The University's web site details courses at Sydney, some careers they can lead to, and what university life is like. The interactive site, with video and sound clips, has links to the University's faculties and departments. You can explore the University of Sydney on the web at www.usyd.edu.au.

Communications should be addressed to:
The University of Sydney, NSW 2006.
Phone: (02) 9351 2222
Faculty of Engineering
Phone: (02) 9351 2534
Fax: (02) 9351 4654

University semester and vacation dates 2001

<table>
<thead>
<tr>
<th>Semester 1 lectures begin</th>
<th>Monday 26 February</th>
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</thead>
<tbody>
<tr>
<td>Easter recess</td>
<td></td>
</tr>
<tr>
<td>Last day of lectures</td>
<td>Thursday 12 April</td>
</tr>
<tr>
<td>Lectures resume</td>
<td>Monday 23 April</td>
</tr>
<tr>
<td>Study vacation: 1 week beginning</td>
<td>Monday 11 June</td>
</tr>
<tr>
<td>Examinations commence</td>
<td>Saturday 30 June</td>
</tr>
<tr>
<td>Semester 1 ends</td>
<td>Monday 23 July</td>
</tr>
<tr>
<td>Semester 2 lectures begin</td>
<td>Friday 21 September</td>
</tr>
<tr>
<td>Mid-semester recess</td>
<td>Tuesday 2 October</td>
</tr>
<tr>
<td>Last day of lectures</td>
<td>Friday 5 November</td>
</tr>
<tr>
<td>Lectures resume</td>
<td>Monday 12 November</td>
</tr>
<tr>
<td>Study vacation: 1 week beginning</td>
<td>Saturday 1 December</td>
</tr>
</tbody>
</table>

Last dates for withdrawal or discontinuation 2001

<table>
<thead>
<tr>
<th>Semester 1 units of study</th>
<th></th>
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<tbody>
<tr>
<td>Last day to add a unit</td>
<td>Friday 9 March</td>
</tr>
<tr>
<td>Last day for withdrawal</td>
<td>Friday 30 March</td>
</tr>
<tr>
<td>Last day to discontinue without failure (DNF)</td>
<td>Thursday 12 April</td>
</tr>
<tr>
<td>Last day to discontinue (Discontinued - Fail)</td>
<td>Friday 8 June</td>
</tr>
<tr>
<td>Semester 2 units of study</td>
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</tr>
<tr>
<td>Last day to add a unit</td>
<td>Friday 3 August</td>
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<tr>
<td>Last day for withdrawal</td>
<td>Friday 31 August</td>
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<tr>
<td>Last day to discontinue without failure (DNF)</td>
<td>Friday 7 September</td>
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<tr>
<td>Last day to discontinue (Discontinued - Fail)</td>
<td>Friday 2 November</td>
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<tr>
<td>Full Year units of study</td>
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<tr>
<td>Last day for withdrawal</td>
<td>Friday 30 March</td>
</tr>
<tr>
<td>Last day to discontinue without failure (DNF)</td>
<td>Friday 27 July</td>
</tr>
<tr>
<td>Last day to discontinue (Discontinued - Fail)</td>
<td>Friday 2 November</td>
</tr>
</tbody>
</table>

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Message from the Dean

Welcome to the Faculty of Engineering of the University of Sydney, which is also known as the PN. Russell Faculty of Engineering in commemoration of its industrialist benefactor, Sir Peter Russell. Over the past one hundred and ten years about ten thousand students have preceded you along the path you have chosen to follow towards professional engineering.

An aim of this faculty is to provide the best possible education in the best possible facilities, for its students, both undergraduate and postgraduate. Undergraduate teaching is one of the highest expressions of education; for us, undergraduate teaching is a great social responsibility as well as an opportunity to produce engineers of the future who are both technically competent and socially aware. We produce engineers who will be Australia's future industrial leaders. Over recent years our Advanced Engineering program has seen our high achieving students exposed to innovation, entrepreneurship and integrated design. We are now embarking on even more ambitious schemes to allow all our graduates to become skilled in these important areas.

In whichever of the engineering branches you may choose to enrol, you will find that the engineer is concerned with applying scientific knowledge and exercising social skills. To do so with competence and assurance, we believe he or she should have a strong basis in science. Consequently, during the first two years of your course this scientific basis is laid down. This vital foundation, the soundness of which is the hallmark of the Peter Nicol Russell Faculty, provides you with the ability you will depend on during your future professional career to appreciate the significance of new and developing technologies, and to work with them. At the same time we teach you the responsibility you have as an engineer.

The engineer must operate in the real world of economic forces and social priorities. Engineering is a creative occupation: based on science applied with art and skill, and with the economic and social dimensions added. Our graduates develop the skills to thrive in the real world, with concern for and the knowledge required to deal with the important environmental issues of today. These skills will be taught to you by our outstanding academic staff in collaboration with our colleagues from industry. You will work on real problems with real engineers!

You may have chosen to take engineering because you enjoy proficiency at mathematics and in the sciences, disciplines you probably find interesting and challenging. You perhaps have a liking for solving problems and making things. These are all characteristics of the engineer. Engineering is about meeting people too, and managing. Many engineers travel extensively; they tend to have high starting salaries and high career mobility; and they are greatly needed by the nation.

If you are one of the growing number of students who have opted to take a combined degree, you will already be aware of the value and flexibility that these additional studies in quite different areas can add not only to your career prospects but also to your enjoyment of your university time and appreciation of life in general. You will be gaining a breadth of experiences and knowledge that can only benefit your career as an engineer.

The course in engineering includes more classes and laboratory hours than most. It calls for steady and concentrated effort. Above all it is stimulating and exciting. Engineering students are a cohesive group who work and play hard, win more than their share of sporting trophies, and have a reputation for flair and initiative. This too, is the essence of engineering. I congratulate you for joining us and I wish you well in your university life and professional career.

Judy Raper, Dean
Letter from the SUEUA President

As the president of the Sydney University Engineering Undergraduate Association (SUEUA), I am writing this letter to inform you of the outstanding attributes that the Faculty of Engineering has to offer, in both the academic and non-academic aspects of university life.

I chose to study engineering at the University of Sydney, due to its reputation for academic excellence and the Faculty's ability to cater for all needs of the whole student body. The Dean's passionate support for SUEUA gives us as a student association the ability, and the enjoyment, to fulfil the social needs of the faculty.

This will be my fourth year of study at Sydney. I can gladly say that as a result of the last three years in engineering, being so involved with SUEUA has brought to light some of my hidden skills in communication, leadership and fun. July involvement with SUEUA has also given the chance to make new and exciting friendships with students from all over the faculty. These friendships which will last a lifetime!

Prospective students

What exactly does SUEUA do? Well I'm glad you asked. SUEUA's role as the student faculty society is to organise and run all social events on the engineering calendar, liaise with academic and administrative staff and provide seminars and workshops with industry to help prepare students for their eventual departure into the ever-advancing world of engineering.

Compared with your high school, the University of Sydney is quite vast and may seem a little intimidating at first. However, if you get involved early, instead of seeing thousands of unknown faces each day on your way to class, you will see friends whom you would have met at SUEUA functions such as 'First Year Camp', 'Beer'n'Bangers' or a lazy Friday afternoon SUEUA barbecue.

Engineering can be quite a challenging degree, so why not come to the University of Sydney and enjoy all the benefits the Faculty of Engineering has to offer.

Fellow students

So you've been at this University for one, two or maybe even five years working hard to get your degree. If I could offer you some advice: don't forget to have fun. Think of yourself and experience everything that university life has to offer. If you get involved now, you too will be able to meet exciting new friends, future business contacts and develop your own interpersonal skills.

Last year in seeking a summer placement for my vocational employment, I was involved in many job interviews with some of the largest engineering firms in Sydney. It was during these interviews that the importance of my involvement with SUEUA, and also the Engineering Revue, became very apparent. In the modern world of engineering employers are no longer only looking for the students with HD averages, skills in management, leadership and teamwork are of increasing importance. As a student with no, or very little, industry experience, how did my potential employers compare the with my competition? They looked into the extent of my extra-curriculum experience and involvement, and what skills I had gained as a result.

Without a doubt, the last three years have been the most rewarding and exciting of my life. It was not until I arrived at the University of Sydney and the Faculty of Engineering, that I really saw the potential of what university life had to offer. I've learnt so much, developed in so many different ways and had an amazing, unforgettable time in between. Hopefully you too can see this transformation within yourself and are using the experiences, gained to lead you into the future.

Have a great year. I know I will.

Alan Connack, SUEUA President 2001
biochemical industries such as pharmaceuticals, fermentation or food and dairy processing.

Reservoir Engineering. These courses deal with the properties and behaviour of petroleum and natural gas reserves, and the strategies used in their management.

Regardless of the option chosen, the graduate will be a fully qualified chemical engineer, well prepared for a career in any of the process industries.

The Department has a number of active exchange programs with leading Departments overseas. The exchanges, with the Royal Institute of Technology, Stockholm, and the Ecole Nationale Superieure D'Ingénieurs de Genie Chimique in Toulouse, see five or six of our final year students completing their degrees at one of these Institutions each year, with similar numbers of their students finishing their courses in Sydney. There is also an exchange program with Iowa State University which allows one or two of our students to spend their third year there. Each of these exchange schemes includes Industrial Experience in the host country. Some financial assistance is available to approved students.

The majority of chemical engineering graduates enter industry, taking up positions in plant operation, supervision, and eventually management. Others will be engaged in plant design, construction, and commissioning work either for a large process company or one of the specialist construction firms.

There is also scope for research and development work with industry or government organisations.

Chemical engineers are also recruited by many of the larger companies for technical service and sales. Graduates may also be able to obtain positions overseas either directly or through Australian companies with overseas associations.

Civil Engineering and Project Engineering and Management

Phone: (02) 9351 2136
Fax: (02) 9351 3343
Email: office@civil.usyd.edu.au
Head: Associate Professor Robert J. Wheen
Executive Assistant to Head of School: Ms Tmne Blair

The title Civil Engineer is given to one who invents, contrives, designs and constructs for the benefit of the community. Civil engineering covers a wide range including the conception, design, construction and maintenance of those more permanent structures and services such as roads, railways, bridges, buildings, tunnels, airfields, water supply and sewerage systems, dams, pipelines, river improvements, harbours and irrigation systems. In the broader sense civil engineers are charged with the task of producing structures and systems that give the greatest amenity for the funds expended. They have therefore to optimise their schemes in terms of technological performance, impact upon the environment and the financial resources available.

Civil engineers find employment in government authorities whose concern is the design, construction and maintenance of public services; with consultants whose main interest is the design of civil engineering works; with contractors who carry out the construction work; and in civil engineering industries which manufacture and supply materials, plant and equipment.

Graduates in construction engineering and management will find themselves particularly well placed for project management and leadership roles in the following organisations; construction companies, project management organisations (major management, consulting and planning firms), government organisations, large corporations including mining and industrial companies, and part of multidiscipline teams of professionals in charge of large infrastructure projects - eg, water supply or transportation systems.

In the first and second years of the course, the student is given a grounding in mathematics and the sciences with an introduction to structural theory, design, construction, and the properties of materials.

In the third year, basic courses are given in structures, soil mechanics, surveying, hydraulics, structural design, construction, materials and practice of civil engineering.

In the fourth year, the basic courses of the third year are continued with an additional course which requires the preparation of a thesis. At honours level a more extensive thesis is required. A major segment of final year studies comprises options in structures, fluid mechanics, engineering management, soil mechanics and geomechanics.

As civil engineering is a practical profession, attention is given to this aspect throughout the course. Full use is made of the laboratories with students carrying out experiments to obtain a better understanding of behaviour under practical conditions. There is extensive use of computers in design and other exercises. During the vacation between the senior and senior advanced years, every student must obtain practical experience in a civil engineering field and must submit a satisfactory report on this experience. Seminars are also held and visits to works in progress are made as opportunities arise. Students are encouraged to take a close interest in current research and investigations.

Quality Assurance: For most subjects originating in the Department of Civil Engineering, independent Quality Assurance Auditors have been appointed to ensure that high standards are maintained in the teaching of all subjects.

Electrical, Telecommunications, Software and Computer Engineering

Phone: (02) 9351 3229
Fax: (02) 9351 3847
Email: peterf@ee.usyd.edu.au
Web: www.ee.usyd.edu.au
Head: Associate Professor Stephen Simpson
Manager, Academic Support Services: Peter Finmeran

The School of Electrical and Information Engineering offers students the opportunity to study engineering in an exciting, innovative and relevant environment. The fields of Electrical, Software, Telecommunications, eCommerce and Computer Engineering are ones in which there has been a history of constant improvements, developments and innovations in existing technologies, coupled with the evolution of new technologies. The School is closely linked to the engineering industry and the units of study are of a quality to ensure that our graduates are prepared for a changing profession.

The degree courses offered by the School of Electrical and Information Engineering - Electrical Engineering, Software, Telecommunications, eCommerce and Computer Engineering- are four year programs (for both Pass and Honours). They can, however, be taken as five year double degree programs with Arts, Medical Science, Science or Commerce. The School will be offering a new degree in Electronic Commerce in 2001. Students are also able to participate in exchange programs with universities in Sweden, Hong Kong and the USA as part of their degree program.

The degree courses include emphasis on practical problem solving, the basic theory necessary to underpin the profession through the rapid changes being made, and professional practice. There are opportunities to make contacts in industry, including a three months practical training in industry at the end of third year.

The Electrical Engineering degree is designed to be general and allows a student to concentrate in the later years on a variety of fields such as biomedical engineering, energy engineering and automatic control as well as telecommunications and computers or take a broad selection in several areas.

The Telecommunications Engineering degree offers specialisation in the third and fourth years in the subjects electronics and optics, computer systems, electromagnetics, signal and communication systems and telecommunications software. Extensive problem-solving computer based projects, and aspects of modern workplace management, are features of the program.
The Computer Engineering degree has a greater emphasis on computer science but the core program in the first two years is almost the same as the other two degrees. This degree specialises in the third and fourth years in advanced computer systems, computer networking and software engineering. A wide range of computer oriented electives including artificial intelligence and integrated circuit design are available. Features of the program include computer based tutorials, aspects of modern workplace management principles and the development of communication skills.

The Software Engineering degree has a common first year with Electrical, Telecommunication and Computer Engineering programs. The second year is mostly in common with a core emphasising science and technology, computer science and microcomputer programming. A feature of the program is that students can start specialising in the second year by selecting software engineering electives in business software, electronics and circuits, for CAD software, commerce and biology. Specialisations in software engineering databases, signal processing, information systems, telecommunication software systems, CAD, operating systems and compilers, real time systems and high performance computing.

The e-commerce degree is for those who want a broad knowledge of the emerging digital economy, its underlying technology, and the business skills relevant to it. The program will produce IT professionals with the knowledge of those technologies that will allow them to become leaders and innovators in the emerging information technology and electronic business industries.

Electrical, Telecommunications, Software, ecommerce and Computer engineers have a wide choice of career opportunities. Prospective employers include consulting engineering firms, State and local government, computer companies, financial companies, manufacturers, builders, and research institutions such as the CSIRO or universities. Like engineering itself, the possibilities are almost limitless.

**Mechanical, Mechatronic and Biomedical Engineering**

Phone: (02) 9351 2341
Fax: (02) 9351 7060
Email: hod@mech-eng.usyd.edu.au
Web: www.mech-eng.usyd.edu.au
Head of School: vacant
Administrative Officer: Colleen Moore

The School of Aerospace, Mechanical and Mechatronic Engineering offers degrees in mechanical, mechatronic and biomedical engineering.

**Mechanical Engineering** is a very broad branch of professional engineering and mechanical engineers are found in almost every type of engineering activity. They are involved in power generation, transportation systems for land, sea and air, pollution control, environmental protection and, biomedical engineering. They are found in a wide range of industries which manufacture machinery and consumer goods and offer research and technical services.

Mechanical engineers design machinery, engines, vehicles, agricultural and mining equipment, ships and household appliances. They are managers who run production lines, power stations and steel mills. They design and maintain coal conveyer systems, building services, oil and gas pipelines and port loading facilities. The great diversity of applications for mechanical engineers means they are much sought after in both commercial and industrial fields.

Students have the opportunity to complete the Bachelor of Mechanical Engineering in one of three different degrees - Mechanical, Mechatronics or Biomedical.

**Mechatronics** combines mechanical engineering, electronics and computing. It is the enabling technology of computer-automated manufacturing through the use of robots and automated machine tools. Mechatronics may be concerned with individual machines such as robots, or manufacturing systems automated in their entirety.

Mechatronic engineers use computers and other digital systems to control industrial processes. They bring electronic, materials and mechanical sciences together to create a diverse range of products. These range from everyday products such as cameras, washing machines, photocopiers and anti-lock car brakes, to miniaturised substitutes for human organs and to powerful and precise computer-controlled machine tools used in manufacturing.

**Biomedical engineers** apply engineering principles to understand, modify or control biological systems, and develop technology to monitor physiological functions and to assist in diagnosis and treatment of patients. Biomedical engineering is an interdisciplinary branch of engineering, encompassing areas of electrical, mechanical and chemical engineering.

Subjects in biomedical and orthopaedic engineering as well as research opportunities in Electrical, Mechanical and Mechatronic Engineering are available. This degree meets the tertiary study entry requirements for the Graduate Medical Program.

The first two years of undergraduate study in mechanical, mechatronic or biomedical engineering provide students with an introduction to engineering science, design and manufacturing methods, management, computing and electronics, so that by the end of the second year, a broad field has been covered.

In third year, mechanical engineering students study in more depth the hardware, materials and manufacturing processes which are at the heart of mechanical engineering. In addition to this, mechatronics students study topics such as control, digital systems and computer technology, electronics and electrical machines. Three months’ practical training in industry follows third year for all students.

The final year of mechanical, mechatronic and biomedical engineering allows students to develop the professional skills that they will need after graduation. Emphasis is placed on using engineering science, up-to-date technologies and professional tools to solve practical problems. Specialisation in the final year is encouraged. Areas of specialisation include: management, thermo-fluids, environmental engineering, computational fluid dynamics, design, rheology, advanced materials, orthopaedic/biomedical engineering and mechatronics.
CHAPTER 2

Undergraduate units of study

Units of study are subject to alteration

Arrangements for units of study, and the units themselves, including staff allocated as stated in this or any other publication, announcement or advice of the University are an expression of intent only and are not to be taken as a firm offer or undertaking. The University reserves the right to discontinue or vary such units of study, arrangements or staff allocations at any time without notice.

On the following pages details of the units of study are provided in a form which is convenient for reference. Every care has been taken to ensure that the information given is complete and accurate. However, updates are constantly ongoing and therefore variations may be made from time to time. These will be announced by the lecturer or posted on the relevant noticeboards. It is the responsibility of students, by attendance at lectures and frequent inspection of the noticeboards, to ensure that they have the latest information on any unit of study.

Textbooks

Changes sometimes occur in the selection of prescribed textbooks, or reference books, owing to supply difficulties, or the publication of new and more suitable works. Such changes will be announced by lecturers and it is prudent to check with the relevant lecturer before buying the books you expect to need.

Elective units of study in other faculties

There is provision for students to apply to the Faculty of Engineering for special permission to take any other units of study which are available in other degree programs towards their BE degrees (eg, Computer Science 3, Economics 2). Any unit of study which is not listed in the Tables of Units of Study or in the list of recommended elective units of study in this handbook is referred to as a 'non-listed' unit of study by the Faculty.

If you have a strong interest in taking a particular 'non-listed' unit of study, you should consult the relevant faculty handbook for details about it. You will also need to check whether or not there is a quota for this unit of study or any special assumed knowledge/prerequisite. You will also need to ensure that the unit of study creates no timetable clash with Engineering requirements.

If you decide that you wish to enrol in a 'non-listed' unit of study, you will need to apply for special permission to do so. Please ask to see the Chair of the Committee for Undergraduate Studies or the Faculty’s Undergraduate Coordinator at enrolment time for application procedure.

Unit of study numbering system

The units of study available for the degree are designated Junior (First Year), Intermediate (Second Year), Senior (Third Year), Senior Advanced or Honours (Fourth Year). These names indicate the year of attendance in which the unit of study becomes available to you if you are making normal progress.

Each unit of study has a unique code and number, comprising 4 letters followed by 4 numbers (eg, MECH 2200). Each unit of study also has a unique and much longer numerical code allocated to it by the University for administrative purposes, however for the majority of student requirements (eg, enrolment) this will not be necessary.

The first 4 letters (eg, MECH, AERO) indicate the Department which teaches the unit of study. The first number of the set of 4 numbers following indicates the year of study. Example 'MECH 2200': This is a unit of study taught by the School of Aerospace, Mechanical and Mechatronic Engineering and is normally offered to Second Year (Intermediate) students.

Aeronautical Engineering

AERO 1 4 0 0 Intro to Aircraft Construction & Design

6 credit points

Offered: July. Classes: 1 lec/week per semester, 1 x 3hr practical/ workshop session/week per semester. Assessment: In-course involvement, practical assignments and quizzes.

First Year Elective unit of study for the degree in Aeronautical Engineering.

Syllabus Summary

Introduction to aircraft design and construction methods; fibre-glass molding of complex components; bonding and gluing; structural reinforcement; manufacture of metal components; wooden components; aircraft grade materials; welding; riveting; bolting and other fasteners.

