any other course.

To satisfy course requirements students must take the set of core engineering subjects prescribed for the branch of engineering being studied. This will include the professional study requirements in one of chemical, civil, mechanical, computer, electrical or software engineering. For the course structure please go to the *Faculty of Engineering (p.1)* section of the handbook and select the appropriate stream.

#### Course objectives

The course objectives are that graduates should have acquired:

- the educational and professional standards of the professional institutions and boards with which the Faculty of Engineering's courses are accredited;
- a sense of professional ethics and responsibility towards their chosen professions and the community;
- the ability to think critically, analytically and creatively when seeking to design solutions to professional problems whilst displaying an understanding of dynamic, economic, social, political and physical environments in which they occur;
- the oral and written communication skills which are necessary to operate effectively in their chosen disciplines and of other disciplines so as to facilitate effective work-related communications;
- a broad knowledge-base of their chosen disciplines and of other disciplines so as to facilitate effective work-related communications;
- a sound fundamental understanding of the scientific principles underlying technology;
- the mathematical and computational skills necessary for the solution of theoretical and practical problems, for further development professionally, and for meeting future changes in technology;

- understand and can efficiently and effectively apply a knowledge of the basic principles underlying the management of physical, human and financial resources in an engineering-based enterprise.

### Bachelor of Engineering (Biomedical Engineering) (BE(Biomed.))

#### Course structure

The Bachelor of Engineering (Biomedical Engineering) is a four-year full-time course. The degree is administered by the Department of Civil and Environmental Engineering with individual streams taught in the Departments of Chemical and Biomolecular Engineering, the School of Electrical, Computer Science and Software Engineering and the Department of Mechanical and Manufacturing Engineering. Full-time BE degree course students take approximately a quarter of their workload for the degree each year for four years. Within limits and with approval, more or less than 100 credit points may be earned in any one year. To be awarded the degree of Bachelor of Engineering (Biomedical Engineering), students must normally have passed 400 points. This course cannot be combined with any other course.

To satisfy course requirements students must take the set of core engineering subjects prescribed for the stream of engineering being studied. This will include the professional study requirements in one of biocellular, bioinformatics, biomechanical or biosignal engineering. For the course structures please go to the *Biomedical Engineering (p.1)* section of the *Handbook*.

#### Course objectives

This course has as its objectives that graduates should:

- have a sound fundamental understanding of the scientific principles underlying technology and the ability to apply these problems in medicine and biology;
- have acquired the educational and professional standards of the professional institutions and boards with which the faculty's courses are accredited;
- possess a broad knowledge base of their chosen discipline and of other disciplines so as to facilitate effective communication with those other professionals with whom engineers routinely communicate;
- understand the basic principles underlying the management of physical, human and financial resources;
- have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems and the ability to interpret the results in the appropriate biomedical context;
- possess analytical, problem-solving and, where relevant, design skills, appropriate for living systems;
- have verbal and written communication skills that enable them to contribute substantially to society;
- have acquired a sense of professional ethics and responsibility towards the profession and the community;
- have an appreciation of the interpersonal and management skills required by engineers in undertaking professional activities; and
- understand the social, cultural, global and environmental responsibilities of the professional engineer.

### Bachelor of Geomatic Engineering (BGeomE)

#### Course structure

The Bachelor of Geomatic Engineering is a four-year full-time course. Full-time BGeomE degree course students take a quarter of their workload for the degree each year for four years. Within limits and with approval, more or less than 100 credit points may be earned in any one year. To be awarded the degree of Bachelor of Geomatic Engineering, students must normally have passed 400 points. For the course structure please go to the *Geomatics (p.1)* section of the *Handbook*.

#### Course objectives

The course objectives are that graduates should:

- have a sound fundamental understanding of the scientific principles underlying technology;
- have acquired the educational and professional standards of the professional institutions and boards with which the faculty's courses are accredited;
- possess a broad knowledge base of their chosen discipline and of other disciplines so as to facilitate effective communication with those other professionals with whom geomatics practitioners routinely communicate;
- understand the basic principles underlying the management of physical, human and financial resources;
- have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems, for further development professionally and for meeting future changes in technology;

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- possess analytical, problem-solving and, where relevant, design skills, including those appropriate for sustainable development;
- have verbal and written communication skills that enable them to contribute substantially to society;
- have acquired a sense of professional ethics and responsibility towards the profession and the community;
- have an appreciation of the interpersonal and management skills required by geomatics practitioners in undertaking professional activities; and
- understand the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development.

### Bachelor of Geographic Information Technology (BGeoIT)

#### Course structure

The Bachelor of Geographic Information Technology is a three-year full-time degree comprising a total of 300 credit points. Within limits and with Faculty approval, more or less than 100 credit points may be earned in any one year. To be awarded the degree of Bachelor of Geographic Information Technology (BGeoIT) students must normally have passed 300 points. For the course structure please go to the *Geomatics (p.1)* section of the *Handbook*.