Investigation of a typical aircraft configuration; component layout; alternate configurations; weight penalties or gains.

Requirements for ancillary equipment; aircraft instruments; accuracy of instruments; engine and propeller selection; fuel system; navigation and communication systems.

Aviation regulation; process of aircraft certification; aircraft categories; performance measurement and requirements; weight and balance; centre of gravity requirements.

Objectives/Outcomes

The objective of this unit of study is to introduce and foster practical engineering skills in students newly enrolled in the degree of Bachelor of Engineering (Aeronautical).

Students will actively participate in the construction and design of a light aircraft. The aircraft is to be constructed under current Civil Aviation Regulations so that students will gain an insight into all aspects of the process. By being a part of the construction team students will also experience the organisation- al requirements necessary to successfully complete a complex engineering project.

The final outcome will be that students gain an understanding of:

- Light aircraft design methods
- Innovative methods of construction
- Techniques for selecting, sizing and stressing components
- Regulatory requirements for certification
- Off-Design requirements
- Construction tolerances
- Team-work requirements in undertaking complex engineering projects.

AERO 1 6 0 0 Workshop Technology

4 credit points


Objectives/Outcomes

To develop an understanding of the fundamentals of vehicle manufacture, construction, servicing and repair. Students will develop skills working with machine tools and hand tools.

Syllabus Summary

Fitting - measurement, measuring tools, marking tools, holding tools, hammers, cutting tool materials, cutting tool shapes, the machine tools: lathe, mill, grinder, drill, shaper, deburring and finishing operations.


Heat treatment - Definition and importance of heat treatment, forging, normalising, hardening, case hardening, stress relief.

Fasteners - Types of fasteners for aircraft, riveted, bolted, bonded, locking of fasteners.

Maintenance-Requirements for various aircraft components, engine overhaul, component life, lubrication, patches and repairs, serviceability of components.
Faculty of Engineering Handbook 2001

Textbooks
Reference book: Cutler Understanding Aircraft Structures (BSP Professional, 1988)

AERO 1601 Aerospace Manufacture
6 credit points
Offered: February. Prohibition: AERO 1600 Workshop Technology. MECH 1600 Manufacturing Technology. Classes: (1 lec, one 3hr lab)/wk. Assessment: Assignments, practical work.
Objectives/Outcomes:
To develop an understanding of the fundamentals of vehicle manufacture, construction, servicing and repair. Students will develop skills working with machine tools and hand tools. To understand the concepts of project and time management and the influences of ethics, communication and responsibility in the context of Engineering practice.

Syllabus Summary:
a) Workshop Technology:
Fitting - measurement, measuring tools, marking tools, holding tools, hammers, cutting tool materials, cutting tool shapes, the machine tools: lathe, mill, grinder, drill, shaper, deburring and finishing operations.
Heat treatment - Definition and importance of heat treatment, forging, normalising, hardening, case hardening, stress relief. Fasteners - Types of fasteners for aircraft, riveted, bolted, bonded, locking of fasteners.
Maintenance - Requirements for various aircraft components, engine overhaul, component life, lubrication, patches and repairs, serviceability of components.
b) Professional Engineering:
Ethics and Responsibility. Introduction to project management, time management and planning. Communications; oral; written; effective presentation of ideas.

Textbooks
Reference book: Cutler Understanding Aircraft Structures (BSP Professional, 1988)

AERO 1701 Introduction to Aerospace Engineering
3 credit points
Offered: February. Classes: (1 lec, one 2hr tut/lab)/wk.
Assessment: Assignments, quizzes and evaluation of work undertaken during the semester.
Objectives/Outcomes:
To develop an understanding of the role of aerospace engineers within industry along with the underlying fundamentals of aerospace vehicle design, analysis performance and operation. Students will develop skills in working in groups, communication and presentation of information, solving engineering based problems.

Syllabus Summary:
Reference books
Jane's All the World's Spacecraft (Annual)
Jane's All the World's Aircraft (Annual)
Stinton The Anatomy of the Aeroplane (Collins, 1985)

AERO 2201 Fluid Mechanics 1
4 credit points
Offered: July. Prerequisite: MATH 1001, MATH 1002, MATH 1003.
Prohibition: AERO 2701 Space Engineering 1. Classes: (three lec, one 1 hr lab/tut)/wk. Assessment: Assignments, practical work, 2hr examination.


Objectives/Outcomes:
To develop an understanding of the fundamentals of fluid dynamics and its application to aircraft and related components. Students will develop a competency in tackling fluid flow problems and producing solutions for engineering applications.

Syllabus Summary:
Properties of fluids and gases; measurement and prediction of gas properties and behaviour; temperature, density, pressure, viscosity, speed of sound. Perfect gas laws. Definition of Newtonian fluid, non-Newtonian fluid, continuum and rarefied flows. Fluid behaviour, governing equations, controlling non-dimensional parameters, Reynolds number, Mach number, Froude number, Weber number, Knudsen number.
Fluid dynamics. Governing conservation of mass, momentum and energy equations; continuity, Bernoulli and Euler equations. Applications in flow rate and velocity measuring devices; venturi; pitot-static tube; orifice plate. Velocity potential equation for flow modelling; internal and external flows; prediction of surface pressure distribution; production of forces by fluid; vorticity and circulation. Definition of non-dimensional force coefficients; lift, drag and pitching moment coefficients.
Introduction to viscosity and compressibility effects. Boundary layer flows; laminar and turbulent layers; skin friction coefficient; flow separation; pressure and friction drag.
Introduction to turbomachinery.

Textbooks
Fox and McDonald, Introduction to Fluid Mechanics (5th Ed, Wiley)
Houghton and Brock Aerodynamics for Engineering Students (Edward Arnold, 1988)
Ower and Pankhurst The Measurement of Airflow (Pergamon, 1977)
AERO 2300 Mechanics of Solids 1
4 credit points
Offered: February. Prerequisite: 12 credit points of first year Maths (i.e. Maths 1001, 1002, 1003, 1005). Classes: (1 lec, one 3hrlab)/wk.
Assessment: 2hr exam and course assignments.
Objectives/Outcomes
To develop an understanding of the fundamentals of structural analysis and its application to the general field of engineering. Students will develop the ability to tackle typical structural problems and produce solutions for applications in aeronautical, mechanical and mining engineering.
Syllabus Summary
Concepts of equilibrium, compatibility, stress and strain; study of internal stress systems due to tension, bending, torsion and shear; statically determinate and indeterminate structural elements; concepts of energy methods, displacement analysis; simple buckling. Problem based applications in aerospace, mechanical, mining engineering.
Textbooks

AERO 2500 Intro Flight Mechanics and Performance
4 credit points
Offered: February. Prerequisite: MATH 1001, 1002, 1003. Classes: (3 lec, one 1hr/tut/lab)/wk. Assessment: 2hr exam, assignments.
Objectives/Outcomes
To develop an understanding of the concepts of the mechanics of flight including fundamentals of aircraft performance, stability and control. Students will learn the basic concepts and be introduced to the mathematical tools used for prediction of aircraft flight mechanics.
Syllabus Summary
Introduction to aircraft performance. General performance; steady level flight; balance of forces; take-off; climb; cruise; landing performance. Range calculations. Manoeuvre performance.
Reference books
McCormick Aerodynamics, Aeronautics and Flight Mechanics (Wiley, 1979)
Hale Aircraft Performance, Selection and Design (Wiley, 1987)
Etkin Dynamics of Atmospheric Flight (Wiley, 1972)
Roskam Airplane Flight Dynamics and Automatic Flight Controls (Roskam A&EC, 1979)

AERO 2701 Space Engineering 1
8 credit points
AERO 2500 Introductory Flight Mechanics and Performance. Classes: (4 lec, one 2hr tut/lab)/wk. Assessment: Exam (50%), assignments (50%).
Objectives/Outcomes
To develop an understanding of the environment of space, including the effects due to relevant physical phenomenon. To gain an understanding of the initial component steps to be undertaken in the design of an aerospace vehicle.
Syllabus Summary:
Introduction to instrumentation for the physical sciences, optics for communications and sensing. Electromagnetic properties of matter; Maxwell equation.
Launch system basics; introduction to fluid mechanics; basic flight mechanics and orbital mechanics. Vehicle stability and control.
Introduction to spacecraft subsystems; attitude control, structures, thermal loading, mechanisms, power generation and storage, propulsion; liquid and solid rockets. Telemetry tracking and command (TT&C), useful payloads. Space application concepts; communications, earth observation, astronomy, microgravity, exploration.
Textbooks
Reference books: to be advised

AERO 2800 Aeronautical Engineering Computing
4 credit points
Offered: February. Prerequisite: AERO 1801 Computer Engineering Applications. Classes: (1 lec, one 3hrlab)/wk.
Assessment: 2hr exam (50%), assignments(50%).
Objectives/Outcomes
To develop an understanding of the use of the computer as a tool for solution of problems in the field of aeronautical engineering. Students will develop skills in applying computer software algorithms to problems in this field. Students will learn the usefulness and applicability of many currently available software packages.
Syllabus Summary
The storage of data in efficient file or memory structures. Data retrieval; sorting; collation; statistical analysis. The generation and use of random numbers.
Use and evaluation of software packages. Wordprocessors; databases; spreadsheets; mathematical symbolic manipulation; CAD/CAM; graph plotting; engineering analysis. Definitions for user-friendly interfaces; GUI's; data format requirements.
Use of the Internet as an aeronautical research tool; email; WWW; network etiquette.
Reference books
The Student Edition of MATLAB (Prentice-Hall, 1992)

AERO 3200 Aerodynamics 1
4 credit points
Offered: February. Prerequisite: AERO 2201 Fluid Mechanics 1.
Classes: (3 lec, one 1hrtut/lab)/wk. Assessment: 2hr exam (75%), assignments (25%).
Objectives/Outcomes
To develop an understanding of the fundamental equations governing aerodynamics and their application to aeronautical problems. Students will gain skills in problem solving in area of fluid mechanics.
Syllabus Summary
Basic equations governing aerodynamics; continuity; conservation of mass and momentum; Bernoulli, Euler and Navier-Stokes equations. Application to fluid mechanics; forces on objects in a moving fluid; pressure distribution; effects of Reynolds and Mach number. Vorticity, circulation and the production of lift; Kutta-Joukowski Law. Modelling of solid bodies in potential flow; solutions for two and three dimensional shapes; Biot-Savart Law.
Aerodynamic loading on aerofoil sections, wings, fuselages and other aircraft components. Effects on aircraft performance. Performance optimisation using energy methods; excess power and specific energy calculations.
Reference books
McCormick Aerodynamics, Aeronautics and Flight Mechanics (Wiley, 1979)
Bertin and Smith Aerodynamics for Engineers (Prentice Hall 1979)
Donnmasch Airplane Aerodynamics (Pitman)
Houghton and Brock Aerodynamics for Engineering Students (Edward Arnold)
Abbott and Von Doenhoff Theory of Wing Sections (Dover 1959)
AERO 3250 Aerodynamics 2
4 credit points
Offered: July. Prerequisite: AERO 2201 Fluid Mechanics 1.
Classes: 2 lec, one 1hr tut/wk. Assessment: 2hr exam, assignments/lab reports.

Objectives/Outcomes:
To develop an understanding of the fundamental equations governing aerodynamics and their application to aeronautical problems. Students will gain skills in problem solving in area of flow theory, boundary layers and gas dynamics.

Syllabus Summary:


Reference books
Potter & Wiegert, Mechanics of Fluids, Prentice Hall
McComb Aerodynamics, Aeronautics and Flight Mechanics (Wiley, 1979)
Berlin and Smith Aerodynamics for Engineers (Prentice Hall 1979)
Houghton and Brock Aerodynamics for Engineering Students (Edward Arnold)
Liepmann and Roshko Elements of Gas Dynamics (Wiley 1957)
Schlichting Boundary Layer Theory (McGraw Hill, 1960)

AERO 3301 Aerospace Structures 1
4 credit points
Offered: February. Prerequisite: AERO 2300 Mechanics of Solids 1.
Classes: 3 lec, one hr tutorial/lab per week. Assessment: 2hr exam, assignments/lab reports.

Objectives/Outcomes:
To develop an understanding of the fundamentals of structural strength estimation. Students will gain skills in problem solving in the area of aerospace structural analysis.

Syllabus Summary:

Solid mechanics; stress and strain; linear elasticity; strain energy. Plane stress systems. Elastic vibration and buckling.

Reference books
Timoshenko Strength of Materials, Part I and II (Van Nostrand)
Langtiaar Energy methods in Applied Mechanics (Wiley)
Bruhn Analysis and Design of Flight Vehicle Structures (Tri-State Offset)
Megson Aircraft Structures for Engineering Students (Edward Arnold, 1972)

AERO 3351 Aerospace Structures 2
4 credit points
Offered: July. Prerequisite: AERO 2300 Mechanics of Solids 1.
Classes: 3 lec, one 1 hr tut/lab per week. Assessment: 2hr exam, assignments/lab reports.

Objectives/Outcomes:
To develop an understanding of the fundamentals of structural strength estimation. Students will gain skills in problem solving in the area of aerospace structural analysis.

Syllabus Summary:

Solid mechanics; thermal stresses and plasticity; applications in plane stress systems.
Structural analysis; elementary analysis of plates and stiffened panels and shells. Analysis of complex frameworks; introduction to displacement methods of analysis.

AER 3400 Aircraft Design 1
3 credit points
Offered: February. Prerequisite: MECH 2400 Mechanical Design 1.
Prohibition: AERO 3401 Aerospace Design 1.
Classes: 1 lec, one 3hr tut/wk. Assessment: Exam, tutorial assignments, major and minor design projects.

Objectives/Outcomes:
To develop an understanding of the procedures for design. Students will gain skills in designing aircraft components.

Syllabus Summary:

Introduction to design; the process of aircraft design; safety and its implications; component design; structural analysis.

Reference books
Svennson Introduction to Engineering Design (UNSW Press, 1981)
Bruhn Analysis and Design of Flight Vehicle Structures (Tri-State Offset)

AERO 3450 Aircraft Design 2
3 credit points
Offered: July. Prerequisite: MECH 2400 Mechanical Design 1.
Classes: 1 lec, one 3hr tut/wk. Assessment: Exam, tutorial assignments, major and minor design projects.

Objectives/Outcomes:
To develop an understanding of the procedures for design. Students will gain skills in designing aircraft components.

Syllabus Summary:

Optimisation; design for manufacture; joints and fasteners; vibration; fatigue; human factors, the art of design; social responsibilities.

Reference books
Svennson Introduction to Engineering Design (UNSW Press, 1981)

AERO 3500 Flight Mechanics 1
4 credit points
Offered: July. Prerequisite: AERO 2500 Introductory Flight Mechanics and Performance.
Classes: 3 lec, one 1 hr tut/lab/wk. Assessment: Exam, assignments.

Objectives/Outcomes:
To develop an understanding of dynamic behaviour of aircraft in flight. Students will gain skills in problem solving in the area of flight vehicle motion.

Syllabus Summary:

Axis systems for the description of aircraft motion. Axis transformations. The general equations of flight vehicle motion. State-Space forms of the longitudinal and lateral-directional equations of aircraft motion. Nonlinear differential equations. Trim and perturbation equations. Linearisation about trim con-
ditions. Linearised equations of longitudinal and lateral-directional motion.

Laplace transforms and their application to aeronautical dynamic system analysis. Eigenvalues and eigenvectors and their relation to the stability and behaviour of aeronautical systems. Static lateral-directional equilibrium and stability. Introduction to lateral-directional control.

Linear approximation of aerodynamic derivatives and the influence of aircraft components on stability derivatives. Longitudinal and lateral-directional dynamic stability. Frequency domain dynamic stability analysis. Time domain analysis and solutions for the flight path of a rigid body aircraft; response to control inputs.

Reference books
Etkin Dynamics of Atmospheric Flight (Wiley, 1972)
Roskam Airplane Flight Dynamics and Automatic Flight Controls (Roskam AE&EC, 1979)

AERO 3501 Flying Operations
2 credit points
Classes: Part-week course held mid-semester vacation.
Objectives/Outcomes
To develop a hands-on feel of the dynamic behaviour of aircraft in flight. Students will gain skills in flying, navigation and aircraft operating procedures.

Syllabus Summary
Flying instruction covering: level flight; turns; stall; take-off; landing; circuits; night flying; navigation, both visual and using instruments; emergency procedures and safety.

AERO 3600 Aviation Technology
4 credit points
Offered: February. Classes: (one 2hr lec, one 2hr tut/lab)/wk.
Assessment: exam(50%), assignments(50%).
Objectives/Outcomes
To develop an understanding of the background processes that are required for the design, manufacture and operation of aircraft. Students will gain skills in aerospace component manufacture, design, testing and operation.

Syllabus Summary
Survey of current practice in aviation measurement and instrumentation. Introduction to pressure, force, velocity and displacement transducers; accelerometers; anemometers; temperature sensors and strain gauges. Use of computer data acquisition systems; signal processing; filtering; A/D conversion. Digital data formats; storage requirements and accuracy limitations. Signal post processing; mean; standard deviation; analysis using FFT’s; random decrement. Calibration of sensors.

Manufacturing processes; automated machining; techniques for manufacture of non-metal components; manufacture using composite materials; properties of sealants and adhesives. Fasteners. Introduction to CAD and NC machining.


Reference books
CASA Civil Aviation Orders, parts 100 to 103.
Cutler Understanding Aircraft Structures (PSP professional, 1988)

AERO 3602 Aviation Operation and Management
4 credit points
Offered: July. Classes: (one 3hr lec/tut)/wk. This course is given by visiting lecturers who are currently associated with the aerospace industry. The availability of the course is not guaranteed each year.
Assessment: Assignments.
Third year elective unit of study for the degree in Aeronautical Engineering.

Objectives/Outcomes
To develop an understanding of the current state of aerospace manufacturing for the Australian aviation industry. Students will gain skills in aerospace engineering management.

Syllabus Summary

Textbooks
Reference books: To be advised by the Lecturer.

AERO 3700 Space Engineering 2
8 credit points
Offered: July. Prerequisite: AERO 2701 Space Engineering 1.
Classes: 4 lec, one 2hr tut/lab per week; site visits. Assessment: exam (50%), assignments(50%).
Objectives/Outcomes
Students will gain skills in solving problems typically encountered in Space Engineering. An appreciation of the complexity of space vehicle design and component integration will be gained. Methods of program management to ensure absolute quality control will be shown to have paramount importance.

Syllabus Summary
Advanced spacecraft subsystems; propellant budgets, attitude control, thermal view factor calculations, nuclear generation of power, surface tension propellant tanks, sensor and actuator sizing.

Introduction to Quality Assurance; Product Assurance.
Launch vehicle design; systems and trajectory analysis. Launch site design and operation; including environmental considerations. Earth station design, staff functions, TT&C ground segment implementation. Human spaceflight; design & operational implications. Spacecraft operation and control. Space vehicle testing; theory and practice; acoustic, vibration, thermal, thermal vacuum tests.


Textbooks
To be advised.

AERO 4200 Aerodynamics 3
3 credit points
Offered: February. Prerequisite: AERO 3250 Aerodynamics 2.
Classes: (2 lec, one 1 hr tut/lab)/wk.
Assessment: 2hr exam(50%), assignments/lab reports(50%).
Objectives/Outcomes
To develop an understanding of modern applications of aerodynamic theory. Students will gain skills in problem solving using state of the art methods for air and fluid flows.

Syllabus Summary
Panel method techniques for the solution of inviscid two and three dimensional flows. Vortex lattice; doublet/vortex panel methods. Linearised compressibility corrections. Modelling of complete aircraft configuration.

Aerodynamic section boundary layer theory; pressure gradient effects; transition from laminar to turbulent flow; laminar separation bubbles; stalled flow. Calculation of aerofoil drag using viscous/inviscid flow interaction.


Steady two-dimensional supersonic flow; shock waves; normal and oblique: method of characteristics. Two-dimensional supersonic aerofoils. Introduction to three-dimensional effects.

Reference books
McCormick Aerodynamics,Aeronautics and Flight Mechanics (Wiley, 1979)
Pankhurst and Holdon Wind Tunnel Technique (Wiley)
Bertin and Smith Aerodynamics for Engineers (Prentice Hall 1979)
Abbott and Von Doenhoff Theory of Wing Sections (Dover 1959)
Houghton and Brock Aerodynamics for Engineering Students (Edward Arnold)
AERO 4201 Propulsion
4 credit points
Offered: July. Prerequisite: MECH 3201 Thermodynamics 2. Classes: (3 lec, one 1 hr tut/lab)/wk. Assessment: 2hr exam(50%), assignments/lab reports(50%).
Objectives/Outcomes
To develop an understanding of the modern techniques used for aircraft propulsion. Students will gain skills in problem solving for aircraft propulsion systems ranging from propellers, gas-turbine engines to rockets.

Syllabus Summary
Propulsion unit requirements subsonic and supersonic flight; thrust components, efficiencies, additive drag of intakes. Piston engine components and operation. Propeller theory. Operation, components and cycle analysis of gas turbine engines; turbojets; turbofans; turboprops; ramjets. Components: compressor; fan; burner; turbine; nozzle. Efficiency of components; off-design considerations. Operation, components and thermodynamics of rocket motors. Dynamics of rocket flight; orbital velocity; staging. Future directions; minimisation of noise and pollution; sub-orbital propulsion systems; scram-jets; hybrid engines.

Reference books
McCormick Aerodynamics, Aeronautics and Flight Mechanics (Wiley, 1979)
Glaeser The Elements of Aerofoil and Airscrew Theory (C.U.P.)
Kerber Aircraft Engines and Gas Turbines (MIT Press, 1977)
Archer and Salazsy Introduction to Propulsion (Prentice-Hall 1996)

AERO 4250 Aerodynamics 4
3 credit points
Offered: July. Prerequisite: AERO 3250 Aerodynamics 2. Classes: (2 lec, one 1 hr tut/lab)/wk. Assessment: Assignments/lab reports.
Objectives/Outcomes
To develop an understanding of modern applications of aerodynamic theory. Students will gain skills in problem solving using state of the art methods for air and fluid flows.

Syllabus Summary
Unsteady supersonic one-dimensional flow. Hypersonic flow; real gas effects.
Introduction to the use of CFD for transonic flow.
Solution of internal and external problems in aerodynamics using finite element methods. Direct simulation method (DSMC); rarefied flow; near-continuum solutions.

Reference books
Bertin and Smith Aerodynamics for Engineers (Prentice Hall 1979)
Thompson Compressible Fluid Dynamics (McGraw-Hill)
John Gas Dynamics (Allyn and Bacon, 1984)
Bird Rarefied Gas Dynamics 2nd Ed (Oxford UP, 1995)

AERO 4290 Rotary Wing Aircraft
4 credit points
Offered: February. Prerequisite: AERO 3250 Aerodynamics 2. Classes: (3 lec, one 1 hr tut/lab)/wk. Assessment: course assignments and a written examination.
Objectives/Outcomes
To develop an understanding of the theory of flight, design and analysis of helicopters, autogyros and other rotary wing aircraft. Students will gain an appreciation of the extra difficulties involved when the vehicle flow is cyclic in nature.

Syllabus Summary
Introduction to rotary wing aircraft; vertical flight performance; forward flight performance; blade motion and control; dynamics of rotors; rotorcraft stability; rotor blade design.

Reference books
Branwell Helicopter Dynamics (Arnold)
Gessow and Myers Aerodynamics of the Helicopter (Mcmillan)
AERO 4291 Advanced Computational Aerodynamics
3 credit points
Offered: July. Prerequisite: AERO 3250 Aerodynamics 2. Classes: (2 lec, one 1 hr tut/lab)/wk. Assessment: Course assignments/lab assessments.
Objectives/Outcomes
To develop a specialist knowledge in the field of Computational Fluid Dynamics including an appreciation of the coding of Aerodynamics problems using these computer analysis systems.

Syllabus Summary
Explicit methods; implicit finite difference and finite volume methods. Extensions to the basic method to capture shock wave effects. Computation of one and two dimensional flows. Benchmarking of computational results against known flow solutions.

Reference books
CAJ Fletcher Computational Techniques for Fluid Dynamics Vol 1 and 2 (Springer-Verlag, 1992)

AERO 4292 Aeroelasticity
3 credit points
Offered: July. Prerequisite: AERO 3250 Aerodynamics 2. Classes: (2 lec, one 1 hr tut/lab)/wk. Assessment: Course assignments/lab assessments.
Objectives/Outcomes
To develop a specialist knowledge in the field of unsteady aerodynamics. The develop familiarity with the techniques for predicting airflow/structure interactions for high speed vehicles.

Syllabus Summary
Advanced two and three dimensional panel method techniques; calculation of oscillatory flow results; prediction of aerodynamic derivatives. Pressure distributions for complete aircraft configuration. Unsteady subsonic flow analysis of aircraft; calculation of structural modes. Structural response to gusts; aeroelasticity; flutter and divergence.

Reference books
Abbott and Von Doenhoff Theory of Wing Sections. (Dover, 1959)
Bertin and Smith Aerodynamics for Engineers (Prentice Hall, 1979)
Fung An Introduction to Theory of Elasticity (Dover, 1969)

AERO 4301 Applied Numerical Stress Analysis
6 credit points

Reference book
Cook Concepts and Applications of Finite Element Analysis (Wiley, 1989)

AERO 4303 Aerospace Structures 3
6 credit points
Offered: February. Prerequisite: AERO 3350 Aircraft Structures 2 or AERO 3351 Aerospace Structures 2. Prohibition: AERO 4301 Applied Numerical Stress Analysis. Classes: (3 lec, one 1.5 hr tut/ lab)/wk. Assessment: 2hr exam, assignments/lab reports.
Objectives/Outcomes
To develop an understanding of modern techniques for the estimation of structural strength. Students will gain skills in problem solving using state of the art methods in aerospace structural analysis.

Syllabus Summary:
Finite element method analysis of problems in structural behaviour; elastic; static; dynamic; thermal effects; transient; non-linear. Modelling structures using one, two and three dimensional elements.
Reference books
Brush and Almroth Buckling of Bars, Plates and Shells (McGraw-Hill)
Cook Concepts and Applications of Finite Element Analysis (Wiley, 1981)
Cox Design of Structures of Least Weight (Pergamon, 1965)
Heubner The Finite Element Method for Engineers (Wiley Interscience)
Madag Metal Fatigue: Theory and Design (Wiley)
Roark Formulæ for Stress and Strain (McGraw-Hill-Kogakusha)
Stanley Analysis of Aircraft Structures (Dover)
Timoshenko and Woinowsky-Krieger Theory of Plates and Shells (McGraw-Hill-Kogakusha)
Washizu Variational Methods in Elasticity and Plasticity (Pergamon)
Zienkiewicz The Finite Element Method in Engineering (McGraw-Hill)

AERO 4351 Aerospace Structures 4

3 credit points
Offered: July. Prerequisite: AERO 3351 Aerospace Structures 2, AERO 3350 Aircraft Structures 2. Classes: 2 lec, one 1 hr tut/lab/wk. Assessment: 2hr exam, assignments/lab reports.

Objectives/Outcomes
To develop an understanding of modern techniques for the estimation of structural strength. Students will gain skills in problem solving using state of the art methods in aerospace structural analysis.

Syllabus Summary
Plates and shells. Optimum structures. Buckling of Bars, plates and shells; imperfection sensitivity. Structural dynamics. Structural fatigue; principles and practice.

Reference books
Brush and Almroth Buckling of Bars, Plates and Shells (McGraw-Hill)
Cook Concepts and Applications of Finite Element Analysis (Wiley, 1981)
Cox Design of Structures of Least Weight (Pergamon, 1965)
Heubner The Finite Element Method for Engineers (Wiley Interscience)

AERO 4390 Smart Materials and Structures

3 credit points
Offered: July. Prerequisite: AERO 3351 Aerospace Structures 2, AERO 3350 Aircraft Structures 2. Classes: 2 lec, 1 h tut/lab per week. Assessment: 2 hr exam, assignments/lab reports.

Objectives/Outcomes
To develop an understanding of the modern smart materials and structures technologies. Students will gain an appreciation of the advanced technology components: sensors, actuators, and control. Central processing unit, in the implementation of Smart Structures System.

Syllabus Summary
Smart materials (Piezoelectricity, SMA, ER/MR Fluids, Magnetostriiction, Electrostriction, MEMS), Modeling single/dual piezoelectric actuation of beams and plates (Surface bonded or embedded actuators; Block force/Uniform strain/Bernoulli-Euler models; Bending/torsion models with skewed inputs); Vibration Control; Contro Schemes (single channel feedback/feed-forward control, digital filters, adaptive controllers); MEMS: Fiber Optics; Composite structures; Structural health monitoring/damage detection (Damage detection methods, vibration signature analysis for fault detection, damage classification, case study).

AERO 4400 Aircraft Design 3

6 credit points
Offered: February. Prerequisite: AERO 3450 Aircraft Design 2. AERO 3401 Aerospace Design. Classes: (1 lec, one 3 hr design class)/wk. Assessment: Design projects.

Objectives/Outcomes
To develop an understanding of the application of design to the modern aerospace industry. Students will gain an overview of how to manage a design team and will also gain skills in carrying out detailed design problems.

Syllabus Summary
System design: requirements and specification. System design procedures, systems integration.

Reference books
Torenbeek Synthesis of Subsonic Airplane Design (Delft UP)
Roskam Airplane Design (Roskam A&EC)

AERO 4490 Advanced Aircraft Design

4 credit points
Offered: July. Prerequisite: AERO 3450 Aircraft Design 2. AERO 3401 Aerospace Design. Classes: (one 3 hr design class)/wk. Assessment: Design projects.

Objectives/Outcomes
To develop an understanding of the application of design to the modern aerospace industry. Students will gain an overview of how to manage a design team and will also gain skills in carrying out detailed design problems.

Syllabus Summary
Advanced system design: modern aircraft requirements and specification. Glass cockpit design, systems integration and validation.

Reference books
Torenbeek Synthesis of Subsonic Airplane Design (Delft UP)
Roskam Airplane Design (Roskam A&EC)

AERO 4500 Flight Mechanics 2

6 credit points
Offered: February. Prerequisite: AERO 3500 Flight Mechanics 1. Classes: (4 lec, 1 tut)/wk.

Objectives/Outcomes
To develop an understanding of the application of flight mechanics to modern aircraft systems. Students will gain skills in problem solving in the areas of dynamic aircraft behaviour, control systems and aircraft handling.

Syllabus Summary
Aircraft response to deterministic and stochastic inputs. Extended aircraft models. Sources of stochastic inputs and their characteristics.
Mechanics and models of aircraft control systems, sensors, components and devices. Motion measurement, signal analysis and conditioning.
Applications of closed loop control; modification of aircraft dynamic characteristics, stability and handling; guidance, manoeuvre control and navigation. Reference input signal characteristics and design. Transient response to control inputs.
Transfer functions for complete aircraft and control systems; stability and response characteristics of the closed loop system. Aircraft handling qualities description, specification and modification.

Reference Books
Etkin Dynamics of Atmospheric Flight (Wiley, 1972)
Roskam Airplane Flight Dynamics and Automatic Flight Controls (Roskam & EC, 1979)

AERO 4590 Advanced Flight Mechanics
3 credit points
Offered: July. Prerequisite: AERO 3500 Flight Mechanics 1.
Classes: (2 lec, 1 tut/awk).

Objectives/Outcomes
To develop an understanding of the application of flight mechanics and control systems to modern aircraft. Students will gain skills in problem solving in the areas of dynamic aircraft behaviour, control systems and aircraft handling.

Syllabus Summary
Overview of aircraft dynamic system modelling.

Reference Books
Roskam Airplane Flight Dynamics and Automatic Flight Controls (Roskam & EC, 1979)

AERO 4600 Practical Experience
0 credit points
Offered: July. Prerequisite: 40 credit points of 3rd year UOS.
Classes: 12 weeks of prac work experience.

Objectives/Outcomes
To develop skills in the application of engineering theory to real industry situations. To gain experience in the actual practice of engineering.

Syllabus Summary
Each student is required to work as an employee of an approved engineering organisation and to submit a satisfactory written report of his or her work. Normally 12 weeks of practical work experience (375 hours minimum) is required and this is undertaken after the completion of some or all of the prescribed senior core courses and before enrolment in the final year of study. The University Careers and Appointments Service is available to assist students to obtain suitable employment.

AERO 4620 Aeronautical Exchange Program
24 credit points
Offered: February, July. Prerequisite: Completion of all first, second and third year core units of study in Aeronautical Engineering. Approval by Head of School of Aerospace, Mechanical and Mechatronic Engineering. Assessment: Individual units of study at an overseas university participating in an aeronautical exchange program are assessed and a weighted average mark will be calculated from this to obtain an assessment.

Objectives/Outcomes
The object of this exchange program is to give students the opportunity to study in a different cultural environment for one semester. Students will gain an understanding of the differences in technique applied in the aeronautical industry in other parts of the world. Many aerospace developments are being initiated by groups in North America or Europe and this exchange program will allow Australian students to be involved in these new areas.

Exchange Program Summary
Students spend one semester at an overseas university that is part of the approved exchange program in aerospace engineering. The course work completed at the exchange university is to be equivalent to one semester at University of Sydney. Units of study must be at the advanced undergraduate level commensurate with core units of study in the fourth year aeronautical engineering program. The specific units of study must be approved by heads of department at both institutions. A recommended subject is 'Design or Project' and students are encouraged to undertake work experience within the overseas industry where this is possible.

For details of overseas universities participating in this exchange program, contact the head of department of aeronautical engineering.

AERO 4700 Space Engineering
3 credit points
Offered: February. Prerequisite: AERO 3700 Space Engineering 2.
Classes: 3 lec, one 1 hr tut/lab per week. Assessment: Exam (50%), assignments (50%).

Objectives/Outcomes
Students will gain an appreciation of the advanced technology components required in the implementation of Aerospace Engineering. They will gain an understanding of the possibilities and future directions of these emerging technologies.

Syllabus Summary
Advanced spacecraft subsystems and design; redundancy philosophies; flight computers; magnetic torquing; star tracking. Advanced launch systems; Reuseable, Single Stage To Orbit, nuclear propulsion, mass drivers. Advanced orbit mechanics; gravity assist trajectories and other interplanetary strategies, Lagrange points, Halo orbits, gravitational models etc.
Launch vehicle selection and payload integration; coupled analysis.
Re-entry vehicle design, including application of super/hypersonic flow. An introduction to rarefied gas dynamics.
Advanced space propulsion systems; solar sailing, electric propulsion, pulsed nuclear, antimatter. Space navigation systems; GPS; GLONASS. Space based communications system architecture (GEO, LEO, MEO systems)
Project Management; Schedule, cost control, proposals, bid structure, personnel management, systems engineering, ISO 9001, and other relevant standards.
Basic Space Law and legislative issues; The Outer Space Treaty, The Space Activities Act.

Textbooks
To be advised

AERO 4900 Thesis or Design Project
10 credit points
Offered: February, July. Prerequisite: 40 Credit Points of 3rd Year UOS AERO 4980 Thesis Preparation. Classes: Literature survey, design, expt and/or analysis work over whole year. Assessment: A bound thesis document to be submitted for assessment.

Objectives/Outcomes
To develop an understanding of the practice of aeronautical engineering. Students will gain skills in design, analysis and management by undertaking a significant research project.
Each student is required to conduct one piece of experimental, theoretical or design work in greater detail than is possible in ordinary classes and to write a thesis presenting the results of these investigations.
The student is expected to design and construct (where possible) any special piece of apparatus or model that may be necessary.

AERO 4907 Interdisciplinary Thesis A
2 credit points
Offered: February, July. Prerequisite: 40 credits of 3rd year UOS.
Assessment: A Thesis Plan and Literature Review is to be submitted for assessment.

Objectives/Outcomes:
To develop an understanding of the practice of aeronautical engineering. Students will gain skills in task preparation, specification definition, communication and work schedule planning. These are the preliminary steps required to commence a significant research project.
Each student is to conduct a literature survey on a research topic of their choice. Once complete they are then required to submit a detailed task schedule for the proposed research project. The schedule should include a task completion timeline, resource specifications, and detailed designs for the project.

If the submission is considered to be satisfactory then it will be used as the basis for the research project to be undertaken in AERO 4957 Interdisciplinary Thesis B.

AERO 4920 Seminar
2 credit points
Offered: July. Prerequisite: 40 credit points of 3rd Year UOS.
Classes: A mini-conference held at the end of a week midway through the semester. Assessment: Oral presentation evaluated by peers and staff.
Objectives/Outcomes:
To develop skills in the presentation of engineering ideas. To gain skills in communication.
Each student is required to present a seminar on a selected topic. Students are also expected to take part in the discussion sessions following each presentation.

AERO 4950 Thesis Preparation
2 credit points
Offered: February, July. Prerequisite: 40 credit points of 3rd Year UOS. Classes: None. Assessment: A Thesis Plan and Literature Review to be submitted for assessment.
Objectives/Outcomes:
To develop an understanding of the practise of aeronautical engineering. Students will gain skills in task preparation, specification definition, communication and work schedule planning. These are the preliminary steps required to commence a significant research project.
Each student is to conduct a literature survey on a research topic of their choice. Once complete they are then required to submit a detailed task schedule for the proposed research project. The schedule should include a task completion timeline, resource specifications, and detailed designs for the project.
If the submission is considered to be satisfactory then it will be used as the basis for the research project to be undertaken in AERO 4900 Thesis.

AERO 4957 Interdisciplinary Thesis B
10 credit points
Offered: February, July. Prerequisite: 40 Credit Points of 3rd Year UOS AERO 4907 Interdisciplinary Thesis A. Assessment: A bound thesis document is to be submitted for assessment.
Objectives/Outcomes:
To develop an understanding of the practice of aeronautical engineering. Students will gain skills in design, analysis and management by undertaking a significant research project.
Each student is required to conduct one piece of experimental, theoretical or design work in greater detail than is possible in ordinary classes and to write a thesis presenting the results of these investigations.
The student is expected to design and construct (where possible) any special piece of apparatus or model that may be necessary.

Chemical Engineering

CHNG 1001 Chemical Engineering Applications
4 credit points
Offered: February. Classes: One (2 hr) lecture/tutorial per week plus one (3 hr) laboratory or plant visit per week for one semester. Assessment: Laboratory reports (30%), industrial visits (10%), lecture reports (15%), final examination (45%). First year core unit of study for the degree in Chemical Engineering.

What Is Chemical Engineering? Obtain some overview of Chemical Engineering; of the process industries in Australia; of what chemical engineers do and the challenges they face. Meet some Chemical Engineers.

Laboratory
Find out about the construction, methods of fabrication, selection of materials of construction, and the operation of common chemical process plant hardware; giving attention to the importance of costs, safety, operability and reliability. Learn about the key steps in engineering communication.

Industrial Practice
Understand how chemical engineering works in practice by seeing what real plants and their equipment look like, what these plants do, and why. Student will develop skills in equipment handling; in communication, written and oral; in individual and group working; in peer assessment.

Syllabus Summary
(a) What is chemical engineering? A survey of the nature of chemical engineering, of the nature of the Australian process industries, and of the main professional activities of chemical engineers. Lectures are given by invited speakers from government, industry and academia. Visits to works in the Sydney region are undertaken with tutorial exercises based on these visits.
(b) Chemical engineering applications laboratory. An appreciation of (i) the methods and materials of construction of items of process equipment, (ii) the role of this equipment in building up an entire chemical processing plant, (iii) its operation and maintenance and (iv) safety requirements and procedures. Students will dismantle, reassemble and operate items of process equipment. They will present written answers to questions, supplemented by drawings of process flowsheets, diagrams of dismantled equipment, and discussions of heat and mass balances and of process parameter values.

CHNG 1101 Chemical Engineering 1A
4 credit points
Offered: February. Classes: Two (1 hr) lectures; plus one (2 hr) tutorial per week for one semester. Assessment: One 3hr exam at end of semester plus continuous assessment of assignments. First year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
This is a first unit in chemical engineering calculations. It aims to teach students how they should formulate and solve mass balances on chemical process systems. It also introduces students to introductory flowsheet analysis.

Syllabus
The unit consists of a series of tutorial exercises by which students are exposed to a range of typical problems on process systems; and then some larger projects which allow students to apply the approaches and procedures that they have learned to more realistic and complex applications.
The lectures introduce and complement the tutorials. Topics covered in the lectures include: unit systems and unit conversion; properties of fluids; mass balance calculations on flow systems; combustion processes; calculation of equilibrium compositions of reacting systems; vapour pressure and humidity.

CHNG 1102 Chemical Engineering 1B
4 credit points
Offered: July. Prerequisite: CHNG 1101 Chemical Engineering 1A. Classes: 2 hours of tutorials per week. Assessment: Assignments; final examination. First year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
This is a first unit in chemical engineering calculations. It aims to teach students how they should formulate and solve energy balances on chemical process systems. It completes the analysis of typical industrial flowsheets by including both mass and energy balances.

Syllabus
The unit consists of a series of tutorial exercises by which students are exposed to a range of typical problems on process systems; and then some larger projects which allow students to apply the approaches and procedures that they have learned to more realistic and complex applications.
The lectures introduce and complement the tutorials. In addition, the lectures cover the following topics: the First Law of
Thermodynamics applied to flow systems; thermodynamic properties; enthalpy, internal energy, heat capacities; calculations for ideal gas and liquid systems; thermochemistry; adiabatic flame temperature; equilibrium in adiabatic reactors; heats of solution and mixing.

CHNG 1201 Chemical Process Case Studies
4 credit points
Offered: July. Classes: 4 hours of lectures / tutorials per week for one semester. Assessment: Tutorials, assignments, final examination.
First year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
To develop an understanding of:
- The chemistry of industrial processes.
- The economic aspects of the industry.
- Process flowsheets.
- Modern environmental concerns.

Syllabus Summary
An introduction to the major processes of the modern chemical industry. An overview of the process chemistry involved, the process flowsheet, together with design, control and optimisation needs. The economic and environmental constraints that shape the industry. The case study format will be used to develop a number of professional skills in the student - team work, use of library and computer resources and presentation skills.