#### Course objectives

The course objectives are that graduates should have acquired:

- a broad knowledge of geographic information technology that enables them to competently enter the geographic information industry and allied sectors of the IT community;
- in-depth technical knowledge and skills in the development and application of geographic information technology;
- a sound fundamental understanding of scientific and information technology principles and methods;
- analysis, problem-solving and design skills;
- a capacity to apply practical skills in the development of mathematical and computer-based solutions to problems in which geographic information technology can be applied;
- verbal and communication skills that enable them to communicate effectively in the context of defining and solving problems;
- an understanding of the basic principles underlying the management of physical, human and financial resources;
- skills and personal attributes, and depth of knowledge, which equip them for positions of leadership in basic and applied research, and management of technology-intensive enterprises;
- an appreciation of the roles and responsibilities of the many professional groups engaged in the geographic information industry; and
- an understanding of the extent to which team work underscores successful IT solutions in the geographic information industry and an appreciation of the interpersonal, communication and management skills necessary for the successful development and implementation of these IT-based solutions.

### Bachelor of Computer Science (BCS)

#### Course structure

The Bachelor of Computer Science is a three-year full-time degree or six-year part-time degree comprising a total of 300 credit points. Full-time students take approximately a third of their workload for the degree each year for three years. Within limits and with Faculty approval, more or less than 100 credit points may be earned in any one year. The course involves core studies in computer science, mathematics and other discipline areas at 100-level, 200-level and 300-level as specified by the Department of Computer Science and Software Engineering. The degree specifies no more than 125 points of 100-level studies, at least 25 points of non-technical studies and no more than 62.5 points of studies from outside the Faculties of Science and Engineering. For the course structure please go to the *Electrical Engineering and Computer Science (p.1)* section of the handbook.

A bioinformatics stream is also available.

#### Course objectives

The course objectives are that graduates should have acquired:

- a broad knowledge of the discipline of computer science, including a sound fundamental understanding of scientific and engineering principles and methods;
- an in-depth knowledge and understanding within selected areas of computer science;
- appropriate analytical, problem-solving and design skills;
- a capacity to apply practical skills towards the development of computer-based solutions to problems;

- verbal and written communication skills that enable them to communicate effectively in the context of defining and solving problems;
- an appreciation of the roles and responsibilities of computer scientists in society; and
- a firm base of knowledge from which to undertake further development professionally or to enter higher educational studies.

### Diploma of Geographic Information Systems (DipGIS)

#### Course structure

The Diploma in Geographic Information Systems consists of 100 credit points of study of 100-level, 200-level, 300-level or higher-level subjects, and will typically add one year to the total duration of the concurrent undergraduate degree. For the course structure please go to the *Diploma in Geographic Information Systems (p.4)* section of the *Handbook*.

#### Course objectives

The diploma aims to provide skills in, and a critical understanding of, what Geographic Information Systems (GIS) and its associated technologies can and cannot achieve. It acts as an entry qualification for a career as an applied GIS researcher within a wide range of public and private organisations. Specific objectives are to:

- develop a fundamental understanding of the theoretical principles and practical aspects relating to GIS and associated science and technology;
- develop basic practical skill in applying GIS and related software to problems in areas such as land administration, natural resources management, facility management, environmental science, geography, geomatics, planning, agriculture, forestry and architecture;
- develop analytic, problem solving, team work and design skills;
- develop verbal and communication skills that enable students to interact effectively with others in the context of defining and solving problems using GIS; and
- develop a critical appreciation of the roles and responsibilities of professionals who use GIS.

### Planning your combined course

There are a number of combined courses within the Faculty. They are the five-year engineering programs BE/BSc engineering/science, BE(IT)/BSc engineering(information technology)/science, BE/BCom engineering/commerce, BE(IT)/BCom engineering(information technology)/commerce, BE/BCS mechatronics (mechanical engineering/computer science), BA/BE arts/engineering, BA/BE(IT) arts/engineering(information technology), LLB/BCS laws/computer science and the six-year LLB/BE laws/engineering degree and LLB/BE(IT) laws/engineering (information technology). There are also five geomatics combined programs within the faculty. The five-year programs are the BGeomE/BSc geomatic engineering/science, BA/BGeomE arts/geomatic engineering, BGeomE/BIS geomatic engineering/information systems, BGeomE/BPD geomatic engineering/planning and design (property and construction) and the six-year program is the LLB/BGeomE laws/geomatic engineering degree.

### Bachelor of Arts/Bachelor of Engineering (BA/BE) and Bachelor of Arts/Bachelor of Engineering (Information Technology) (BA/BE (IT))

The standard BA/BE and BA/BE(IT) combined degrees require a total of 500 points, of which 300 are designated engineering points and 200 are designated arts points.