CHNG 1301 Computing for Chemical Engineers 1A
4 credit points
Offered: February. Classes: One (1 hr) lecture and one (2 hr) tutorial per week for one semester. Assessment: Tutorial assessment and a final examination.
First year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
To develop a basic understanding of personal computers and their use in solving engineering problems.

Syllabus Summary
Introduction to personal computers. Use of spreadsheet packages for carrying out data manipulation, numerical calculations and graphing. Application to chemical engineering problems.

CHNG 1302 Computing for Chemical Engineers 1B
4 credit points
Offered: July. Prerequisite: Advisory prerequisite: CHNG 1301
Computing for Chemical Engineering 1A. Classes: Two lectures and one tutorial per week for one semester. Assessment: assessed on pass/fail basis - 100% tutorial performance.
Objectives/outcomes: to develop a basic understanding of the Matlab computing environment and its use in solving chemical engineering problems.

Syllabus summary:
- Review of linear algebra
- Introduction to Matlab
- Matlab functions
- Interpolation and curve fitting
- Applications (of the above) to chemical engineering problems

Textbooks

CHNG 2101 Chemical Engineering 2A
4 credit points
Offered: February. Classes: Two lectures and one tutorial per week; three laboratory sessions in total. Assessment: Laboratory reports; project reports; design competition; final written examination.
Second year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
This unit seeks to introduce students to basic concepts of fluids handling relevant to the process industries. Students will meet simple equipment design problems in this area and will apply their understanding to measurements and analysis of laboratory plant. Satisfactory completion of the course will prepare students for more advanced courses in fluids and in the integration of fluid flow with heat and mass transfer.

Students will develop generic skills in:
- technical problem solving
- scaling and thinking non-dimensionally
- operating and analysing process plant

Syllabus Summary
Fluid statics - applications to pressure measurement; forces on storage vessels. Inviscid flow theory - Bernoulli’s equation; flow friction; flow measurement. Laminar flow - force balance; analytical solutions for velocity profile. Turbulent flow - dimensional analysis, friction factor. Pumping - ideal pumps; pump selection; net positive suction head. Pipe networks.

CHNG 2102 Chemical Engineering 2B
4 credit points
Offered: July. Classes: Two lectures and one tutorial per week; three laboratory sessions in total. Assessment: Laboratory reports; project reports; design competition; final written examination.
Second year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
This unit seeks to introduce students to basic concepts of how heat energy is transferred, especially to and from fluids; similarly the concept of mass transfer and its conceptual relationship to heat transfer is introduced. This unit introduces the concept of chemical engineering rate processes and their importance in selecting and designing process equipment; students will meet simple equipment design problems in this area and will develop their understanding through measurements and analysis of laboratory plant. Satisfactory completion of the course will prepare students for more advanced courses in fluids and in the integration of fluid flow with heat and mass transfer. A light-hearted design exercise brings the student body together, encouraging them to apply their understanding to unusual problems and to think laterally.

Students will develop generic skills in:
- technical problem solving
- scaling and thinking non-dimensionally
- working in small groups on unusual problems.

Syllabus Summary
Heat transfer: Conduction; convection - the heat transfer coefficient, dimensional analysis. Correlations for pipe flow, external flows, natural convection. The overall heat transfer coefficient.
Simple heat exchangers.
Mass Transfer: Diffusion; convection - the mass transfer coefficient, dimensional analysis, analogy with heat transfer. Correlations. The overall mass transfer coefficient. Mass transfer in dilute absorbers. Simultaneous heat and mass transfer.

CHNG 2301 Chemical Engineering Computations
4 credit points
Second year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
To develop an understanding of:
- Chemical engineering problem analysis.
- Computational techniques in problem solving.
- Software applications.
- Students will develop skills in:
  - Using computers.
  - Solving engineering problems.
  - Developing and using computer software.

Syllabus Summary
and extension of first-year statistics and computing with an emphasis on chemical engineering applications.

**CHNG 2302 Process Data Management**
4 credit points

*Offered:* February.  *Classes:* 4 hrs/week of lectures and tutorials for one semester. *Assessment:* Tutorial assignments and a final examination.

Year 2 elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**
It is expected that students will understand the basic principles of statistical data analysis and usage.

**Syllabus Summary**
Data gathering and uses; data quality; data filtering; frequency distributions; averages and measures of dispersion; statistical inference; hypothesis testing; analysis of variance; least-squares fitting; linear regression; data reconciliation; control charts; statistical software packages.

**CHNG 2501 Environmental Chem Eng Fundamentals**
4 credit points

*Offered:* July.  *Classes:* Two (1 hr) lectures and one (1 hr) tutorial per week for one semester. *Assessment:* Tutorial assignments (both individually and in small groups) and two projects. Second year core unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**
- To develop an awareness of the various concepts which underpin sustainable development;
- To explore the role of chemical and process engineers in promoting sustainable development;
- To explore tools and approaches for quantifying industry’s environmental performance.

**Syllabus Summary**
- Sustainability - its biophysical, economic and social dimensions;
- A thermodynamic analysis of the industrial economy;
- Industry’s “triple bottom line” accountability;
- Environmental resource management - air, water, and land pollution;
- Australian industry and sustainability;
- Industry case studies - successes and failures.

**CHNG 2502 Clean Products and Processes**
4 credit points

*Offered:* July.  *Prerequisite:* advisory prerequisite: CHNG 2501.  *Classes:* Two (1 hr) lectures and one (1 hr) tutorial per week for one semester. *Assessment:* Tutorial assignments (both individually and in small groups) and two projects. Year 2 elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**
- To develop a systems analysis view of industry’s environmental performance;
- To distinguish between ‘cleaner technology’ and ‘clean-up’ technology;
- To develop tools and approaches for the design of cleaner processes.

**Syllabus Summary**
- Limitations of clean-up technologies;
- From products to processes to services;
- Cleaner technology, Life Cycle Assessment and industrial ecology;
- Waste minimisation hierarchy;
- Process synthesis with environmental objectives;
- Design for sustainability - micro and macro dimensions;
- Case studies: (a) resource industries; (b) chemical and process industries; (c) small and medium scale industries.

**CHNG 2601 Materials and Corrosion**
4 credit points

*Offered:* July.  *Classes:* 2hr of lec & tut/wk. *Assessment:* One 2hr exam.

Core unit for the degree in Chemical Engineering.

**Syllabus summary**

**Textbooks**

**Reference books**
Unrig and Revie Corrosion and Common Control 3rd edn (Wiley, 1985)

Pourbaix Atlas of Electrochemical Equilibria in Aqueous Solutions (NACE, 1974)

**CHNG 2701 Fundamentals of Bioprocess Engineering 1**
4 credit points

*Offered:* February.  *Prerequisite:* Advisory prerequisite: CHEM 1101, CHEM 1201.  *Classes:* one lecture per week and two tutorial/project/lab sessions per week for one semester. *Assessment:* Tutorials 35% projects 35% and final examination 30%.

Second year elective unit of study for the degree in Chemical Engineering.

**Objectives**
To understand the major metabolic pathways of the cell.
- To understand the role of biochemistry in Biochemical Engineering.
- To understand how chemical engineering fundamentals are relevant to the study of biochemistry.

**Syllabus**
Major macromolecules of the cell: carbohydrates, proteins, lipids, nucleic acids.
- Enzymes: structure and function, enzyme kinetics, enzyme recovery and purification.
- Major metabolic pathways: carbohydrate metabolism, citric acid cycle, lipid metabolism, oxidative phosphorylation, nitrogen metabolism.

**Textbooks**
Biochemistry, L. Stryer 4th edition, WH Freeman and Co. NY

**CHNG 2702 Fundamentals of Bioprocess Engineering 2**
4 credit points

*Offered:* July.  *Prerequisite:* advisory prerequisite: CHEM 1101, CHEM 1201.  *Classes:* one lecture and two tutorial/project/labs per week for one semester. *Assessment:* Laboratory 35% projects 35% and final examination 30%.

Second year elective unit of study for the degree in Chemical Engineering.

**Objectives**
To study practical aspects of the application of biochemistry to industrial processes.

**Syllabus**
Molecular biology basic concepts; Introduction to Immunology; Biochemistry and medicine.

**Laboratory projects**
Enzyme reactions, Protein separation, Electrophoresis, Chromatography.

**Textbooks**

**CHNG 3001 Chemical Engineering Laboratory**
4 credit points

*Offered:* February.  *Prerequisite:* Advisory prerequisite: CHNG 2101 Chemical Engineering 1A; CHNG 2102 Chemical Engineering 2B.  *Classes:* Laboratory sessions as scheduled. *Assessment:* Written laboratory reports (including skills assessment in planning and executing experiments) and oral presentation of work.

Third year core unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**
To develop skills in the following:
- the planning and conducting of laboratory-scale experiments.
- report writing and oral presentations.
Syllabus Summary
This laboratory course complements the various "Unit Operations" courses in 3rd Year.

As part of the preparation for any experiment, a student will be expected to undertake the following:

• be familiar with the background theory
• understand the operation of the experimental apparatus
• define the experimental aim, the range of measurements to be made and how these measurements will be processed.

Considerable importance is attached to the analysis and interpretation of the experimental data and to the writing of a clear, logical and concise technical report.

CHNG 3041 Exchange Program 3A
24 credit points
Offered: February, July. Prerequisite: Completion of all Year 1 and 2 core units of study in Chemical Engineering, and at least 96 credit points towards the degree. Approval of the Heads of Department of Chemical Engineering at the University of Sydney and the host institution. Assessment: Individual approved subjects at the host institution are assessed according to their standard procedures and a composite mark is derived from the weighted average of those assessments.
Year 3 elective unit of study for the degree in Chemical Engineering.

Objectives/Outcomes
The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program.

Upon completion of the full year-long exchange (ie both CHNG 3041 and 3042), students will have completed work at least equivalent to Year 3 in the Chemical Engineering degree, including in particular all Year 3 units of study.

CHNG 3042 Exchange Program 3B
24 credit points
Offered: February, July. Prerequisite: Completion of all Year 1 and 2 core units of study in Chemical Engineering, and at least 96 credit points towards the degree. Approval of the Heads of Department of Chemical Engineering at the University of Sydney and the host institution. Assessment: Individual approved subjects at the host institution are assessed according to their standard procedures and a composite mark is derived from the weighted average of those assessments.
Year 3 elective unit of study for the degree in Chemical Engineering.

Objectives/Outcomes
The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program.

Upon completion of the full year-long exchange (ie both CHNG 3041 and 3042), students will have completed work at least equivalent to Year 3 in the Chemical Engineering degree, including in particular all Year 3 units of study.

CHNG 3101 Unit Ops (Heat Transfer)
4 credit points
Offered: July. Prerequisite: Advisory prerequisite: CHNG 2101 Chemical Engineering 2A; CHNG 2102 Chemical Engineering 2B. Classes: One (1 hr) lecture and one (2 hr) tutorial per week for one semester. Assessment: Tutorial work, project report, and a final examination.
Third year core unit of study for the degree in Chemical Engineering.

Objectives/Outcomes
To develop an understanding of how basic heat-transfer theory is applied to the performance analysis and design of heat-transfer equipment.

Syllabus Summary

CHNG 3102 Unit Ops (Mass Transfer)
4 credit points
Offered: February. Prerequisite: advisory prerequisites: CHNG 2101 Chemical Engineering 2A; CHNG 2102 Chemical Engineering 2B. Classes: Two (1 hr) lectures and one (1 hr) tutorial per week for one semester. Assessment: Tutorial assignments (both individually and in small groups) and a final examination.
Third year core unit of study for the degree in Chemical Engineering.

Objectives
To develop an appreciation of several industrially important mass transfer operations (such as drying, distillation, gas absorption and extraction).

To be able to analyse and design equipment used for such mass transfer operations.

Syllabus Summary
The industrial importance of mass transfer operations. Mass transfer as an equilibrium stage process. Vapour-liquid equilibrium (ideal and non-ideal), x-y and T-x-y diagrams. Flash distillation. Analysis and design of binary distillation columns as equilibrium stage processes. McCabe-Thiele diagrams. Analysis and design of other mass transfer operations (such as gas absorption) as equilibrium stage processes. Computer-based physical property packages and mass transfer calculations.

CHNG 3103 Unit Ops (Particle Mechanics)
4 credit points
Offered: July. Prerequisite: advisory prerequisites: CHNG 2101 Chemical Engineering 2A; CHNG 2102 Chemical Engineering 2B. Classes: Three (1 hr) lectures/tutorials per week for one semester. Assessment: Assignments, and a final examination.
Third year core unit of study for the degree in Chemical Engineering.

Objectives/Outcomes
To develop an understanding of the following:
• The characteristics of particles.
• The processing of particulate systems.

Syllabus Summary
Introduction to particulate systems, particle size and shape parameters, size distributions and statistical properties, test sieve analysis. Screening, particle-screen mechanics, efficiency of screening. Size reduction, energy requirements, classical laws, product size distribution. Motion of a particle in a fluid, terminal velocity, hindered settling. Phase separations, classification, elutriation, thickening, cyclones, centrifuging. Motion of fluids in particle beds, filtration, filters.

CHNG 3104 Unit Ops (Fluid Mechanics)
4 credit points
Offered: February. Prerequisite: advisory prerequisites: CHNG 2101 Chemical Engineering 2A; CHNG 2102 Chemical Engineering 2B. Classes: Four hours of lectures and tutorials per week for one semester. Assessment: Tutorial assignments and final examination.
Third year core unit of study for the degree in Chemical Engineering.

Objectives/Outcomes
To develop an understanding of:
• non-Newtonian flows
• compressible fluid flow
• other fluid flows

Students will develop skills in:
• solving problems in non-Newtonian flow
• solving problems in compressible fluid flow
• understanding the unusual phenomena in some non-Newtonian and compressible flow situations
• designing power inputs to agitated vessels.

CHNG 3105 Thermodynamics 1
4 credit points

Offered: February. Prerequisite: advisory prerequisites: CHNG 2101 Chemical Engineering 2A; CHNG 2102 Chemical Engineering 2B. Classes: Two (1 hr) lectures plus one (1 hr) tutorial per week for one semester. Assessment: Assignments; final examination.

Third year core unit of study for the degree in Chemical Engineering.

Objectives/Outcomes

The major objectives are:

(i) To understand the theoretical basis for equilibrium in multiphase systems and reacting systems.

(ii) To introduce the thermodynamic concepts: chemical potential, fugacity, activity, and excess properties.

(iii) To predict the behaviour and compositions of liquids and vapours in equilibrium.

(iv) To predict the composition of systems in chemical equilibrium.

Syllabus

Criteria for equilibrium. Extension of the fundamental property relationship to multicomponent systems. Thermodynamic properties: Gibbs Free Energy, chemical potential, fugacity; calculation of fugacities of pure components from equations of state. Calculation of residual enthalpies and entropies using volume-explicit equations (e.g. the virial equation in volume-explicit form); application of pressure-explicit equations of state in computer methods for property prediction.

CHNG 3106 Thermodynamics 2
4 credit points

Offered: July. Prerequisite: Advisory prerequisite: CHNG 3105 Thermodynamics 1. Classes: Two (1 hr) lectures plus one (1 hr) tutorial per week for one semester. Assessment: Assignments; final examination.

Third year core unit of study for the degree in Chemical Engineering.

Objectives/Outcomes

The major objectives are:

(i) To understand the theoretical basis for equilibrium in multiphase systems and reacting systems.

(ii) To predict the behaviour and compositions of liquids and vapours in equilibrium.

(iii) To predict the composition of systems in chemical equilibrium.

Syllabus


Solution properties: Liquid models; partial molal properties; excess properties; activity coefficients. Stability of liquid solutions.
CHNG 3401  Project Economics
4 credit points
Offered: July. Classes: Two (1 hr) lectures and one (1 hr) tutorial per week for one semester. Assessment: Tutorial assignments plus final examination.

Third year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
To develop a basic understanding of the role that economic considerations have in industrial projects.
Syllabus Summary
The assessment of projects using economic criteria: taxation, capital and depreciation; manufacturing costs and capital cost determination. Comparison of alternatives, allowing for risk and uncertainty, project finance.

CHNG 4001  Practical Experience
0 credit points
Offered: July. Prerequisite: advisory prerequisite: 28 credit points of 3rd year units. Classes: There are no formal classes. Students are required to obtain 10 weeks of practical work experience before entering their 4th Year. Assessment: By submission of a report of approximately 2500 words on the industrial experience undertaken. The report will cover the nature of the industry, the company's organisational relationships both internally and externally and a technical section devoted to the work performed by the student. The report is to be submitted before the end of the first week of the 4th academic year.

Fourth year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
To obtain first-hand experience of the way chemical engineering skills are employed in an industrial context.
Syllabus Summary
Each student is required to work as an employee of an approved organisation and to submit a report on that work. The employment undertaken must be relevant to Chemical Engineering and should be discussed before acceptance with a member of the Department of Chemical Engineering. While the responsibility for obtaining satisfactory employment rests with the student, the Department, through the Chemical Engineering Foundation, and the Careers and Appointments Service will assist wherever possible.

CHNG 4002  Thesis
8 credit points
Offered: February. Prerequisite: Advisory prerequisite: Students should have completed (or be enrolled in) all other 4th Year core units. Classes: No formal classes. The thesis supervisor will be available for discussion at agreed times but the student is expected to work on his/her own initiative. Assessment: Written thesis and seminar.

Fourth year core unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
To obtain an understanding of how to define, undertake and report on an open-ended piece of supervised research work.
Syllabus Summary
Students are asked to write a thesis based on a modest (but significant) research project, which is very often some aspect of a staff member's research interests. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility studies, or the design, construction, and testing of equipment. In undertaking the project, the student will learn how to examine published and experimental data, set objectives, organise a program of work, and analyse results and evaluate these in relation to existing knowledge. The thesis will be judged on the extent and quality of the student's original work and particularly on how critical, perceptive, and constructive he or she has been, in assessing his/her own work and that of others.

Students are required to give a seminar, explaining the aims and achievements of their thesis.

CHNG 4003  Advances in Chemical Engineering A
4 credit points
Offered: February, July. Classes: Two (1 hr) lectures plus one (1 hr) tutorial per week for one semester. Assessment: Assignments; final examination.

Fourth year elective unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
The objective of this unit is to provide students with exposure to the latest developments in research and technology.
Syllabus
This unit will discuss the impact of current research and new technology on the profession of chemical engineering. It will address the changes that are taking place in industrial processes as a result of these new technologies. The syllabus details will change from time to time as specialist lecturers become available.

CHNG 4004  Advances in Chemical Engineering B
4 credit points
Offered: July. Classes: Two (1 hr) lectures plus one (1 hr) tutorial per week for one semester. Assessment: Assignments; final examination.

Fourth year elective unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
The objective of this unit is to provide students with exposure to the latest developments in research and technology. It will address the changes that are taking place in industrial processes as a result of these new technologies. The syllabus details will change from time to time as specialist lecturers become available.

CHNG 4006  Professional Option
2 credit points
Offered: July. Prerequisite: advisory prerequisites: Passed at least 144 credit points. Classes: There are no formal classes for this course. Assessment: See Syllabus description.

Fourth year elective unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
The objective of this course is to provide students with experience in how to prepare and present a technical report.
Syllabus
This course requires a student to carry out an assignment related to the profession of chemical engineering - this will normally consist of a discussion of the design or operation of an industrial process. The discussion will be presented in the form of a written report, as a seminar, or both.

CHNG 4041  Exchange Program 4A
24 credit points
Offered: February, July. Prerequisite: Completion of all Year 1, 2 and 3 core units of study in Chemical Engineering, and at least 144 credit points towards the degree. Approval of the Heads of Department of Chemical Engineering at the University of Sydney and at the participating exchange institution. Assessment: Students spend one academic year at the host institution where they take a normal load. Their specific course choices are approved by the Heads of Department of the two institutions. Individual approved subjects at the host institution are assessed according to their standard procedures and a composite mark is derived from the weighted average of these assessments.
Year 4 elective unit of study for the degree in Chemical Engineering.
Objectives/Outcomes
The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program.

Upon completion of the full year-long exchange (ie both CHNG 4041 and 4042), students will have completed work at least equivalent to Year 4 in the Chemical Engineering degree,
including in particular the Year 4 core units of study, and will have fulfilled all the requirements of their degree from the University of Sydney.

**CHNG 4042 Exchange Program 4B**

24 credit points

**Offered:** February, July. **Prerequisite:** Completion of all Year 1.2 and 3 core units of study in Chemical Engineering, and at least 144 credit points towards the degree. Approval of the Heads of Department of Chemical Engineering at the University of Sydney and at the participating exchange institution. **Assessment:** Students spend one academic year at the host institution where they take a normal load. Their specific course choices are approved by the Heads of Department of the two institutions. Individual approved subjects at the host institution are assessed according to their standard procedures and a composite mark is derived from the weighted average of these assessments.

Year 4 elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program.

Upon completion of the full year-long exchange (ie both CHNG 4041 and 4042), students will have completed work at least equivalent to Year 4 in the Chemical Engineering degree, including in particular the Year 4 core units of study, and will have fulfilled all the requirements of their degree from the University of Sydney.

**CHNG 4101 Separation Processes**

4 credit points

**Offered:** July. **Prerequisite:** Advisory prerequisites: CHNG 3101, CHNG 3102, CHNG 3103, CHNG 3104. **Classes:** Four hours of lectures and tutorials per week for one semester. **Assessment:** Tutorial assignments and final written examination.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

To develop an understanding of:

- multicomponent distillation;
- separation in non-ideal liquid systems;
- membranes and treatment of waste water.

Students will develop skills in:

- solving multicomponent distillation problems;
- investigating azeotropes;
- developing process flowsheets for difficult separation systems;
- solving wastewater cleanup problems.

**Syllabus Summary**


**CHNG 4102 Transport Phenomena**

4 credit points

**Offered:** July. **Classes:** 4 hrs/week consisting of a mixture of lectures and practical sessions. **Assessment:** In-class assessments, assignments and project work.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

To develop an understanding of the equations which govern momentum, heat and mass transfer and ways of solving them.

Students will develop skills in:

- solving ordinary and partial differential equations
- unifying heat, mass and momentum transfer concepts

**Syllabus Summary**

Constitutive equations for momentum, heat and mass transfer. Analogies between momentum, heat and mass transfer. Diffusion, forced convection, and natural convection laminar and turbulent flow. Solution of flow problems using a computational package.

**CHNG 4103 Advances in Polymer Engineering**

4 credit points

**Offered:** July. **Classes:** 3 hrs of lectures/tutorials per week for one semester. **Assessment:** Tutorials, assignments, final examination.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

To develop an understanding of:

- How polymeric resins are manufactured.
- Polymer properties in engineering application.
- Polymer processing in manufacturing.
- How polymers are recycled.

Students will develop skills in:

- Laboratory and conceptual work.
- Verbal and written communication (project work).
- Solving engineering problems involving polymers.

**Syllabus Summary**

Basic structure and properties of polymers. Application of chemical engineering fundamentals including reaction engineering and kinetics to produce polymer resins from monomers. Engineering principles of polymer processing and shaping by extrusion, injection moulding, blow moulding, calendering and film blowing to obtain value-added products such as sheets, tubes, car parts, bottles, fibres for clothes, etc. Case studies with nylon, polyester, polyethylene will be treated in detail. Selecting polymers for engineering applications based on chemical, mechanical, thermal and flow behaviour. Recycle and reuse of polymers.

**CHNG 4104 Reaction Engineering 2**

4 credit points

**Offered:** July. **Prerequisite:** Advisory prerequisite: CHNG 3107 Reaction Engineering 1. **Classes:** Two (1 hr) lectures and one (2 hr) tutorial per week. **Assessment:** Tutorials (20%), assignment (20%) and a final examination (60%).

Fourth year unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

Extend knowledge of homogeneous, isothermal, ideal reactors undertaking single reactions to non-isothermal reactions, multiple reactions, heterogeneous reactions and non-ideal reactors.

Further develop problem solving skills by a tutorial based course where the problem solving requires the student to:

(a) Define the problem statement.
(b) Set up the equations which define the system.
(c) Select the appropriate numerical method / computer package to solve the equations.
(d) Present and discuss the results obtained and their implications with respect to the problem statement.

**Syllabus Summary**

Temperature effects; multiple reaction(s); non-ideal reactor(s); heterogeneous reactions; non-catalytic, catalytic, multiphase reactions.

**CHNG 4105 Advanced Thermodynamics**

4 credit points

**Offered:** February. **Prerequisite:** Advisory prerequisites: CHNG 3105 and CHNG 3106. **Classes:** Three hours of lectures and tutorials per week for one semester. **Assessment:** May vary from year to year.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

This subject will provide students with information and knowledge on advanced aspects of thermodynamics. It will consider the application of this material to process simulation and design.
Syllabus Summary: A selection of advanced thermodynamic topics that may include: - multiphase equilibrium; - multicomponent equilibrium; - computation of the conditions for equilibrium; - cubic equations of state; - mixing rules; - thermodynamics of polymer models; - group contribution of Rorey’s lattice model and the mean field lattice gas model.

The syllabus details may change as specialist lecturers become available.

**CHNG 4201 Chemical Engineering Design 1**
4 credit points

*Offered:* February.  *Classes:* 4 hours of lectures and tutorials per week for one semester.  *Assessment:* Tutorial assignments and a final examination.

Fourth year core unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

To develop an understanding of:
- concepts in process flowsheeting
- use of computer packages
- optimisation of the process; heat exchanger networks.

Students will develop skills in:
- development of the process flowsheet
- solving flowsheet problems using computer packages
- designing heat exchanger networks
- awareness of cost optimisation.

**Syllabus Summary**


**CHNG 4202 Chemical Engineering Design 2**
8 credit points

*Offered:* July.  *Classes:* Approximately 8 hours of informal classes, design and library work per week for one semester.  *Assessment:* Design report and contribution to design group.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

To develop an understanding of:
- full chemical engineering design study;
- preparation of a full design report.

Students will develop skills in:
- designing a complete chemical plant;
- working in a design group;
- interacting with a consultant;
- writing a design report.

**Syllabus Summary**

The preparation of a detailed design project: flowsheet selection, heat and mass balances, detailed equipment design and costing, hazard assessment and hazard operability studies, environmental impact and project financial analysis.

**CHNG 4203 Major Industrial Project**
24 credit points

*Offered:* February.  *Prerequisite:* Passed at least 144 credit points.  Students wishing to do this unit of study are required to discuss the matter with the Head of Department prior to enrolment.

Fourth year elective unit of study for the degree in Chemical Engineering.

The objective of this unit of study is to provide students with experience in carrying out a major project within an industrial environment, and in preparing and presenting detailed technical reports (both oral and written) on their work.

**Syllabus**

The major component of this unit of study is the conduct of a project in industry under joint University/industry supervision. The project will encompass many of the features of CHNG 4002 Thesis, but will be larger in scope. The student will be required to submit a bound report to both the University and any company involved.

In addition, students will be required to incorporate in their work industry case studies in core curriculum areas of their degree program, as determined by the Head of Department. Students are expected to show a proficiency in each of these case studies comparable with that which would be achieved in the units of study they are replacing. The Major Industrial Project may not then be counted with the units of study corresponding to the selected case study areas. Case studies which may be required are:

1. Case Studies in Process Design and Simulation (in lieu of CHNG 4201 Chemical Engineering Design 1)
2. Case Studies in Project Management (in lieu of CHNG 4401 Project Engineering)

**CHNG 4301 Advanced Fluid Dynamics Modelling**
4 credit points

*Offered:* July.  *Classes:* Four hours per week consisting of a mixture of lectures and practical sessions.  *Assessment:* Assignments and project work.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

To develop an understanding of current computational models of fluid flow and its associated physics.

Students will develop skills in:
- using a CFD package;
- breaking a complex problem into simpler pieces;
- solving real problems.

**Syllabus Summary**

This course will familiarise students with modern developments in computational fluid dynamics (CFD) modelling. It will contain a review of the basic equations and introductions to mesh generation, solution methods, graphical analysis of results, turbulence modelling, multiphase flows, combustion, non-Newtonian flow and chemical reactions. The course will comprise a mixture of theory and practical use of a CFD package.

**CHNG 4304 Process Control 2**
4 credit points

*Offered:* February.  *Prerequisite:* CHNG 3302 Process Control 1.  *Classes:* Four hours of lectures, tutorial and laboratory work per week for one semester.  *Assessment:* Tutorial assignments, laboratory reports and a whole semester project.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

It is expected that students will become familiar with a variety of advanced control strategies, their experimental application, as well as receiving training in Distributed Control System configuration and use.

**Syllabus Summary**


**CHNG 4305 Process Systems Engineering**
4 credit points

*Offered:* July.  *Prohibition:* CHNG 4303 Optimisation Techniques.  *Classes:* Two (1 hr) lectures and one (1 hr) tutorial per week for one semester.  *Assessment:* Tutorial work, project reports and a final examination.

Fourth year elective unit of study for the degree in Chemical Engineering.

**Objectives/Outcomes**

To develop skills in integrating process modelling, simulation, design, optimisation and control concepts.

**Syllabus Summary**

Introduction to process systems engineering. Cost-benefit analysis. Process modelling (steady-state and dynamic) and simulation. An introduction to the techniques of systematic process
design. Process optimisation (theory and applications) and advanced control concepts. Available computer packages for these various applications.

**CHNG 4401 Project Engineering**  
4 credit points  
**Offered:** February. **Classes:** 4 hours of lectures, seminars and discussions per week for one semester. **Assessment:** Tutorial assignments, seminar presentations and a final examination.  
Fourth year core unit of study for the degree in Chemical Engineering.  
**Objectives/Outcomes**  
To obtain an appreciation of the techniques employed in the successful management of an industrial project.  
**Syllabus Summary**  
Principles of project management, Management of large projects or a portfolio of small projects - including planning techniques, organisation and control. Management of commissioning and start-up of process plant, and of plant maintenance. Preparation and delivery of oral presentations on technical subjects. Introduction to occupational safety, safety management systems, management of environmental performance, safety during shutdowns, quality assurance and principles of Total Quality Management. The concept of ‘completed staff work’. Introduction to process plant production management. Individual and team approaches to solving standard and open-ended problems.

**CHNG 4402 Process Plant Risk Management**  
4 credit points  
**Offered:** February. **Classes:** Two (1 hr) lectures and one (1 hr) tutorial per week for one semester. **Assessment:** Tutorial work, project reports and a final examination.  
Fourth year core unit of study for the degree in Chemical Engineering.  
**Objectives/Outcomes**  
To develop an understanding of the central concepts underlying risk management, and the quantification and reduction of such risks in the engineering field.  
**Syllabus Summary**  

**CHNG 4403 Engineering Business Skills**  
4 credit points  
**Offered:** July. **Classes:** Three hours per week of group work with a (nominated) company for one semester. **Assessment:** Group report and a final examination.  
Fourth year elective unit of study for the degree in Chemical Engineering.  
**Objectives/Outcomes**  
This course is built around the Young Achievement Australia course "Business Skills for Tertiary Students" which aims to give students an insight into modern management concerns and resolution skills.  
**Syllabus Summary**  
Participants in this program will be exposed to a range of business issues including the following:  
- the factors affecting business outcomes;  
- the importance of cash flow management;  
- the core requirements of any enterprise team (whatever its size);  
- leadership and management skills;  
- how specialist areas of expertise can combine to reach a common goal;  
- the advantages and disadvantages of risk-taking, and ways of coping with both;  
- strategies for achieving (and communicating) clear expectations, objectives and requirements in business and the community.

**CHNG 4501 Biochemical Engineering**  
8 credit points  
**Offered:** July. **Prerequisite:** CHNG 2701 & CHNG 2702  
Fundamentals of Bioprocess Engineering 1 & 2; MICR 2007 Microbiology for Engineers A; MICR 2008 Microbiology for Engineers B. **Classes:** 2 x 2 hr / week Lectures, 4 x 12 hr / semester Laboratories. 6 x 1 hr Tutorials. **Assessment:** Assignments (15%), laboratory work (15%), design study (15%) and final examination (55%).  
Fourth year elective unit of study for the degree in Chemical Engineering.  
**Objectives/Outcomes**  
1. Understand the history and scope of the biotechnology industry.  
2. Identify the role of biochemical engineering in the industrial application of biotechnology and its development.  
3. Provide an understanding of the major fundamental aspects of biochemical engineering.  
4. Use this fundamental understanding to study some selected industrial applications.  
**Syllabus Summary**  
Fundamentals: History of biochemical engineering; review of metabolism; quantification of cell growth and metabolism; modelling of microbial growth; fermenter design, sterilisation, aeration; bioseparations.  
Applications: Industrial yeast production and brewing; amino acid production; cheese manufacture; computer applications; animal/plant cell technology; genetic engineering; wastewater treatment; biotechnology regulation.

**CHNG 4504 Environmental Decision Making**  
4 credit points  
**Offered:** July. **Classes:** One 2 hour lecture and one (1 hr) tutorial per week for one semester. **Assessment:** Tutorial assignments and projects.  
Fourth year unit of study for the degree in Chemical Engineering.  
**Objectives/Outcomes**  
- To acquaint students with the issues to be considered in environmental decision making, the wide range of stakeholders involved, and uncertainties in the information available to support the decision.  
- To bring all this together in a structured manner, ensuring the clear identification of decision objectives, and the criteria by which the value of possible decision outcomes will be assessed.  
- To explore decision making in Impact Assessment.  
**Syllabus Summary**  
This course will consider, from a “Systems” perspective, the practice of environmental decision making, the tools and approaches used in problem structuring and decision analysis, and the evaluation of decision outcomes. A specific focus will be where there are multiple objectives to be satisfied, including the exploration of trade-offs between environmental, economic, and social objectives. The course will explore the use of “Life Cycle Thinking” to guide the scope of decision analysis, providing the spatial and temporal boundaries which define the decision space. Students will be exposed to the theory and practice of Environmental Impact Assessment, as well as product and process Life Cycle Assessment. Decision making in the context of project life cycle considerations will also be explored, focusing on identification and management of risk and uncertainty.

**CHNG 4506 Advanced Environmental Engineering**  
4 credit points  
**Offered:** February. **Prerequisite:** All four components of Unit Operations; CHNG 3106 Thermodynamics 2. **Classes:** Two (1hr) lectures plus one (1 hr) tutorial per week for one semester. **Assessment:** Assignments; final examination.  
**Objectives/Outcomes**  
The application of chemical engineering methods and principles to the problems of pollution prevention and control.
Syllabus

Both courses (A and B) are aimed at developing quantitative descriptions of environmental rate and transport processes. These processes include chemical partitioning, reactions, and convective/dispersive transport in air, water and soil. The specific syllabus for each course will be redefined from time to time. Course topics will be drawn from:

Air pollution: Sources and types of air pollution; atmospheric chemistry and ozone depletion; control and removal of sulphur and nitrogen oxides; transport, dispersion and reaction in the atmosphere; vapour emissions from landfills and surface impoundments.

Water pollution: Sources and types of water pollution; equilibria in aqueous phases; interactions between aqueous phase and sediments in lakes and estuaries; dispersion of contaminants in rivers and lakes; physio-chemical and biological treatment processes; pollution from leaching processes in tailings dumps and landfills.

Soils and Sediments: Sources and types of pollution in soils and sediments; physics of movement of groundwater and contaminants in porous media; oily phase migration in soils; in-situ remediation of contaminated soils and sediments.

CHNG 4601 Advanced Particle Mechanics
4 credit points
Offered: July. Prerequisite: All four components of Unit Operations. Classes: 3hrs lec & tut/week for one semester. Assessment: Assignments and final examination.

Fourth Year elective unit for the degree in Chemical Engineering.

Syllabus summary
Bulk solids flow: properties of bulk granular material; stress analysis of solids; testing of granular material; flow properties; design of bunkers; flow rate predictions; calculation of flow parameters of hoppers.

Fluidisation: Applications; types of fluidisation; incipient fluidisation; theory of bubble rise; bubble formation; fluid-bed reactors.

Conveying: Pneumatic and hydraulic conveying of solids: regimes, models and equipment (including blowers and pumps).

CHNG 4604 Chemical Modelling of Aqueous Systems
4 credit points
Offered: February. Prerequisite: CHNG 3101, CHNG 3102, CHNG 3103, CHNG 3104 and CHNG 3106. Classes: Three hours of lectures/tutorials per week for one semester. Assessment: Class assignments, tutorials and a final examination.

Year 4 elective unit of study for the degree in Chemical Engineering.

Objectives/Outcomes
To develop an understanding of the current state-of-the-art in chemical modelling of aqueous systems and its application to environmental problems, water pollution and wastewater treatment, chemical process engineering, corrosion engineering, mineral processing and extractive metallurgy. Students will develop skills in making critical decisions in characterising aqueous systems, developing appropriate models for solving realistic problems involving aqueous processes, critically assessing and evaluating computer packages for modelling, developing treatment strategies for process streams, wastewaters and the aquatic environment. Typical questions to be addressed include: does the toxicity of a heavy metal depend on its dissolved form? What species are present in a complex waste water? What effect will the pH have on the solution composition of an aqueous stream and what solids might precipitate? Will atmospheric carbon dioxide influence this? What will be the effect of chloride ion on the stability of a heavy metal solid residue? How will chemical modelling aid in characterising and treating an aqueous waste? What software is available and at what cost?

It will be shown how predictive chemical models allow complex aqueous processes to be treated in a systematised way and, consequently, to be understood and managed.

CHNG 4605 Mineral Processing
4 credit points
Offered: February. Prerequisite: Unit Operations (all four components). Classes: Three hours of lectures/tutorials per week for one semester; field trips as arranged. Assessment: Class assignments, tutorials and a final examination.

Fourth year elective unit of study for the degree in Chemical Engineering.

Objectives/Outcomes
To develop an understanding of the fundamental principles of metal extraction from naturally occurring compounds (minerals) and/or recycled materials, and the technology to yield a commercial end-product, with due regard for the environment.

Students will develop skills in:
- devising strategies to achieve extraction process objectives, within the constraints imposed by social, economic and physical environments;
- working in groups;
- verbal and written communication.

Syllabus Summary

CHNG 5101 Chemical Equilibrium Modelling of Aq Sys
8 credit points

This course introduces you to the current state-of-the-art in chemical modelling of aqueous systems and its application to environmental problems, water pollution and wastewater treatment, chemical process engineering, corrosion engineering, mineral processing and extractive metallurgy. Students will develop skills in making critical decisions in characterising aqueous systems, developing appropriate models for solving realistic problems involving aqueous processes, critically assessing and evaluating computer packages for modelling, and developing treatment strategies for process streams, wastewaters and the aquatic environment. Typical questions to be addressed include: does the toxicity of a heavy metal depend on its dissolved form? What species are present in a complex waste water? What effect will the pH have on the solution composition of an aqueous stream and what solids might precipitate? Will atmospheric carbon dioxide influence this? What will be the effect of chloride ion on the stability of a heavy metal solid residue? How will chemical modelling aid in characterising and treating an aqueous waste? What software is available and at what cost?

It will be shown how predictive chemical models allow complex aqueous processes to be treated in a systematised way and, consequently, to be understood and managed.

CHNG 5401 Process Plant Risk Management
8 credit points
Offered: February.

CHNG 5501 Environmental Biotechnology
8 credit points
Offered: February.
NB: Contact Dept of Chemical Engineering for Environmental Engineering postgraduate handbook.
Microbial metabolism; reactor design for liquid, gaseous and solid treatment including anaerobic processes, biological nutrient removal, biofiltration and bioremediation.

CHNG 5503 Environmental Decision Making
8 credit points
Offered: July. Assessment: Major project, 2 minor projects, assignments.
Acquaints students with the issues to be considered in environmental decision making, the wide range of stakeholders involved, and uncertainties in the information available to support the decision. This will all be brought together in a structured manner, ensuring the clear identification of decision objectives, and the criteria by which the value of possible decision outcomes will be assessed. Decision making will be explored in Impact Assessment.

CHNG 5901 Project Part A
6 credit points
Offered: February, July.
NB: See Department of Chemical Engineering for information.

CHNG 5902 Project Part B
6 credit points
Offered: February, July.
NB: See Department of Chemical Engineering for information.

CHNG 5904 Seminar 1
2 credit points
Offered: February, July.
NB: See Department of Chemical Engineering for information.

CHNG 5905 Seminar 2
2 credit points
Offered: February, July.
NB: See Department of Chemical Engineering for information.

Civil Engineering

CIVL 1001 Civil Engineering 1
4 credit points
Offered: February. Assumed knowledge: Mathematics 3 unit course and a satisfactory knowledge of 2 unit Chemistry or the Chemistry component of the 3 or 4 unit Science HSC course and of the 2 unit Physics course or the Physics component of the 3 or 4 unit Science HSC course. Classes: Lectures: 13hrs; lec/tut-13hrs; lab /drawing office: 26hrs. Assessment: Specified assignments and one 3hr exam at end of unit.
First year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil). Elective unit of study for the other branches.
Objectives: To provide a basic introduction to Civil Engineering.
Outcomes: A basic understanding of some aspects of Civil Engineering including Structural Engineering, Engineering Construction, Geomechanics, Hydraulics and Engineering Communications.

Syllabus summary
(a) Engineering Projects - Introduction to the planning, design, construction and operation of engineering projects. Economic and non-economic evaluation of projects.
(b) Elements of Engineering Science - Structures, geomechanics, materials, hydraulics and water resources, environment, systems, management.
(c) Communications -Freehand and scale drawing, engineering plans, shop drawings, techniques for producing drawings. Preparation of reports, verbal and written.

Reference books
Krick An Introduction to Engineering - Concept, Methods and Issues (John Wiley and Sons).
Hogan and Firkins Economical Structural Steelwork (Australian Institute of Steel Construction).
Brown Getting Across (Edward Arnold).
Strunk and White The Elements of Style (Macmillan).
Concrete Institute of Australia Recommended Practice - Reinforced Concrete Detailing Manual (CIA).
Dandy and Warner Planning and Design of Engineering Systems (Unwin Hyman).