#### BA/BE, BA/BE(IT) course structure

To satisfy course requirements students must:

- take the set of core engineering subjects prescribed for the branch of engineering being studied. This will include the professional study requirements in one of chemical engineering, civil engineering, environmental engineering, mechanical engineering, or one of electrical and electronic, computer or software engineering;
- complete 200 points towards the arts component comprising:
  - 50 points of level-one points (usually four subjects);
  - 75 points of level-two points (usually six subjects);
  - 75 points of level-three (usually six subjects).

In planning the arts component students should refer to the Faculty of Arts entry in the Handbook and particularly those under the headings arts-approved subject requirements and combined degree requirements and course planning. For the course structure please go to the *Faculty of Engineering (p.1)* section of the *Handbook*.

#### BA/BE, BA/BE(IT) course objectives

The course objectives are that graduates should:

- have a broad knowledge-base and command of the scientific principles underlying technology;
- have acquired the educational and professional standards required by the Institution of Engineers Australia for registration as chartered professional engineers;
- possess a broad knowledge base of their chosen engineering discipline and of other disciplines such as management, humanities and languages;
- demonstrate a sound knowledge and understanding of selected fields of study in the humanities, languages and social and behavioural sciences;
- have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems, for further development professionally and for meeting future changes in technology;
- understand the basic principles underlying the management of physical, human and financial resources;
- have acquired well-developed generic skills such as critical thinking, intellectual curiosity, problem solving, independent thought, effective communication and the ability to work in a cooperative manner as a member of a team; and demonstrate an independent approach to knowledge that uses rigorous methods of inquiry and appropriate theories and methodologies that are applied with intellectual honesty and a respect for ethical values;
- communicate effectively and, in the case of students undertaking a language major, are able to read, write and speak fluently and with an appreciation of the cultural context of the language;
- have an appreciation of the interpersonal and management skills required by engineers in undertaking professional activities;
- have acquired a sense of professional ethics and responsibility towards the profession and the community;
- apply critical and analytical skills and methods to the identification and resolution of problems within a changing social context;
- act as informed and critically discriminating participants within the community of scholars, as citizens and in the work force;
- have an understanding of political, economic, social and cultural developments in our society and in the wider international context; and
- realise that, as professional engineers, they are a part of a highly competitive global economy.

### **Bachelor of Engineering/Bachelor of Commerce (BE/BCom) and Bachelor of Engineering(IT)/Bachelor of Commerce (BE(IT)/BCom)**

The standard BE/BCom and BE(IT)/BCom combined degrees require a total of 500 points, of which 300 are designated engineering points and 200 are designated commerce points.

#### **BE/BCom, BE(IT)/BCom course structure**

The BE/BCom, BE(IT)/BCom course aims to develop skills in critical analysis and professional competence in the areas of accounting, actuarial studies, business information systems, econometrics, economics, finance, international business, management and marketing; and provide a professional education in one of environmental, chemical, civil, electrical and electronic, computer, software, mechanical engineering. The first two years of this combined course would normally include compulsory engineering and commerce subjects. In years three, four and five the remaining compulsory engineering subjects (and possibly electives) are taken along with sufficient commerce subjects to obtain the required total of 200 commerce points.

In order to establish a balanced study program, it is recommended that by the end of the equivalent of three full-time years, students in most streams of this course are to have:

- completed no less than 100 points of commerce;
- completed no less than 200 points of engineering.

To satisfy course requirements students must:

- take the set of core engineering subjects prescribed for the branch of engineering being studied. This will include the professional study requirements in one of chemical engineering, civil engineering, environmental engineering, mechanical engineering, or one of electrical and electronic, computer or software engineering;
- complete 200 points towards the commerce component (Please see *Commerce and non-commerce subjects (p.3)*) comprising:
  - at least 50 level-one points
  - at least 50 level-three points
  - the five compulsory subjects:
    - 316-102 Introductory Microeconomics
    - 316-101 Introductory Macroeconomics
    - 316-130 Quantitative Methods 1
    - 316-205 Introductory Econometrics.

- 325-201 Organisational Behaviour<sup>1</sup>

BE/BCom, BE(IT)/BCom students would normally undertake 316-102 Introductory Microeconomics, 316-101 Introductory Macroeconomics and 316-130 Quantitative Methods 1 in their first-year of study and 316-205 Introductory Econometrics and 325-201 Organisational Behaviour in their second year of study. For the course structure please go to the *Faculty of Engineering (p.1)* section of the *Handbook*.