CIVL 1004 Computational Engineering
4 credit points
Offered: July. Prohibition: COMP1001 Introductory Programming or COMP 1002 Introductory Computer Science. Classes: 1 lecture and one 2 hour computer lab session/ week. Assessment: One 2 hr examination at end of semester plus assessment of computer exercises during semester.
First year core subject in Civil Engineering and Project Engineering and Management (Civil).
COMP 1001 Introductory Programming and COMP 1002 Introductory Computer Science is an acceptable alternative.
Objectives
To provide an introduction to a programming language and to the logic of programming. To introduce computer graphics and to highlight the application of graphics to the solution of engineering problems.

Outcomes
Students should obtain an understanding of the logic of computer programming and be able to write computer programs to solve engineering problems. They should also be able to present visual images and graphics and to apply computer graphics to the solution of engineering problems.

Syllabus summary
Introduction to the matrix and graphics functions of MATLAB: Matrix manipulation, input/output, flow control, function and script files, object hierarchies including high and low level graphics functions, object properties, plotting functions and colour maps. Introduction to fundamentals of computer graphics: Viewing objects in two and three dimensions, theory of transformations, data structures, perspective and parallel projections, hidden surfaces and colour theory.

Textbooks
Lecture Notes Prepared by Department.
Reference Books

CIVL 1051 Dynamics
5 credit points
Offered: July. Assumed knowledge: Mathematics 3 unit course and Science 4 unit course (or the Physics core of 3-4 unit Science) at the HSC. Prohibition: MECH 1510. Classes: 2 hours lectures and 2 hours tutorials per week. Assessment: One 3 hr exam at the end of the semester plus assessment of assignments and quizzes during the semester.
First year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Syllabus summary: Newton's Laws, Kinematics including rectilinear motion, angular motion and curvilinear motion, motion of rigid bodies. Absolute and relative motion. Kinetics including particle motion and rigid body motion. Work and ener-
Faculty of Engineering Handbook 2001


Objectives: To introduce basic concepts of motion and the calculation of paths of motion and the forces associated with the motion.

Outcomes: It is expected that students will be able to apply the dynamics of particles and rigid bodies, mainly in two dimensions to solve engineering problems.

Textbooks

CIVL 1052 Statics
5 credit points

First year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Syllabus summary: Basic concepts; scalars and vectors; units. Statics of the rigid body; forces and moments in two dimensions and three dimensions; system isolation; free body diagrams, and equilibrium criteria in two dimensions and three dimensions. Cable systems; beams with distributed loads, statically determinate pin-jointed structures, hydrostatics.

Objectives: To introduce basic concepts of static equilibrium and the calculation of forces and moments in statically determinate structures.

Outcomes: It is expected that students will be able to analyse simple pin jointed structures, draw free body diagrams.

Textbooks

CIVL 2004 Engineering Communications 1
2 credit points
Offered: February. Classes: 12hrs lec, 14hrs discussion/oral presentation. Assessment: Based on two written reports and one oral presentation session. Extra credit for some or all oral presentations may be given for verifiable public speaking activities with the students' section of the Institution of Engineers, Australia, the University of Sydney Debating Society or equivalent organisation. Students are encouraged to engage in these activities.

Second year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Objectives: To develop effective written and oral communication skills.

Outcomes: Ability to make written and oral presentations on topics of general, technical and/or social significance to small groups.

Syllabus summary: 12 hours of lectures on effective report writing and oral presentation. Written reports and oral presentation on three topics of general, technical and/or social significance of 5, 10 or 15 minutes duration. Oral presentation in groups of eight students in a lecture or round-table discussion format.

Reference Books
Library classification 808.

CIVL 2201 Structural Mechanics
6 credit points

Assessment: Class assignments and one 3hr closed-book exam covering the whole syllabus at the end of semester.

Second year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Objectives: To provide a basic understanding of the principles of elementary stress and stiffness analyses of simple structural elements under static loading and to be able to use these principles to analyse simple structural elements using hand computation methods.

Outcomes: Proficiency in basic methods of simple structural analysis and interpretation of results.

Syllabus summary: Review of basic statics; elementary elasticity, geometric properties of plane areas, axial loading, flexure in beams, shear stresses in beams, uniform torsion, bending deflections, elementary instability, influence lines, triangulated frames and trusses, combined stresses, continuum mechanics - stresses and strains in 2D, failure theories for materials.

Textbooks
Megson Strength of Materials for Civil Engineering 2nd edn (Arnold).

Reference books

CIVL 2204 Introduction to Structural Concepts
4 credit points

Second year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Objectives: To provide a basic understanding of design concepts and the design of steel, composite and concrete structures.

Outcomes: Proficiency in the selection of structural systems and structural materials including 2D and 3D systems, bracing systems, and floor systems. Proficiency in the computation of structural loadings including dead, live, wind, snow and earthquake loads.

Textbooks
SAA HB2.2 -Australian Standards for Civil Engineering Students: Part 2: Structural Engineering.
or
SAA AS4100 Steel Structures Code
SAA AS3600 Concrete Structures Code, and
SAA AS 1170 Loading Code, Parts I and II.
Buckle, The Elements of Structures, (2nd ed.) (Putman International)
Schoedek, Structures (Prentice-Hall)
Reference Books
Cowan, The Design of Reinforced Concrete student edn. (Sydney U.P.)
Ferguson, Reinforced Concrete Fundamentals student edn (Wiley)
Gordon, Structures - or Why Things Don’t Fall Down (Pelican).
Gorenc, Tinvon and Syan, Steel Designers’ Handbook (6th ed.) (UNSW press)
Park and Paulay, Reinforced Concrete Structures (Wiley)
Trahair and Bradford, Behaviour and Design of Steel Structures to AS4100 3rd Ed. (E & EN Spon 1998)
Warner, Rangan and Hall, Reinforced Concrete (Putman)

CIVL 2205 Introduction to Structural Design
4 credit points

Intermediate core course for the degree in Civil Engineering.

Objectives: To develop an understanding of the properties of concrete, steel and timber materials and their relevance in structural design. To provide a basic understanding of the design in concrete, steel and timber elements to current code criteria.

Outcomes: Proficiency in the design of simple structural elements, including the ability to select the best materials for design applications.

Textbooks
SAA HB2.2 -Australian Standards for Civil Engineering Students: Part 2: Structural Engineering.
or
SAA AS4100 - Steel Structures Code
Chapter 2 - Undergraduate units of study

Outcomes: Students should gain the ability: to determine flu-
did movements and forces in pipes and open channels and around
bodies in fluid streams.

Syllabus summary: Equations of motion. Velocity patterns. One
dimensional flow principles. How measurements. Viscous and
turbulent flow. Resistance to flow of fluids. Flow in closed
conduits. Open channel flow.

Textbooks
Douglas, Gasirek and Swaffield Fluid Mechanics (Pitman).

Syracuse University.

Syllabus summary: Application of geological principles and
practices to solving problems in civil engineering. Surface and
sub-surface geological, geophysical and remote sensing tech-
niques for evaluation of ground conditions. Introductory rock
mechanics, clay mineralogy and behaviour. Natural materials
for construction purposes.

Textbooks
T. West Geology Applied to Engineering.

Outcomes: Students should develop basic competency in
earthwork engineering and economic optimisation of related
construction, including proposing and analysing systems and
methods, estimation of probable output, unit cost and productiv-
exty evaluation.

Syllabus summary: Introduction to the framework under
which construction projects are formulated and analysed; con-
struction engineering fundamentals; construction systems relat-
ed to excavation, hauling and embankment construction, includ-
ing selection and evaluation of plant and methods as well as the
expected output and cost; introduction to construction opera-
tions management.

Textbooks
Lecture Notes for Engineering Construction 1 (Department
of Civil Engineering, The University of Sydney).

Outcomes: Ability to predict the influence of material proper-
ties upon the response of the structure under service conditions.

Syllabus summary: The importance of geology in the planning and
execution of civil engineering projects, and be able to apply their
knowledge of geology to the solution of soil and rock engineering problems.

Syllabus summary: Application of geological principles and
practices to solving problems in civil engineering. Surface and
sub-surface geological, geophysical and remote sensing tech-
niques for evaluation of ground conditions. Introductory rock
mechanics, clay mineralogy and behaviour. Natural materials
for construction purposes.

Textbooks
T. West Geology Applied to Engineering.

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earthwork engineering and economic optimisation of related
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which construction projects are formulated and analysed; con-
struction engineering fundamentals; construction systems relat-
ed to excavation, hauling and embankment construction, includ-
ing selection and evaluation of plant and methods as well as the
expected output and cost; introduction to construction opera-
tions management.

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execution of civil engineering projects, and be able to apply their
knowledge of geology to the solution of soil and rock engineering problems.

Syllabus summary: Application of geological principles and
practices to solving problems in civil engineering. Surface and
sub-surface geological, geophysical and remote sensing tech-
niques for evaluation of ground conditions. Introductory rock
mechanics, clay mineralogy and behaviour. Natural materials
for construction purposes.

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methods, estimation of probable output, unit cost and productiv-
exty evaluation.

Syllabus summary: Introduction to the framework under
which construction projects are formulated and analysed; con-
struction engineering fundamentals; construction systems relat-
ed to excavation, hauling and embankment construction, includ-
ing selection and evaluation of plant and methods as well as the
expected output and cost; introduction to construction opera-
tions management.

Textbooks
Lecture Notes for Engineering Construction 1 (Department
of Civil Engineering, The University of Sydney).

Outcomes: Ability to predict the influence of material proper-
ties upon the response of the structure under service conditions.

Syllabus summary: The importance of geology in the planning and
execution of civil engineering projects, and be able to apply their
knowledge of geology to the solution of soil and rock engineering problems.

Syllabus summary: Application of geological principles and
practices to solving problems in civil engineering. Surface and
sub-surface geological, geophysical and remote sensing tech-
niques for evaluation of ground conditions. Introductory rock
mechanics, clay mineralogy and behaviour. Natural materials
for construction purposes.

Textbooks
T. West Geology Applied to Engineering.

Outcomes: Students should develop basic competency in
earthwork engineering and economic optimisation of related
construction, including proposing and analysing systems and
methods, estimation of probable output, unit cost and productiv-
exty evaluation.

Syllabus summary: Introduction to the framework under
which construction projects are formulated and analysed; con-
struction engineering fundamentals; construction systems relat-
ed to excavation, hauling and embankment construction, includ-
ing selection and evaluation of plant and methods as well as the
expected output and cost; introduction to construction opera-
tions management.

Textbooks
Lecture Notes for Engineering Construction 1 (Department
of Civil Engineering, The University of Sydney).

Outcomes: Ability to predict the influence of material proper-
ties upon the response of the structure under service conditions.
Syllabus summary: Fracture aspects in the design and use of concrete and reinforced concrete structures. Fracture, fatigue, fire and corrosion aspects in the design and use of metal structures. Durability and serviceability aspects in the design and use of concrete and reinforced concrete structures. Two laboratory sessions on failure modes of RC beams, one laboratory session on electron microscopy, one field trip.

Textbooks
Materials Science and Engineering an Introduction
William D. Callister Jr. 4th Edition 'Wiley' publishers
Campbell-Allen and Roper Concrete Structures: Materials Maintenance and Repair (Longman Scientific and Technical) - preferred text.
Soroka Portland Cement Paste and Concrete (Macmillan Australia, 1979)
Akroyd Concrete - Its Properties and Manufacture (Pergamon) and/or
Troxell Composition and Properties of Concrete 2nd edn (McGraw Hill).
U.S. Bureau of Reclamation Concrete Manual
Czemen Cement Chemistry and Physics for Civil Engineers (Lockwood).
Relevant SAA Specifications.

CIVL 3204 Structural Analysis
6 credit points
Third year core unit of study for the degree in Civil Engineering. Third year elective unit of study for the degree in Project Engineering and Management (Civil).
Objectives: To provide an understanding of the principles of (a) the force and displacement methods for analysing redundant trusses and beams, and (b) the lower and upper bound methods for the plastic analysis of beams and frames. To be able to apply computer methods to structural analysis and to check the validity of such solutions.
Outcomes: To be able to apply the manual methods of analysis taught in the unit of study to simple structures. To be able to apply and check computer analyses of structures.
Textbooks
KJR Rasmussen, Structural Analysis 1, (Univ of Sydney)
KJR Rasmussen, GJ Hancock, MJ Clarke Structural Analysis 2, (Univ of Sydney)
Reference Books
Popov, Introduction to the Mechanics of Solids (Prentice Hall)
Parves, Braced Frameworks (Pergamon)
Timoshenko and Young, Theory of Structures (McGraw Hill)

CIVL 3206 Steel Structures 1
6 credit points
Assessment: One 3 hr exam at the end of the semester plus assessment of design and problem based assignments.
Third year core unit of study for the degree in Civil Engineering. Third year elective unit of study for the degree in Project Engineering and Management (Civil).
Objectives: To provide a basic understanding of the behaviour and design of steel members, connections and structures.
Outcomes: The development of some of the skills required for the design of practical steel structures.
Syllabus summary: The behaviour and design of steel members, connections and structures - design concepts, loads and load combinations, strength, stability and serviceability criteria, safety and reliability, practical steel structures, properties of cross-sections, local buckling, elastic beams, plastic beams, tension members, compression members, effective lengths and elastic in-plane frame buckling, lateral buckling of beams, in-plane bending of beam-columns, lateral buckling of beam-columns, bolted and welded connections.
Textbooks
(AISC) Economical Structural Steelwork.
GJ. Hancock, M.J. Clarke & T. Wilkinson, CIVL 3206 Steel Structures 1 printed lecture notes.
BHR Hot Rolled and Structural Products Handbook.
Standards Australia Specifications - current editions AS 1170 Parts 1 and 2 Loading Code, and AS4100 Steel Structures Code; or
ASHB 2.2 Structural Engineering Standards.
Reference books
AISC. Design Capacity Tables for Structural Steel.

CIVL 3207 Risk and Reliability Analysis
2 credit points
Assessment: One 3hr exam plus a mid-semester test.
Third year core unit of study for the degree in Civil Engineering. Third year elective unit of study for the degree in Project Engineering and Management (Civil).
Objectives: To provide a basic understanding of the principles of statistical decision theory, probabilistic risk assessment and structural reliability analysis; to develop an understanding of basic methods of risk and reliability analysis, including event trees, fault trees and decision trees and First Order Second Moment methods of structural reliability analysis; to develop an understanding of the principles of reliability-based design.
Outcomes: Understanding of basic methods of risk and reliability analysis and interpretation of results.
Syllabus summary: Review of basic statistical methods of analysis (including significance testing, and linear regression); probability concepts, Bayes Theorem, statistical decision theory; preposterior analysis; probability measures, types of uncertainty, principles of probabilistic risk assessment, event trees, risk acceptance criteria; structural safety and reliability; First Order Second Moment methods of reliability analysis, the Safety Index, f.e design point, reliability based design, simulation methods, system effects.
Reference books
Melchers, Structural Reliability Analysis and Prediction (Ellis Horwood/TWiley, 1987).

CIVL 3223 Concrete Structures: Behaviour
3 credit points
Assessment: One 3 hour exam plus mid-semester test and reports.
Third year unit of study for the degree in Civil Engineering. Third year elective unit of study for the degree in Project Engineering and Management (Civil).
Syllabus summary: The behaviour of reinforced concrete members and structures, including: introduction, material properties, elastic analysis (stresses/deformations/time-dependance), ultimate strength of beams (flexure), ultimate strength of columns (short and slender). Material aspects of cement and concrete.
Objectives: To provide a basic understanding of the behaviour of reinforced concrete members and structures; to provide a basic understanding of standard methods of analysis of reinforced concrete behaviour (including an understanding of capabilities and limitations).
Chapter 2 - Undergraduate units of study

CIVL 3402 Soil Mechanics B
4 credit points

Offered: July. Assumed knowledge: CIVL 3401 Soil Mechanics A.

Classes: 16 hrs lect./tut., Project Work. Assessment: One 2hr exam covering the whole syllabus at the end of semester. 3 Projects each of 3 weeks duration during semester.

Third year core unit of study for the degree in Civil Engineering. Third year elective unit of study for the degree in Project Engineering and Management (Civil).

Objectives: To develop an understanding of the concept of soil strength, and how this can be used in estimating the stability of soil constructions. To undertake an experimental project.

Outcomes: Students should gain an understanding of: the strength of soil masses and the factors that control the strength; the basic theories of bearing capacity and slope stability. In particular, students should gain the ability to: interpret soil strength tests; predict the strength and stability of soil. Improved team, report writing and presentation skills. Production of design charts and aids.


Reference Books

CIVL 3501 Surveying 1
4 credit points


Third year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Objectives: To introduce students to basic distance, angle, and height measurement; to give students sufficient knowledge to achieve basic computational, analytical, and interpretational skills based on the measurements; to introduce students to basic electronic field equipment; to give students an insight into future trends in measurement technologies.

Outcomes: Students should gain ability to: undertake basic angle and distance measurement; undertake appropriate calculations and checks involving observed data; understand errors associated with measurement, select the correct measurement alternatives for simple measurement problems.

Syllabus summary: Introduction to engineering surveying, distance measurement, angle measurement, levelling, measurement errors, traversing, topographic surveys, optical distance measurement, error analysis, electronic surveying equipment, future surveying technologies.

Textbooks

CIVL 3602 Fluids 2
4 credit points

Offered: July. Assumed knowledge: CIVL 2610 Fluids 1. Classes: Lectures: 26hrs; tut.: 26hrs. Assessment: one 3hr exam covering the whole syllabus at the end of semester. Tutorial tests, as indicated at the commencement of the course.

Third year core unit of study for the degree in Civil Engineering. Third year elective unit of study for the degree in Project Engineering and Management (Civil).

Objectives: To develop an understanding of: theory and practical aspects of analysis of fluid behaviour in pipes and open channels, and of fluid machines.

Outcomes: Students should gain the ability: to calculate heads and flows through pipe and open channel systems for steady and for unsteady conditions; and to determine machine requirements for various systems.

Syllabus summary: Dimensional analysis and similitude, open channel flow, pipe networks, hydro and aero-foils, pumps and turbines, compressible flow and unsteady flows.
CIVL 3701 Transportation Engineering and Planning

2 credit points
Offered: July. Classes: 26hrs lec. Assessment: one 2hr exam and assignment.

Third year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil). Third and fourth year elective unit of study for the degree in Mechanical Engineering.

Objectives: To introduce students to the civil engineering aspects of the main modes of transport and their effects on the environment.

Outcomes: An appreciation will be gained of the basic requirements of the main transport modes in the design of facilities, along with environmental effects and the acquisition of transport planning information.


Reference books:
Young Munson and Okiishi A Brief Introduction to Fluid Mechanics (Wiley).
Douglas, Gasiorek and Swaffield Fluid Mechanics (Pitman).
Faculty of Engineering Handbook 2001

CIVL 3802 Engineering Construction 2

4 credit points
Offered: February. Assumed knowledge: Completion of CIVL 2801 Engineering Construction 1 or equivalent knowledge. Classes: 26hrs lec & 26hrs tut. Assessment: A number of assignments, including both oral and written presentations, will be assessed formally and will make the balance 10 marks (total 100 marks).

Third year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil), elective for other branches of engineering.

Objectives: To gain a working knowledge of building structures and heavy construction engineering, including planning, cost estimating and optimisation of construction works related to building structures, underground structures, quarry operations, temporary structures and associated aspects. The objectives are to be achieved by active participation in a number of projects and preparation of plans for the same.

Outcomes: Students should develop basic competency in planning, engineering, optimisation and cost estimation of operations in civil engineering and building construction, including design of construction systems and temporary works.

Syllabus summary: Fundamentals of tunnelling in soft and hard rock, ground improvement, piling and excavation support design, construction systems for multi-storey structures, vertically-formed concrete structures, construction water supply and dewatering, production of natural and crushed rock aggregates, pavement design fundamentals and construction, safety in construction, quality management of construction works. This course will be run through a problem-based learning approach.

Textbooks
Hand-outs will be given during the currency of the course.

Reference Books
Numerous other reference books which will address specific segments of the course, such as design and engineering of temporary structures or tunnelling.

CIVL 3803 Project Appraisal

4 credit points

Senior core course for the Bachelor of Project Engineering & Management (Civil), elective for all other branches of engineering (except Civil Engineering) and faculties.

Course objectives: To develop basic competency in project appraisal, planning and strategic management, including an appreciation of the total project life cycle analysis and associated decision processes.

Expected outcomes: Students should be able to carry out basic project appraisal, financial planning and life cycle costing tasks. Projects and ventures in both public and private sectors will be studied. It is expected that students will develop skills in decision making regarding analysis of alternatives, financial budgeting and project capital decisions.

Syllabus summary: Framework for conceptualisation and development of capital projects; various stages in project life cycle; importance of front-end planning and optimisation; techniques for project appraisal; economic analysis of public sector projects; depreciation, capitalisation and valuation, studies, replacement of long term assets, the impact of fiscal policies on projects; value engineering/management; sensitivity and project risk analysis/management.

Textbooks
Grant, Leshon and Leavenworth, Principles of Engineering Economy (J.Wiley & Sons).
Reference Books

CIVL 3804 Contracts, Formulation and Management

5 credit points
Offered: July.

Senior core course for the Bachelor of Project Engineering and Management (Civil), fourth year elective for Civil Engineering degree, elective for all other branches of engineering and faculties.

Course objectives: To give students a fundamental knowledge of the legal system under which project procurement is conducted generally. Emphasis will be on the principles of contract formulation, administration and finalisation, including prevention and/or settlement of disputes.