#### **BE/BCom, BE(IT)/BCom course objectives**

The course objectives are that graduates should have acquired:

- the educational and professional standards of the professional institutions and boards with which the Faculty of Engineering's courses are accredited;
- a sense of professional ethics and responsibility towards their chosen professions and the community;
- the ability to think critically, analytically and creatively when seeking to design solutions to professional problems whilst displaying an understanding of the dynamic economic, social, political and physical environments in which they occur;
- the oral and written communication skills which are necessary to operate effectively in their chosen disciplines and of other disciplines so as to facilitate effective work-related communication;
- a broad knowledge-base of their chosen disciplines and of other disciplines so as to facilitate effective work-related communication;
- a sound fundamental understanding of the scientific principles underlying technology;
- the mathematical and computational skills necessary for the solution of theoretical and practical problems, for further development professionally, and for meeting future changes in technology;
- the ability to efficiently and effectively apply, the basic principles underlying the management of physical, human and financial resources in an engineering-based enterprise;
- a basic level of knowledge and skills in several disciplines and a more specialised level of knowledge and skills in one or more of the following disciplines: accounting, actuarial studies, business information systems, econometrics, economics, finance, management and marketing;
- an understanding of basic concepts and institutional arrangements operating in the Australian economy; and
- skills in basic quantitative methods used in the study of the economy, commerce and government.

### **Bachelor of Laws/Bachelor of Engineering (LLB/BE) and Bachelor of Laws/Bachelor of Engineering(Information Technology) (LLB/BE(IT))**

The standard LLB/BE, LLB/BE(IT) combined degrees require a total of 600 points, of which 300 are designated engineering points and 300 are designated law points.

#### **LLB/BE, LLB/BE(IT) course structure**

To satisfy course requirements students must:

- take the set of core engineering subjects prescribed for the branch of engineering being studied. This will include the professional study requirements in one of chemical engineering, civil engineering, environmental engineering and, mechanical engineering, or one of electrical and electronic, computer or software engineering;
- complete 300 points of law subjects including the core law subjects:
  - 730-101 Torts and the Process of Law I
  - 730-102 Torts and the Process of Law II
  - 730-105 History and Philosophy of Law I
  - 730-115 History and Philosophy of Law II
  - 730-231 Criminal Law and Procedure I
  - 730-232 Criminal Law and Procedure II
  - 730-221 Contracts I
  - 730-222 Contracts II
  - 730-341 Property I: Concepts and Principles
  - 730-342 Property II: Acquisitions and Dealings
  - 730-301 Constitutional and Administrative Law
  - 730-462 Equity and Trusts

Students must also complete law electives, including at least 12.5 points of legal theory, to make up the 300 points.

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

## Faculty of Engineering

For the course structure please go to the *Faculty of Engineering (p.1)* section of the *Handbook*.

### LLB/BE, LLB/BE(IT) course objectives

This combined course has as its objectives that graduates should:

- have a sound fundamental understanding of the scientific principles underlying technology;
- have acquired the educational and professional standards of the professional institutions and boards with which the faculties' courses are accredited;
- possess a broad knowledge base of each of their chosen disciplines and of other disciplines so as to facilitate effective communication with those other professionals with whom engineers and lawyers routinely communicate;
- understand the basic principles underlying the management of physical, human and financial resources;
- have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems, for further development professionally and for meeting future changes in technology;
- think critically, analytically, and creatively when seeking to develop solutions to professional problems whilst displaying an understanding of the dynamic economic, social, political and physical environments in which they occur;
- have acquired a sense of professional ethics and responsibility towards their chosen professions and the community;
- understand, identify, use and evaluate rules, concepts and principles of law, their derivation and the various theories that attempt to systemise them;
- have acquired the oral and written communication skills necessary to develop legal reasoning and argument as well as contribute to society;
- develop a continuing critical interest in law and its reform and obtain satisfaction from its study and practice; and
- be committed to promote justice.

### Bachelor of Engineering/Bachelor of Science (BE/BSc) and Bachelor of Engineering(Information Technology)/Bachelor of Science (BE(IT)/BSc)

The standard BE/BSc and BE(IT)/BSc combined degrees require a total of 500 points, within which students must take a minimum of 300 engineering points and 237.5 science points. The total points of a standard course can be kept to 500 as at least 50 points of core material within the various streams of engineering also earn science points.

#### BE/BSc, BE(IT)/BSc course structure

To satisfy course requirements students must:

- take the set of core engineering subjects prescribed for the branch of engineering being studied. This will include the professional study requirements in one of chemical engineering, civil engineering, environmental engineering, and mechanical engineering;
- accumulate a minimum of 237.5 science points, which must include:
  - between 75 and 125 points at 100-level;
  - completion of 50 points of a prescribed science major at the 300-level. For detailed information on science majors, refer to the Faculty of Science section *Planning a science major (p.11)*.

With regard to the science component note that:

- There are no specific requirements at the 200-level.
- Science points are awarded for the completion of *science* subjects listed in the Faculty of Science section of this *Handbook*. The majority of subjects listed in this section earn science credit, although there are exceptions. Some subjects offered by the Department of Information Systems, Department of Mathematics and Statistics, and School of Earth Sciences do not earn science credit. 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 science section of this *Handbook* is a non-science subject.
- The engineering component may require the completion of specific (generally 100-level) science subjects. These subjects are detailed in the requirements of the various engineering courses that follow in the departmental entries.
- Selection of science subjects

Students are normally able to enrol in any subjects earning science credit where they have satisfied the prerequisite and corequisite requirements. These requirements are included in individual subject descriptions. Note that some science subjects are quota-restricted as the demand for the subject exceeds the number of places available. Selection into quota subjects is based on academic merit. Refer to the Faculty of Science section *Quota subjects (p.9)*

- Students who commenced prior to 1999  
Students who first enrolled in the combined engineering/science 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 points at 300-level made up of science subjects of their choice.
- Honours in science

The Faculty of Science offers a Bachelor of Science (Honours) program. It involves advanced research and coursework and results in the award of an honours qualification. This will add an extra year to the combined degree. Refer to the Faculty of Science section *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)*

For the course structure please go to the *Faculty of Engineering (p.1)* section of the handbook.

#### BE/BSc, BE(IT)/BSc course objectives

The course objectives are that graduates should have acquired:

- a broad knowledge of science and engineering in several disciplines including a sound fundamental understanding of scientific and engineering principles and methods;
- an in-depth knowledge and skills within specified areas of engineering and science;
- the appropriate analytical, problem-solving and design skills;
- a capacity to apply practical skills towards the development of mathematical and computer-based solutions of problems;
- learning skills and a knowledge base to enable them to readily accommodate future changes in technology;
- verbal and written communication skills that enable them to communicate effectively in the context of defining and solving problems;
- an understanding of the basic principles underlying the management of physical, human and financial resources;
- skills, personal attributes and depth of knowledge which equip them for positions of leadership in basic and applied research, engineering and management of technology-intensive enterprises;
- an appreciation of the roles and responsibilities of engineers and scientists in society; and
- the educational and professional standards of the professional institutions with which the faculties' courses are accredited.

### Bachelor of Engineering (Mechatronics)/Bachelor of Computer Science (BE/BCS)

The standard BE(Mechatronics)/BCS combined degree requires a total of 500 points, of which 200 are designated computer science points and 300 points are designated engineering points.

#### BE/BCS course structure

The BE(Mechatronics)/BCS degree course provides professional education in mechanical and electronics engineering with computer science necessary for the design and development of 'intelligent' products and systems. This is facilitated through linkages with the Advanced Engineering Centre for Manufacturing, but is founded on the programs in the relevant departments.

The first year is a combination of the foundation subjects in mechanical and electrical engineering and computer science. These are developed further in later years and integrated by way of mechatronics design and laboratory subjects. The breadth of the foundation of the course results in electives being confined to later years. A total of 200 points are from the BCS course in the total course points of 500. Students must also satisfy course requirements for the BE as required. For the course structure please go to the *Mechanical and Manufacturing Engineering (p.1)* section of the *Handbook*.

#### BE/BCS course objectives

The course objectives are that graduates should have:

- a broad knowledge of the discipline of mechatronics, including a sound fundamental understanding of scientific and engineering principles and methods;
- an in-depth knowledge and understanding within specified areas of mechanical engineering, computer science and electronics;
- analytical, problem-solving and design skills;
- a capacity to apply practical skills towards the development of mathematical and computer-based solutions of problems;
- learning skills and a knowledge base to equip them for future changes in technology;
- verbal and written communication skills that enable them to communicate effectively in the context of defining and solving problems;
- an understanding of the basic principles underlying the management of physical, human and financial resources;

- an appreciation of the interpersonal and management skills required by engineers in undertaking professional activity;
- an appreciation of the roles and responsibilities of engineers/scientists in society; and
- the educational and professional standards of the professional institutions with which the faculties' courses are accredited.

### Bachelor of Laws/Bachelor of Computer Science (LLB/BCS)

The standard LLB/BCS combined degree requires a total of 500 points, of which 300 are designated law points and 200 are designated computer science points.

#### LLB/BCS course structure

The LLB/BCS degree provides professional training and study in both the legal, ethical and moral issues that form the basis of a law degree as well as the technical and theoretical topics that comprise a computer science degree.

To satisfy course requirements students must:

- complete 200 points towards the computer science component;
- complete 300 points of law subjects including the core law subjects:
  - 730-101 Torts and the Process of Law I
  - 730-102 Torts and the Process of Law II
  - 730-105 History and Philosophy of Law I
  - 730-115 History and Philosophy of Law II
  - 730-231 Criminal Law and Procedure I
  - 730-232 Criminal Law and Procedure II
  - 730-221 Contracts I
  - 730-222 Contracts II
  - 730-341 Property I: Concepts and Principles
  - 730-342 Property II: Acquisitions and Dealings
  - 730-301 Constitutional and Administrative Law
  - 730-462 Equity and Trusts

Students must also complete law electives including at least 12.5 points of legal theory to make up the 300 points. For the course structure please go to the *Electrical Engineering and Computer Science (p.1)* section of the *Handbook*.