Expected outcomes: This course will lead to the development of theoretical knowledge in the field of project procurement via contracts formulation and administration, covering not only the areas of contracting but also the principles behind good management of legal framework and associated issues.

Syllabus summary: Brief overview of the legal system in Australia and comparison with the legal systems in the region, fundamental principles behind good management and comparison with legal requirements; fundamentals of project procurement management, introduction to the contract law; introduction to the relevant statutes/by-law requirements and regulations made under these affecting project ownership, planning, design, implementation; review of standard forms of project procurement, implementation and administration; potential liabilities...
associated with project participation; review of typical project delivery systems, including standard and model contract conditions and specifications; optimisation of project team responsibilities, quality management provisions; optimum systems for project delivery; management under uncertain conditions; management of OHS & environmental due diligence and other statutory liabilities; management of contract extensions and claims; management of documentation and records; project assignment.

Textbooks
Allan, Law of Contract in Australia (CCH Australia).
Bockrath, J.T., Contracts and the Legal Environment for Engineers and Architects (McGraw-Hill)

Reference books
Numerous references are specified at the commencement of the course.

CIVL 3805 Project Scope, Time and Cost Management
6 credit points
Coordinator A.Prof. A. Jaafari, Mr. Ted Tooher QA auditor: A.Prof. R J Wheen
Offered: February. Assessment: Tests and assignment completed and submitted by students in stages. Details will be advised at the commencement of the course.

Senior core course for the Bachelor of Project Engineering & Management (Civil), fourth year elective for Civil Engineering degree, elective for all other branches of engineering and faculties.

Course objectives:
• To develop underpinning knowledge of scope, time and cost management as applied to projects
• To provide practical examples and opportunities to apply scope, time and cost management to projects
• To initiate process of reflective learning and evidence development for competencies in the areas of scope, time and cost management

Expected outcomes:
• Demonstrate knowledge of subject area
• Ability to apply tools in a project environment
• Competence in learning and evidence generating to sustain competency

Syllabus summary:
Scope management including project authorisation, scope definition, control and finalisation. Cost management including project costing, resource planning, budgeting and controlling financial completion. Time management including activity sequencing, duration estimating, scheduling, progress control, monitoring and forecasting.

Textbooks

Reference books

CIVL 4008 Practical Experience
0 credit points
Offered: February. Prerequisite: 28 credit points of Senior courses.
Classes: 12wks practical work experience (375hrs minimum).
Assessment: A written report, employers certificate.

Fourth year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Objectives: To expose students to Engineering Practice and to develop an understanding of professional matters which will influence the way they will work as professional engineers.

Outcomes: Knowledge of occupational health and safety act; knowledge of procedures for quality assurance both in design and construction; understanding of industrial relations issues; understanding of basic civil engineering contracts; awareness of ethical issues related to the engineering profession, and the social responsibility of engineers.

Syllabus summary: The lectures will be delivered by practising engineers and other experts in the following subject areas: (a) Social responsibility in engineering, social and environmental issues and ethics of engineering practice; (b) Industrial relations, legal contracts and law; (c) Occupational health and safety; (d) quality assurance; (e) engineering contracts and documentation.

Reference books
As advised during course, and:
Tagg et al. Civil Engineering Procedure (Thomas Telford).
Weame Civil Engineering Contracts (Thomas Telford).
Professional Practice Course Notes (Dept. Civil Engineering, University of Sydney)
CIVL 4218 Concrete Structures 2
5 credit points
Offered: July. Assumed knowledge: CIVL3223 or CIVL3225
Concrete Structures - Behaviour, CIVL 3224 or CIVL 3226
Concrete Structures - Design. Classes: 28hrs lec. 28hrs tut. Assessment: One 3 hr exam at end of the semester plus assessment of assignments. Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).
Objectives: To develop a depth in understanding of the fundamental behaviour and design of concrete and composite members and structures.
Outcomes: The development of design skills that will lead to reliable and economical designs of both practical and more complex structures.
Syllabus summary: Practical aspects of reinforced concrete, prestressed concrete and composite steel-concrete members and structures - non-linear behaviour, load-moment-curvature relationships, serviceability and strength for prestressed concrete beams in flexure and shear, anchorages, prestress losses, load balancing, strength of beams, columns and beam-columns, moment redistribution, ultimate strength of concrete slabs, yield line analysis of slabs, strip equilibrium analysis of slabs, the analysis of time-dependent effects in concrete structures models of concrete creep and shrinkage, design of composite t-beams, design of composite slabs incorporating profiled steel sheeting, design of composite columns.
Textbooks
Reference books
Lin and Burns Design of Prestressed Concrete Structures (Wiley). Park and Gamble Reinforced Concrete Slabs (Wiley).
Other books as indicated in classes.

CIVL 4219 Structural Dynamics
5 credit points
Offered: February. Assumed knowledge: CIVL 3204 Structural Analysis. Classes: 28hrs lec. 28hrs tut. Assessment: One 3hr exam and assignments. Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).
Syllabus summary: Introductory structural dynamics, natural frequency, free and forced vibration, structural damping. Single and multi-degree of freedom systems, finite element dynamics analysis, consistent mass matrix, damping matrix, free vibration, forced vibration, wind loading on structures.
Objectives: To provide an understanding of the dynamic behaviour of structural systems and wind loads on structures.
Outcomes: To be able to determine the natural frequency of simple structural systems manually and complex systems using computer analyses; to be able to perform analyses for the effects of forced vibration and structural damping; to be able to perform wind analyses on low and high rise structures.
Textbooks
‘Vibrations in Civil Engineering’, Postgraduate Course, Department of Civil Engineering, The University of Sydney, May, 1981.

CIVL 4220 Steel Structures 2
5 credit points
Offered: July. Assumed knowledge: CIVL 3206 or CIVL 3227 Steel Structures 1. Classes: 28hrs lec. 28hrs tut. Assessment: One 3 hr exam at end of the semester plus assessment of assignments. Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).
Syllabus summary: Local buckling behaviour and design; stability analysis and design of steel structures including flexural-torsional buckling analysis. Advanced connections - behaviour, analysis and design. Shell structures - behaviour, membrane analysis and bending.
Objectives: To develop a working knowledge of the behaviour and design of steel structures beyond a basic competency.
Outcomes: Proficiency in the design of steel structures.
Textbooks
Syam and Chapman Design of Structural Steel Hollow Section Connections (AISC, 1996).
Gibson Thin Shells (Pergamon, 1980).
Vinson the Behaviour of Plates and Shells (Wiley, 1974).
Reference books
Bulson Stability of Flat Plates (Chatto & Windus, 1970).
Hancock Design of Cold-Formed Structures (AISC, 1994).
Calladine Theory of Shell Structures (CUP, 1983).
Other books as indicated during classes.

CIVL 4221 Bridge Engineering
5 credit points
Offered: February. Assumed knowledge: CIVL 3225 or CIVL 3223
Concrete Structures - Behaviour, CIVL 3224 or CIVL 3224 Concrete Structures - Design and CIVL 3227 or CIVL 3206 Steel Structures 1. Classes: 28hrs lec & 28hrs tut. Assessment: Based on submitted work, seminar presentations and one 3hr exam. Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).
Syllabus summary: Highway and railway bridge loading; influence lines; analysis; transverse load distribution; computer modelling of bridges; effects of temperature and concrete creep and shrinkage; bridge bearings; selection of structural forms; standardised bridge systems, skew and curved bridges, bridge foundations; construction methods; case studies of significant bridges.
Objectives: To develop an understanding of the key issues in the design, construction and maintenance of bridges.
Outcomes: An appreciation of the relevance of all other courses of study to the practice of all aspects of Bridge Engineering.
Reference books
NAASRA Bridge Design Specification.
Australian and New Zealand Railway Conferences Railway Bridge Design Manual.

CIVL 4222 Finite Element Methods
5 credit points
Syllabus summary: Introduction to finite elements, analysis of bars, beams and assemblages. Analysis of elastic continua, in-plane stresses in plates, plane strain problems, plate bending, use and testing of finite element packages.
Objectives: To provide an understanding of the basics of finite element analysis and how to apply this to the solution of engineering problems.
Outcomes: A knowledge of methods of formulating finite element equations, basic element types, the use of finite element methods for solving problems in structural and continuum analysis and the use of finite element packages.
Reference books
Cook Concepts and Applications of Finite element analysis (John Wiley, 1974).

CIVL 4406 Environmental Geotechnics
5 credit points
Offered: July. Assumed knowledge: CIVL 3401 Soil Mechanics A, CIVL 3402 Soil Mechanics B. Classes: Lectures and tutorials - 52 hours. Assessment: Tutorial and assignment submissions, as indicated at the commencement of the course. No final examination. Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Syllabus summary: Landfill design, including clay mineralogy, effects of chemicals on soil permeability, flow rates through membranes, effect of punctures, composite liners, mechanisms of mass transport, diffusion, dispersion, advective transport, sorption, predicting transport time, solutions to advection-dispersion equation, design of liners, stability of clay liners on slopes, design of covers, infiltration rates, Tailings disposal, including types of ponds, water balance, rehabilitation, use of slope stability and seepage software.

Objectives: To develop an understanding of the geotechnical aspects of the design and management of industrial and domestic waste disposal systems.

Outcomes: Students should gain an understanding of: the role of geotechnics in the design of waste management systems; current design methods and technologies. In particular, they should be able to predict: likely interactions between waste and soil; of pollutant movement in the ground, and be able to evaluate strategies for the containment of industrial and domestic wastes and mine tailings.

Reference Books
S. G. Vick Planning, Design and Analysis of Tailings Dams (Wiley).

CIVL 4407 Geotechnical Engineering
5 credit points
Offered: February. Assumed knowledge: CIVL 3401 Soil Mechanics A, CIVL 3402 Soil Mechanics B. Classes: Lectures and tutorials - 52 hours. Assessment: One 2 hour examination covering the whole syllabus at the end of semester. Credit will be given for tutorial and assignment submissions, as indicated at the commencement of the course. No final examination.

Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).


Objectives: To develop an understanding of: current methods used in the investigation and design of foundations on soils and rocks; the limitations of these methods.

Outcomes: Students should gain an understanding of: the design process in foundation engineering; the role of site investigation and field testing; the need to deal with uncertainty. In particular, they should develop the ability to: interpret the results of a site investigation; use soil data to design simple foundations, and develop an appreciation of the interaction between soils, the foundation system and the supported structure.

Reference Books

CIVL 4607 Environmental Fluids 1
5 credit points
Offered: February. Classes: 26 hrs lec, 26hrs tut. Assessment: Tests and assignment submissions as indicated at the beginning of the course. Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Syllabus summary: Elements of meteorology; precipitation measurement and analysis; design rainfall intensities; hydrographs; peak discharge calculations; evaporation and transpiration, infiltration and groundwater; surface runoff, flood routing.

Objectives: To develop an understanding of: basic meteorological principles; the principles of hydrology; the importance of flood routing; the principles of flood mitigation; irrigation requirements; evaporation and reservoir design.

Outcomes: Students will be able to: list the key factors which affect the climate of Australia; describe intensity-frequency-duration curves and explain their use; calculate design rainfall intensities; calculate peak flows from catchments; determine run-off hydrographs for various storm durations and intensities; state the principles of flood routing and perform flood routing calculations; assess surface runoff and infiltration in catchment; list and utilise design procedures for storage and service reservoirs; calculate reservoir safe yield; determine evaporation from reservoirs and evapo-transpiration from catchments.

Textbooks
Raudkivi Hydrology (Pergamon) Raudkivi and Callander Analysis of Groundwater Flow (Edward Arnold).

CIVL 4608 Environmental Fluids 2
5 credit points
Offered: July. Assumed knowledge: Material covered in Environmental Fluids 1. Classes: 26hrs lec, 26hrs tut. Assessment: By tests and assignment submissions, as indicated at the beginning of the course.

Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).


Objectives: To develop an understanding of: ocean wave generation, transmission and coastal effects; the principles of sediment transport; break-water design, fluid-structure interaction; flood detention basins, and advanced flood routing techniques.

Outcomes: Students will be able to: list and describe the major parameters affecting ocean wave generation; describe the processes of ocean wave transmission; calculate energy transfer by waves; describe the behaviour of waves in shallow water; explain the fundamental principles of sediment transport; describe sediment transport processes in rivers; describe coastal sediment transport processes; explain basic performance requirements for breakwaters, and factors considered in their design; describe several fluid structures, together with associated fluid-structure interaction, including, but not limited to, spillways, stilling basins, bridge piers, water supply intakes; describe design considerations for flood detention basins; explain the principles of advanced flood routing techniques utilising computer programs.

Textbooks
Computer Applications in Hydraulic Engineering (Haestad Press).

CIVL 4609 Water Resources Engineering
5 credit points
Offered: July. Classes: Sem: 26hrs lec, 26hrs tut. Assessment: Tests and assignment submissions, as indicated at the beginning of the course.

Fourth year elective unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

Water quality; water purification methods; water reticulation; water resource management; irrigation and hydropower.

Objectives: To develop an understanding of: the assessment methods for water quality; physical biological and chemical
treatment methods; water storage and distribution systems; man-
agement principles for water resources, including water re-use;
irrigation techniques and demands; hydro-power systems.

Outcomes: Students will be able to: state the requirements of
water quality for various purposes; detail the physical methods
of water treatment; detail the biological methods used in water
treatment; detail the chemical methods used in water treatment;
design multi-node water distribution networks; explain the de-
sign principles of water supply for high-rise buildings; describe
water conservation methods and management principles for
water use, including storm water detention and treatment; ex-
plain 'grey water' re-use techniques and their applications; dis-
cribe various irrigation methods and associated hydraulic de-
design small scale hydro-power installations.

CIVL 4803 Engineering Management
4 credit points
Classes: 26hrs lec, 26hrs tut. Assessment: Class tests and
coursework. No final examinations will be conducted.
Fourth year core unit of study for the degree in Civil Engineer-
ing.

Course objectives: To develop basic competency in project
appraisal, planning and strategic management, including an ap-
preciation of the total project life cycle analysis and associated
decision processes.

Expected outcomes: Students should be able to carry out ba-
sic project appraisal, financial planning and life cycle costing
tasks. Projects and ventures in both public and private sectors
will be studied. It is expected that students will develop skills in
decision making regarding analysis of alternatives, financial
budgeting and project capital decisions.

Syllabus summary: Framework for conceptualisation and de-
velopment of capital projects; various stages in project life cy-
cle; importance of front-end planning and optimisation; tech-
niques for project appraisal; economic analysis of public sector
projects; depreciation, capitalisation and valuation studies, re-
placement of long term assets, the impact of fiscal policies on
projects; value engineering/management; sensitivity and project
risk analysis/management.

Textbooks
Grant, Treson and Leavenworth, Principles of Engineering
Economy (J.Wiley & Sons).

Reference books

CIVL 4807 Project Formulation
5 credit points
Offered: July. Assumed knowledge: Completion of CIVL 3803
Project Appraisal or equivalent knowledge. Classes: Tutorials/
workshops 52 hours. Assessment: No formal exam; assessment
will be based on submitted documents and adequacy of oral
presentation to a board of review.
Fourth year elective unit of study for the degree in Civil Engineer-
ing, elective for other branches and faculties. Core unit of
study for the degree in Project Engineering and Management
(Civil).

The unit will integrate the technical, commercial and mana-
gerial aspects of the formulation of a project or product. Techni-
cal design and specification will be carried out to the point where
it can be shown that the concept is technically sound; technical
innovation in the design concept for commercial edge will be
encouraged. Students will be cast in the role of competing entre-
preneurs faced with the exploitation of a business opportunity
related to specific concepts for projects and products. Groups
will develop competitive proposals embodying business plans
and demonstrating the technical and financial feasibility of the
project, appropriate legal and managerial arrangements and cor-
porate structure for the proposed enterprise. The unit will be
conducted through workshops and with the participation of lead-
ing professionals from business planning, engineering, legal and
financing industries.

Objectives: To develop an understanding of conceptualisation,
formulation and documentation of projects and products; to gain
skills in the preparation of a business plan/proposal for a project
or product, including technical, commercial and legal aspects
and statutory approvals.

Outcomes: Students should develop an understanding of the
fundamentals of project conceptualisation, appraisal, planning
and optimisation plus ability to: model and analyse basic financ-
ing and cash flow requirements, develop risk management plan,
develop marketing and sales plan, prepare the design of profes-
sional documentation, and present the same to a board of re-
view.

CIVL 4808 Project Management & Information Technol
4 credit points
Coordinator A. Prof. A. Jaafari, Dr. Milad Saad QA auditor: A.Prof. R
J Wheen
Offered: February. Assumed knowledge: Sufficient knowledge of
information technology systems & communications capabilities.
Assessment: Coursework and class tests. No final examinations
will be conducted. Details will be advised at the commencement
of the course.

Fourth year core unit of study for Project Engineering & Man-
gement (Civil), elective for all other branches of engineering
and other faculties.

Course objectives
• To develop an understanding of information management for
projects.
• To understand computer applications and current e-use of
technology.
• To provide the ability to program and implement project man-
agement systems.

Expected Outcomes
• Understand the importance of information management for
projects.
• Gain in-depth knowledge and skills in project management
information technology.
• Ability to apply the current technology and tools for e-project
management.

Syllabus summary:
Fundamentals of information technology management; under-
standing of computer applications; cost benefit analysis; data
capture and standardisation; projects re engineering; bench-
marks and testing; risk analysis; management roles and technol-
ogy.

Textbooks
Gray and Larson, Project Management - The Managerial Process
(McGraw Hill, 2000)
Published papers; internet addresses; reference books; case
studies.

(Details will be advised at the commencement of the course.)

CIVL 4809 Project Planning and Tendering
4 credit points
Coordinator A.Prof. A. Jaafari QA auditor: A.Prof. R J Wheen Tutors:
Mr. K K Manivong and Mr. M Chiaya
Offered: July. Assumed knowledge: Completion of CIVL 2801
Project Planning and Management, CIVL 3802 Engineering
Construction 1 and CIVL 3802 Engineering
Construction 2 or the equivalent knowledge. Assessment: A class
test and an assignment, using an integrated system. Details will
be advised at the commencement of the course.

Fourth year core unit of study for the Bachelor of Project Engi-
neering & Management (Civil), elective for all other branches
of engineering and other faculties.

Course objectives:
• To teach multidisciplinary project planning and scheduling
skills;
• To develop skills in computer-supported fully detailed plan-
ning and estimating;
• To apply the principles of operational estimating to a given
project, including setting appropriate tendering strategies, risk
analysis and setting of contingency budgets; and
• To develop appropriate contractual reports and documenta-
tion, and to undertake a presentation of the proposed plans
and strategies.

Expected Outcomes
Students will be able to plan and estimate engineering projects,
jobs and operations based on resources and dedicated method
Syllabus summary:
Fundamentals of operational planning and estimating, resource allocation and optimisation, preparation of method statements, estimation of the quantities of resources for execution of tasks and operations, preparation of operational schedules, estimation of indirect costs, estimation of work package costs, building up estimates of direct cost, consolidation of direct cost, risk analysis, alternative analysis and optimisation of plans, setting contingencies, preparation and presentation of reports.

Textbooks
Lecture Notes on Operations Analysis and Management.

Reference books

CIVL 4810  Project Quality Risk and Procurement Mgt
6 credit points
Coordinator A.Prof. A. Jafarian QA auditor: A.Prof. R.J. Wheen
Offered: July. Assessment: based on both coursework and class tests, details of which will be advised at the commencement of the unit. No final examination will be held.

Course objectives: To provide underpinning knowledge and application skills in the project environment for:
• quality management
• risk management
• procurement management

Expected outcomes: Participants will be able to design and implement plans for quality, risk and procurement management on a range of simple generic projects and provide input to these plans for more complex projects. They will also be able to apply reflective learning to production of evidence towards satisfaction of competencies for recommission as project managers.


Textbooks

Civil Engineering Design
6 credit points
Offered: February. Assumed knowledge: CIVL 3225 or CIVL 3223
Concrete Structures - Behaviour, CIVL 3226 or CIVL 3224
Concrete Structures - Design and CIVL 3227 or CIVL 3206
Steel Structures
1. Classes: 13hrs lec & 39hrs of drawing office work. Assessment: No formal exam; assessment will be based on submissions.
2. Fourth year core unit of study for the Bachelor of Project Engineering & Management (Civil), elective for all other branches of engineering and other faculties.

Objectives: To give students an understanding of the role of the designer in the development of Civil Engineering projects.

Syllabus summary: The design sequence including definition, value and criteria selection; generation of proposals; analysis of proposals; selection of design; development of details of a particular design selected. Feasibility studies and examination of existing works. Study of design projects by stages, including details of some aspects.

The unit is under the direction of an engineer in professional practice in cooperation with members of the academic staff. Lectures on specific aspects of design are supplemented by visits to construction, testing and manufacturing sites. Lectures and exercises on architectural design and practice and their relationship to civil engineering are included in the unit.