#### LLB/BCS course objectives

The course objectives are that graduates should have acquired:

- a broad knowledge of the discipline of computer science, including a sound fundamental understanding of scientific and engineering principles and methods;
- an in-depth knowledge and understanding within selected areas of computer science, including analytical and problem-solving skills, relevant design skills and a capacity to apply practical abilities towards the development of computer-based solutions to problems;
- an appreciation of the roles and responsibilities of computer scientists in society, with an emphasis on legal and ethical issues;
- an ability to understand, identify, use and evaluate rules, concepts and principles of law, their derivation and the various theories that attempt to explain them;
- the techniques of legal reasoning and argument, in oral and written form;
- an understanding of the institutions of the law and their social, economic and political context;
- an ability to find the law, to carry out independent research and analysis and to think creatively about legal problems, particularly with regard to issues related to the ownership of information and intellectual property;
- a continuing interest in law and an ability to obtain satisfaction from its study and practice;
- a critical interest in the reform of the law;
- an appreciation of the responsibilities of lawyers to the courts, the legal profession, community and individuals within it;
- a commitment to promote justice; and
- a firm base of knowledge from which to undertake further development professionally in the fields of computer science and law, or to enter higher educational studies in those disciplines.

### Bachelor of Arts/Bachelor of Geomatic Engineering (BA/BGeomE)

The standard BA/BGeomE combined degree requires a total of 500 points, of which 300 are designated engineering points and 200 are designated arts points.

#### BA/BGeomE course structure

To satisfy course requirements students must:

- take the set of core geomatic engineering subjects as prescribed. This will include the professional study requirements in geomatic engineering;
- complete 200 points towards the arts component comprising:
  - 50 level-one points (usually four subjects);
  - 75 level-two points (usually six subjects);
  - 75 level-three points (usually six subjects).

In planning the arts component students should refer to the Faculty of Arts entry in the Handbook and particularly those under the headings arts-approved subject requirement and *Combined arts degrees (p.10)*

For the course structure please go to the *Geomatics (p.1)* section of the *Handbook*.

#### BA/BGeomE course objectives

The course objectives are that graduates should:

- have a broad knowledge base and command of the scientific principles underlying technology;
- have acquired the educational and professional standards required by the Institution of Engineers Australia and the Institution of Surveyors Australia, for registration as chartered professional engineers and surveyors respectively;
- possess a broad knowledge base of their chosen engineering discipline and of other disciplines such as management, humanities and languages;
- demonstrate a sound knowledge and understanding of selected fields of study in the humanities, languages and social and behavioural sciences;
- have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems, for further development professionally and for meeting future changes in technology;
- understand the basic principles underlying the management of physical, human and financial resources;
- have acquired well-developed generic skills such as critical thinking, intellectual curiosity, problem-solving, independent thought, effective communication and the ability to work in a cooperative manner as a member of a team; and demonstrate an independent approach to knowledge that uses rigorous methods of inquiry and appropriate theories and methodologies that are applied with intellectual honesty and a respect for ethical values;
- communicate effectively and, in the case of students undertaking a language major, be able to read, write and speak fluently and with an appreciation of the cultural context of the language;
- have an appreciation of the interpersonal and management skills required by engineers in undertaking professional activities;
- have acquired a sense of professional ethics and responsibility towards the profession and the community;
- apply critical and analytical skills and methods to the identification and resolution of problems within a changing social context;
- act as informed and critically discriminating participants within the community of scholars, as citizens and in the work force;
- have an understanding of political, economic, social and cultural developments in our society and in the wider international context; and
- realise that, as professional engineers, they are a part of a highly competitive global economy.

### Bachelor of Geomatic Engineering/Bachelor of Science (BGeomE/BSc)

The standard BGeomE/BSc combined degree requires a total of 500 points, within which students must take a minimum of 300 engineering points and 237.5 science points. The total points of a standard course can be kept to 500, as at least 50 points of core material within the geomatic engineering course also earn science points.

#### BGeomE/BSc course structure

Students enrolled in the BGeomE/BSc combined course will undertake geomatic engineering subjects in the areas of measurement science, the mapping sciences, spatial and geographic information systems, and land management, as well as the fundamental areas of mathematics, computer science, and professional studies. All requirements of the BGeomE must be satisfied. Details of the requirements are contained in the geomatics departmental entry that follows.

The requirements of the BSc component are identical to those specified for the BSc component of the BE/BSc course, see page 7 for details.

For the course structure please go to the *Geomatics (p.1)* section of the *Handbook*.

#### BGeomE/BSc course objectives

The course objectives are that graduates should have acquired:

## Faculty of Engineering

- a broad knowledge of science and geomatics in several disciplines including a sound fundamental understanding of scientific and engineering principles and methods;
- an in-depth knowledge and skills within geomatics and specified areas of science;
- the appropriate analytical, problem-solving and design skills;
- a capacity to apply practical skills towards the development of mathematical and computer-based solutions of problems;
- learning skills and a knowledge base to enable them to readily accommodate future changes in technology;
- verbal and written communication skills that enable them to communicate effectively in the context of defining and solving problems;
- an understanding of the basic principles underlying the management of physical, human and financial resources;
- skills, personal attributes and depth of knowledge, which equip them for positions of leadership in basic and applied research, engineering and management of technology-intensive enterprises;
- an appreciation of the roles and responsibilities of engineers and scientists in society; and
- the educational and professional standards of the professional institutions with which the faculties' courses are accredited.

### Bachelor of Geomatic Engineering/Bachelor of Information Systems (BGeomE/BIS)

The standard BGeomE/BIS combined degree requires a total of 500 points, of which 287.5 are designated engineering points and 212.5 are designated information systems points.

#### BGeomE/BIS course structure

The combined BGeomE/BIS degree course will provide a course of study for students who want to both understand information systems and develop their knowledge of spatial information science and technology.

To satisfy course requirements students must:

- take the core set of geomatic engineering subjects as prescribed. This will include the professional study requirements in geomatic engineering;
- complete 212.5 points of information systems subjects. This will include the core subjects:

##### 100 level

- 325-101 Managing People and Organisations
- One business-oriented subject chosen from\*:
- 306-107 Accounting Reports and Analysis
- 306-108 Accounting Transactions and Analysis (note that this subject has prerequisites)
- 316-101 Introductory Macroeconomics (note that this subject has prerequisites)
- 316-102 Introductory Microeconomics
- 732-103 Principles of Business Law
- 325-102 Business in the Global Economy
- 325-103 The Asian Economies

\*This list may be modified from time to time

- 615-120 Introduction to Information Systems
- 615-145 Concepts in Software Development I
- 615-150 Organisational Processes

##### 200 level

- 615-230 Database Concepts
- 615-237 Telecommunications Concepts
- 615-240 Concepts in Software Development II or 615-241 Software Development (Advanced)
- 615-245 Systems Analysis and Design
- 615-251 Organisational Analysis and Change
- 615-252 Electronic Commerce

##### 300 level

- 615-328 Managing the Impact of IS
- 615-347 Application Environments
- 615-350 Case Studies in IS Management
- 615-355 Legal and Ethical Framework
- 615-370 Information Systems Project

For the course structure please go to the *Geomatics (p.1)* section of the *Handbook*.

Note: BGeomE/BIS students will need to complete an information systems elective to accrue the required 212.5 information systems points.

#### BGeomE/BIS course objectives

The course objectives are that graduates should have acquired:

- the educational and professional standard of the professional institutions and boards with which the Faculty of Engineering's courses are accredited;
- a sense of professional ethics and responsibility towards their chosen professions and the community;
- a capacity to think critically, analytically and creatively when seeking to design solutions to professional problems whilst displaying an understanding of the dynamic economic, social, political and physical environments in which they occur;
- the oral and written communication skills which are necessary to operate effectively in geomatics and information science;
- a broad knowledge-base of geomatic engineering and information science, and of other disciplines so as to facilitate effective work-related communication;
- a sound fundamental understanding of the scientific principles underlying technology;
- the mathematical and computation skills necessary for the solution of theoretical and practical problems, for further development professionally and for meeting future changes in technology;
- the understanding of and the means to efficiently and effectively apply the basic principles underlying the management of physical, human and financial resources in the workplace environment;
- a broad knowledge and understanding of the science and management of spatial information as related to the management of land resources and the environment;
- the understanding of how people use information and information systems;
- the understanding of the business value that information and information systems can enable in organisations; and
- an appreciation of the economic, political and social contexts in which professional activities are undertaken.

### Bachelor of Geomatic Engineering/Bachelor of Planning and Design (Property and Construction) (BGeomE/BPD)

The standard BGeomE/BPD combined degree requires a total of 500 points, of which 300 are designated engineering points and 200 are planning and design points.

#### BGeomE/BPD course structure

The BGeomE/BPD combined course is structured to provide professional engineers and land surveyors with a comprehensive program to serve the needs of the land development industry. Students enrolled in the BGeomE/BPD combined course will undertake geomatic engineering subjects in the areas of measurement science, the mapping sciences, geographic information systems and land management, as well as the fundamental areas of mathematics, computer science and professional studies. Students will also undertake property and construction subjects in the areas of property, construction technology, management of construction, construction law, accounting concepts and construction cost management. While there is some flexibility in choosing subjects from the property and construction stream, the subjects in the geomatic engineering stream must be completed to meet professional study requirements.

To satisfy course requirements students must:

- take the core set of geomatic engineering subjects as prescribed. This will include the professional study requirements in geomatic engineering; and
- complete 200 points towards the planning and design component.

For the course structure please go to the *Geomatics (p.1)* section of the *Handbook*.

#### BGeomE/BPD course objectives

The course objectives are that graduates should have acquired:

- a broad knowledge of both geomatic engineering and property and construction to enable them to have the skills required to enter the land development, property and construction industries;
- in-depth knowledge and skills within geomatic engineering and property and construction;
- a sound fundamental understanding of scientific and engineering principles and methods;
- the appropriate analytical, problem-solving and design skills;
- a capacity to apply practical skills towards the development of mathematical and computer-based solutions of problems in geomatic engineering, land development, land administration and property and construction;
- the verbal and communication skills that enable them to communicate effectively in the context of defining and solving problems;

- an understanding of the basic principles underlying the management of physical, human and financial resources;
- the skills, personal attributes and depth of knowledge which equip them for positions of leadership in basic and applied research, engineering and management of technology-intensive enterprises;
- an appreciation of the roles and responsibilities of engineers, surveyors, architects, land developers and related professionals in society;
- the necessary educational and professional standards of the Institution of Engineers Australia, the Institution of Surveyors Australia and the Surveyors Board of Victoria; and
- an understanding of the extent to which teamwork underscores the production of property and the construction of buildings, and an appreciation of the interpersonal, communication and management skills necessary for the successful practice of property and construction.

### Bachelor of Laws/Bachelor of Geomatic Engineering (LLB/BGeomE)

This course is available to students who have met the entry requirements for both faculties. For geomatic engineering related enquiries please contact the Faculty of Engineering on 8344 6703. For law related enquiries please contact the Faculty of Law on 8344 4475.

### Extended Bachelor of Engineering Program

The Extended BE 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 engineering courses for students with high academic potential who do not meet the usual selection criteria for the Bachelor of Engineering degree. The program extends the length of the Bachelor of Engineering by one semester (equivalent to 50 points). Students must complete a total of 450 points to be awarded the Bachelor of Engineering. The initial 18 months of the program consists of an integrated course of bridging material plus the first year of the Bachelor of Engineering. 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 Engineering course at the end of the first 18 months. Student advisers will tailor bridging programs for individual students. The descriptions of bridging subjects are in the *Extended Bachelor of Engineering Program (p.10)*. 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 requirements are the same as for the *Bachelor of Engineering (BE) (p.3)* with the following exception: a minimum of 450 points is required which includes up to 62.5 points of bridging subjects.

The course structure normally depends on each student's English language proficiency (determined by IELTS score or equivalent). The following options refer to the bridging subjects undertaken in the first 18 months in addition to 100 points of 100-level subjects.

#### Course structure

Students with an IELTS score of 6.0 are normally required to undertake the following subjects as 50 points extension to the BE degree or as electives within the BE component:

175-126 Effective Communication for Engineering (p.2)

620-081 Preliminary Mathematics A (p.13)

620-082 Preliminary Mathematics B (p.14)

400-102 Intensive Academic Preparation (Eng) (p.1)

and either

610-161 Chemistry and 610-162 Chemistry

or

640-161 Physics: Principles & Applications A (p.3)

and

640-162 Physics: Principles & Applications B (p.3)

Students with an IELTS score of 6.5 are normally required to undertake the following subjects as 50 points extension to the BE degree or as electives within the BE component:

620-081 Preliminary Mathematics A (p.13)

620-082 Preliminary Mathematics B (p.14)

400-102 Intensive Academic Preparation (Eng) (p.1)

and either

610-161 Chemistry and 610-162 Chemistry

or

640-161 Physics: Principles & Applications A (p.3)

and

640-162 Physics: Principles & Applications B (p.3)

### First year

First year of the single BE, BE(IT), BGeomE, BE(ENG MGT), BE(BIO-MEDICAL) BGeoIT, BCS courses, and most of those for combined degrees consist of eight subjects with each carrying 12.5 points. A full load is four subjects and 50 points each semester.

Courses in engineering disciplines are made up of compulsory core subjects complemented with elective or optional subjects. To a large degree, the subjects making up the later years of the courses are part of the compulsory core and therefore prescribed.

It is not possible to take a set of first-year subjects that will satisfy all the second-year prerequisites for all the streams of engineering. However, there are first-year courses which satisfy a number of sub-sets of the second year of engineering streams. Full detail is included in material available at enrolment.

All first-year engineering courses require students to take 25 points of mathematics. There are two streams available. The standard stream is the combination 620-141 Mathematics A and 620-143 Applied Mathematics while 620-121 Mathematics A (Advanced) and 620-123 Applied Mathematics (Advanced) make up an advanced stream. Both streams satisfy prerequisites for the further mathematics required in second year. Students taking the advanced mathematics in first year may take further advanced mathematics in second year. Ms K Baker, the Department of Mathematics and Statistics' director of first-year studies, will advise incoming students as to which stream should be selected.

The Department of Mathematics and Statistics has established a First Year Learning Centre through which teaching and administration of its first year subjects is coordinated. This Centre is located on the ground floor of the Richard Berry Building. Near this centre students will find noticeboards relevant to first year, boxes for the submission of assignments, and the room from which printed material is usually distributed. Within the centre are the office of the Mathematics and Statistics Department's director of first-year studies, Ms K. Baker, offices of tutors in mathematics and statistics, tutorial rooms, a student waiting area, and a consultation room.

### For more information

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