Reference books
The unit is of a wide-ranging nature, and all text and reference books previous and current courses have relevance. In addition, reference will be made to many codes and guides to practice, of which the following list covers only the structural field:

- Current SAA Codes, Manuals and Specifications, particularly AS4100 - Steel Structures Code
- AS3600 - Concrete Structures Code
- AS1511 - High Strength Structural Bolting Code
- AS1170 - Loading Code, Parts I and II
- AS1554 - Manual Welding, Part I
- AS1720 - Timber Engineering Code
- N.A.A.S.R.A. Bridge Design Specification
- (Purchase of separate codes is recommended)

- CIVL 5250  Frame Analysis I
- 4 credit points
- Offered: July.

- CIVL 5253  Steel Structures: Members/Connections
- 6 credit points
- Offered: February.

- CIVL 5254  Steel Structures: Loading/Design
- 6 credit points
- Offered: July.

- CIVL 5257  Concrete Structures: Prestressed
- 6 credit points
- Offered: February.

- CIVL 5351  Environmental Geotechnics
- 6 credit points
- Offered: February.

- CIVL 5353  Environmental Oceanography & Meteorology
- 4 credit points
- Offered: February.

- CIVL 5450  Analysis and Design of Pile Foundations
- 6 credit points
- Offered: February.

- CIVL 5454  Rock Engineering
- 6 credit points
- Offered: February.

- CIVL 5456  Earth and Rockfill Dams
- 6 credit points
- Offered: July.

- CIVL 5654  Ocean Mixing
- 4 credit points
- Offered: July.

- CIVL 5655  Water Resources - Management and Use
- 4 credit points
- Offered: July.

- CIVL 5850  Project Planning and Optimisation
- 6 credit points
- Offered: July.
CIVL 5851  Civil Engineering Project
6 credit points
Offered: July.

CIVL 5852  Project
12 credit points
Offered: February, July.

CIVL 5853  Seminar
2 credit points
Offered: February, July.

CIVL 5854  Project Integration Management
6 credit points
Offered: February.

CIVL 5855  Project Scope, Time and Cost Management
6 credit points
Offered: February.

CIVL 5856  Project Quality, Risk & Procurement Mgt
6 credit points
Offered: July.

CIVL 5857  Project Quality Leadership and TQM
6 credit points
Offered: July.

CIVL 5858  Project Process Design and Management
6 credit points
Offered: February.

CIVL 5859  Contracts Law and Administration
6 credit points
Offered: July.

CIVL 5860  Project Appraisal & Financial Management
6 credit points
Offered: February.

CIVL 5861  Integrated and Concurrent Project Mgt
6 credit points
Offered: July.

CIVL 5862  Life Cycle Asset Management
6 credit points
Offered: February.

CIVL 5863  Project Management and Info Technology
6 credit points
Offered: July.

CIVL 5864  Project Risk and Uncertainty Management
6 credit points
Offered: July.

CIVL 5865  Alliance & Performance Based Contracting
6 credit points
Offered: February.

CIVL 5866  Advanced Project Formulation
12 credit points
Offered: July.

CIVL 5867  Integrated and Concurrent Project Mgt
6 credit points
Offered: July.

CIVL 5868  Life Cycle Asset Management
6 credit points
Offered: February.

CIVL 5869  Project Management and Info Technology
6 credit points
Offered: July.

CIVL 5870  Project Risk and Uncertainty Management
6 credit points
Offered: July.

CIVL 5871  Alliance & Performance Based Contracting
6 credit points
Offered: February.

CIVL 5872  Advanced Project Formulation
12 credit points
Offered: July.

Electrical Engineering

ELEC 1001  Introductory Electrical Engineering
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: MATH 1001 Differential Calculus. Prohibition: ELEC 1102 Foundations of Electronic Circuits. Classes: Two lec/wk and nine 3hr lab/tut. Assessment: Lab reports and assignments and a 2hr exam at end of semester.

Core unit of study for the degrees in Civil Engineering, Project Engineering and Management (Civil) and Mechanical and Mechatronic Engineering.

Syllabus

ELEC 1101  Foundations of Computer Systems
6 credit points
Offered: February. Assumed knowledge: HSC Maths 3 unit. Classes: Six contact hours per week combining lectures, laboratory work, computing, tutorials and presentations. Assessment: Laboratory performance, presentations, reports and assignments plus two 2-hr exams at the end of the semester.

Core unit of study for the degrees in Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.

Syllabus
Number systems and codes. Parity: Logic gates and Boolean Algebra. Universal logic gates (Nand gates); Combinational logic circuits; Design and construct project; Flip-flops and related devices; Digital Arithmetic: operations and circuits, Two's complement addition and subtraction, Overflow; Counters and registers, Shift register applications; Design of synchronous, sequential circuits, Designs of synchronous, cascadable counters (BCD and binary); Integrated circuit logic families; Tri-state signals and data-bases; MSI logic circuits, Applications of multiplexers, demultiplexers, decoders, priority encoders, magnitude comparators; Applications of programmable logic devices, Major project utilising programmable logic devices; Interfacing with the analog world; Memory devices; Introduction to microprocessors, stored-program computer architecture, instruction codes and addressing modes, instruction execution cycle; Digital design of an arithmetic-logic-unit for a computer. Human communication; technical skills in written, numeric and graphical communication, word processors.
**ELEC 1102 Foundations of Electronic Circuits**  
6 credit points  
**Offered:** July.  
**Prerequisite:** Advisory Prerequisite: MATH 1001 Differential Calculus.  
**Assumed knowledge:** HSC Physics 2 unit.  
**Classes:** Six contact hours per week combining lectures, laboratory work, computing, tutorials and projects.  
**Assessment:** Presentations, reports and assignments plus two 2hr exams at the end of the semester.  

Core unit of study for the degrees in Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.  

**Syllabus**  
Linear DC circuit elements and laws, and series and parallel circuits; concepts of equivalent circuits; operational amplifiers and circuits; network analysis. Capacitors and inductors; first order circuits and transient responses; step responses; complex numbers, phasors, impedance and admissance; steady state analysis; frequency analysis; frequency response of RLC circuits; filters; AC power, reactive power and power factor. Electrical measurement tools. Safety issues. Computer based simulation of circuits. Computer communication tools such as spread sheets, charting and drawing packages. Management of people, documents and projects.  

**ELEC 2001 Electrical and Electronic Engineering**  
6 credit points  
**Offered:** February.  
**Prerequisite:** ELEC 1001 Introductory Electrical Engineering.  
**Prohibition:** ELEC 2001 Electrical and Electronic Engineering A, and ELEC 2101 Circuit Analysis, and ELEC 2401 Introductory Electronics, and ELEC 2601 Microcomputer Systems.  
**Classes:** (Three lec and 3hrs lab/tut) per wk.  
**Assessment:** Lab reports and assignments and a 3hr exam at end of semester.  

Core unit of study for Mechatronic Engineering.  

**Syllabus**  

**ELEC 2003 Electrical and Electronic Engineering A**  
4 credit points  
**Offered:** February.  
**Prerequisite:** ELEC 1001 Introductory Electrical Engineering.  
**Prohibition:** ELEC 2001 Electrical and Electronic Engineering A, and ELEC 2101 Circuit Analysis, and ELEC 2401 Introductory Electronics, and ELEC 2601 Microcomputer Systems.  
**Classes:** (Three lec and 3hrs lab/tut) per wk.  
**Assessment:** Lab reports and assignments and a 3hr exam at end of semester.  

Core unit of study for Mechanical Engineering.  

**Syllabus**  


**ELEC 2101 Circuit Analysis**  
4 credit points  
**Offered:** February.  
**Prerequisite:** Advisory Prerequisite: ELEC 1102 Foundations of Electronic Circuits.  
**Prohibition:** ELEC 2001 Electrical and Electronic Engineering, and ELEC 2002 Electrical Technology, and ELEC 2003 Electrical and Electronic Engineering A.  
**Classes:** (Two iec and 2hrs tut) per week.  
**Assessment:** Assignments and a 2hr exam at end of semester.  

Core unit of study for Electrical, Electrical (Information Systems), Computer and Telecommunications Engineering. Recommended elective unit of study for Software Engineering.  

**Syllabus**  

**ELEC 2301 Signals and Systems**  
4 credit points  
**Offered:** July.  
**Prerequisite:** Advisory Prerequisite: MATH 1001 Differential Calculus, and MATH 1002 Linear Algebra, and MATH 1003 Integral Calculus and Modelling, and MATH 1004 Discrete Mathematics.  
**Prohibition:** MATH 3019 Signal Processing and MATH 3909 Signal Processing (Adv).  
**Classes:** (Two lec and an average of 2 hrs lab/tut) per week.  
**Assessment:** Lab, assignments and a 2hr exam at end of semester.  

Core unit of study for Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.  

**Syllabus**  

**ELEC 2401 Introductory Electronics**  
4 credit points  
**Offered:** July.  
**Prerequisite:** Advisory Prerequisite: ELEC 1102 Foundations of Electronic Circuits.  
**Prohibition:** ELEC 2001 Electrical and Electronic Engineering, and ELEC 2002 Electrical Technology, and ELEC 2003 Electrical and Electronic Engineering A.  
**Classes:** (Two lec and an average of 2 hrs lab/tut) per week.  
**Assessment:** Lab work and a 2hr exam at end of semester.  

Core unit of study for Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.  

**Syllabus**  
Basics of semiconductors, diodes, transistors; small-signal and large-signal models, rectification, biasing, gain; FET and BJT circuits, introduction to operational amplifiers.
ELEC 2601 Microcomputer Systems
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: ELEC 1101 Foundations of Computer Systems. Prohibition: ELEC 2001 Electrical and Electronic Engineering and ELEC 2003 Electrical Electronic Engineering A. Classes: (Two lec and an average of 2 hrs lab/tut per week. Assessment: Lab, assignments and a 2hr exam at end of semester.

Core unit of study for Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.

Syllabus

Computer architecture and assembly language programming. Microprocessor and microcontroller systems, memory and I/O interfacing, interrupts and interrupt handling. Serial and parallel communications. Elements of real time control; CPU and memory security and protection. System design, implementation and debugging.

ELEC 3101 Circuit Theory and Design
4 credit points
Offered: July. Prerequisite: Advisory Prerequisites: ELEC 2101 Circuit Analysis, and ELEC 2301 Signals and Systems. Classes: (2 lec and one 2hr tut)/wk. Assessment: Assignments, labs and an exam at the end of semester.

Recommended elective unit of study for Electrical and Telecommunications Engineering.

Syllabus

The main aim of the unit is to teach the theory and design of active and passive analog filters. Topics covered include: Review of network functions: approximation techniques such as Butterworth, Chebyshev characteristics; filter sensitivity to parameters; passive network synthesis; active RC filters; switched capacitor filters.

ELEC 3102 Engineering Electromagnetics
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: PHYS 2203 Physics2EE and ELEC 2101 Circuit Analysis. Classes: (Two lec and a 2hr tut) per week. Assessment: Questions in lec/tut and a 2hr exam at end of semester.

Core unit of study for the degrees in Electrical, Electrical (Information Systems) and Telecommunications Engineering.

Syllabus

Transmission lines (circuit theory is used to derive wave phenomena) - revision of circuit elements and static fields; Maxwell’s Equations in integral form; distributed circuits, characteristic impedance, waves in transmission lines, steady state and transient behaviour, reflections, Voltage Standing Wave Ratio, impedance transformation, and matching. Fields and waves (Maxwell’s equations are used to derive wave phenomena) - revision of boundary problems; Maxwell’s equations in differential form; plane waves and the analogy with transmission lines, reflection of waves at boundaries, atmospheric wave propagation, propagation in waveguides, waveguide components, radiation patterns of antennas and arrays; numerical methods.

ELEC 3103 Electrical Engineering Design
4 credit points
Offered: July. Prerequisite: Advisory Prerequisites: ELEC 2101 Circuit Analysis, ELEC 2301 Signals and Systems, ELEC 2401 Introductory Electronics, and ELEC 2601 Microcomputer Systems. Classes: (One lec and a 2 hr lab) per week. Assessment: Lab, assignments and a 1 hr exam at end of semester.

Recommended elective unit of study for Electrical and Software Engineering.

Syllabus

This is a laboratory based unit where the topics involve a number of areas such as instrumentation, communications, sensing, lighting, thermal design and protection. The aim is to develop an integrated approach using basic concepts drawn from the major disciplines of Electrical and Electronic Engineering.

ELEC 3201 Electrical Energy Systems Fundamentals
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: ELEC 2101 Circuit Analysis. Classes: (Two lec and a 2 hr lab/tut) per week. Assessment: Assignments, a quiz and a 2hr exam at end of semester.

Core unit of study for the degree in Electrical Engineering.

Syllabus

Systems consisting of electromechanical converters (electrical machines), electrochemical converters (batteries, fuel cells) and electronic converters as well as basic circuit elements. An introduction to conventional and alternative renewable/non-renewable energy sources, energy transmission, markets and distribution. Basic techniques of systems modelling and analysis including per unit systems, transformers, lines, interference, power flows, transients, balanced faults, control of real and reactive power. Applications to household, transport, industrial and high voltage systems. Use of MATLAB as a modelling and simulation tool.

ELEC 3202 Power Electronics and Drives
4 credit points
Offered: July. Prerequisite: Advisory Prerequisites: ELEC 2101 Circuit Analysis, and ELEC 2401 Introductory Electronics. Classes: (Two lec and a 2hr lab/tut) per week. Assessment: Lab reports, assignments and a 2hr exam at end of semester.

Recommended elective unit of study for Electrical Engineering.

Syllabus

Applications and historical context, principles of electronic control of power flow, power semiconductors, phase controlled rectifiers and derivatives, AC-AC phase control, DC-DC converters, DC-AC converters. Electromagnetic transducers, rotating magnetic field principles, synchronous machines, induction machines, electronically controlled machine operation.

ELEC 3302 Fundamentals of Feedback Control
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: ELEC 2301 Signals and Systems. Prohibition: MECH 3800 Systems Control and CHNG 3302 Process Control. Classes: (Two lec and a 2hr lab/tut) per week. Assessment: Lab reports and a 2hr exam at end of semester.

Core unit of study for Electrical, Electrical (Information Systems), Computer and Telecommunications Engineering. Recommended elective unit of study for Software Engineering.

Syllabus

History and review of control. Modelling of physical processes; state variables and differential equations. Dynamic response; review of Laplace transform, transfer functions and block diagrams, poles and zeros. Design specifications in the time domain. Basic feedback principles; effect of feedback on sensitivity and disturbance rejection, steady state accuracy and stability; the Routh criterion; proportional, integral and derivative control. Design using the root locus; rules for sketching root locus; lead and lag compensators; analogue and digital implementation of controllers. Frequency response design methods; the Nyquist stability criterion; design specifications in the frequency domain, gain and phase margins; compensator design. An introduction to state space for single input single-output systems; eigenvalues, zeroes and transfer functions; introduction to state variable feedback and design of estimators.

ELEC 3303 Digital Signal Processing
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: ELEC 2301 Signals and Systems. Prohibition: Prohibition: ELEC 4303 Digital Signal Processing. Classes: (Two lec and a 2hr lab/tut) per week. Assessment: Lab reports, assignments and a 2hr exam at end of semester.

Core unit of study for Electrical, Electrical (Information Systems), Computer and Telecommunications Engineering.

Syllabus

Review of discrete time signals and systems: time domain and frequency domain representations, advanced difference equations, stability analysis, magnitude and phase response, linear

**ELEC 3401 Electronic Devices and Circuits**
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 2401 Introductory Electronics and ELEC 2101 Circuit Analysis.
Classes: (2 lec and a 2hr lab) per week. Assessment: Lab and a 2hr exam at end of semester.
Core unit of study for Electrical, Electrical (Information Systems), Computer and Telecommunications Engineering. Recommended elective unit of study for Software Engineering.

**Syllabus**
Basics and models of semiconductor devices (diode, JFET, MOSFET and BJT), IC fabrication (bipolar and MOS), amplifier frequency response, current sources and mirrors, power amplifiers, operational amplifiers and applications, power supplies, oscillators and phase locked loops.

**ELEC 3402 Communications Electronics**
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits. Classes: (2 lec and an average of 2 hr lab/week) per week. Assessment: Practical work and a 2hr exam at end of semester.
Core unit of study for Electrical (Information Systems) and Telecommunications Engineering. Recommended elective unit of study for Electrical Engineering.

**Syllabus**
Photonic devices and models (semiconductor optical properties, lasers and photodiodes), optical transmitters and modulation, optical amplifiers, optical receivers, basic opto-electronic link, tuned amplifiers, oscillators, modulation/demodulation circuits, mixers, feedback amplifiers, high frequency amplifiers.

**ELEC 3403 Switching Devices-High Speed Electronics**
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits. Classes: (2 lec and an average of 2 hr lab/week) per week. Assessment: Practical work and a 2hr exam at end of semester.
Core unit of study for Electrical (Information Systems) and Computer Engineering. Recommended elective unit of study for Electrical and Telecommunications Engineering.

**Syllabus**
Solid state physics, PN and metal-semi junctions, semiconductor devices, digital devices (TTL, Schottky TTL, nMOS and CMOS), inverter and basic gates, output stage (open drain and tri-state), metastability and latch-up in CMOS, logic family characteristics (voltage levels, noise margins, power and switching speed), interfacing logic families, protection and opto-isolators, digital circuits (switch debouncing, driving relays, reset circuits, oscillators), high speed analogue interfacing (transmission line effects and termination, inductive loads, line drivers, RFI, cross-talk and shielding).

**ELEC 3502 Random Signals and Communications**
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite:ELEC 2301 Signals and Systems. Classes: (2 lec and 2 hr lab/week) per week. Assessment: Assignment and lab marks and an exam at end of semester.
Core unit of study for Electrical, Electrical (Information Systems), Computer and Telecommunications Engineering. Recommended elective unit of study for Software Engineering.

**Syllabus**
An overview: sources, channels and limits to communication, signals and spectra, distortionless transmission, linear and non-linear distortion, transmission loss. Noise: Signals: probability and random variables, probability functions, statistical averages, probability models, random processes, random signals. Signal transmission with noise: noise models, signal-to-noise ratio, pulse detection and matched filters. Analog communication: bandpass systems and signals, double-sided amplitude modulation (AM), modulation and demodulation, suppressed sideband amplitude modulation, frequency conversion and demodulation, frequency(phase) modulation (FM/PM), transmission bandwidth and distortion, generation and detection of FM/PM, interference, receivers for FM/PM, frequency division multiplexing, a case study of analog communication systems, noise in analog communication systems.

**ELEC 3503 Introduction to Digital Communications**
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: ELEC 2301 Signals and Systems. Classes: (2 lec and 2 hr lab/week) per week. Assessment: Assignment and lab marks and an exam at end of semester.
Core unit of study for Electrical, Electrical (Information Systems), Computer and Telecommunications Engineering. Recommended elective unit of study for Software Engineering.

**Syllabus**
Introduction: to Communications systems, components, signals and channels, sampling, quantization, pulse amplitude modulation (PAM), pulse code modulation (PCM), quantisation noise, time division multiplexing, delta modulation. Digital communications: baseband signals, digital PAM, eye diagram, equalisation, correlation, coding, error probabilities in baseband digital transmission, bandpass transmission, digital amplitude shift keying (ASK), frequency shift keying (FSK), phase shift keying (PSK) and quadrature shift keying (QPSK), error probabilities in bandpass digital transmission, a case study of digital communication systems. Introduction to information theory: fundamental limits in communications, channel capacity and channel coding, signal compression.

**ELEC 3601 Digital Systems Design**
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: ELEC 2601 Microcomputer Systems or COMP 2001 Computer Systems. Classes: Two lec per week and nine 3hr lab sessions. Assessment: A 2 hr exam at end of semester.
Core unit of study for the degrees in Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.

**Syllabus**
Structure of digital systems, programmable logic, erasable programmable logic devices (EPLD), field programmable gate arrays (FPGA), state machine design, datapath functions, computer arithmetic, serial and parallel arithmetic/logic-units, computer design, computer upgrade design exercise, design for testability, arithmetic pipe-lines, digital systems design project, specification languages, simulation.

**ELEC 3604 Internet Engineering**
4 credit points
Core unit of study for Computer and Software Engineering. Recommended elective unit of study for Electrical, Electrical (Information Systems) and Telecommunications Engineering.

**Syllabus**
Introduction to OSI stack. Standards organisation. Review of circuit and packet switching. Internet Protocol (IP), Transport Control Protocol, User Datagram Protocol; Elementary sockets; advanced sockets; IPv4 and IPv6; Mobile Internet Protocol; Routing sockets; Datalink access; Client server design and pro-
gramming models; Multicasting; Session access protocol; session description protocol; real-time protocol; Applications and standards; some study cases.

ELEC 3701 Management for Engineers
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: Nil.
Classes: (2 lec and 1 hr tut) per week. Assessment: Lab Based Teaching, assignments and a 2hr exam at end of semester.
Recommended elective of study for the degrees in Electrical and Electronic (Information Systems) Engineering.
Syllabus
Engineers and management; Microeconomics; Macroeconomics; Managerial decision making; Behaviour of people in organisations; Human resource management for engineers; Strategic management; Accounting and management; Operations management; Marketing for engineers; The legal environment of business; Industrial relations; Engineering project management.

ELEC 3801 Fundamentals of Biomedical Engineering
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: ELEC 2401
Introduction to Electronics or ELEC 2001 Electrical and Electronic Engineering or ELEC 2003 Electrical and Electronic Engineering A.
Classes: Two lec and an average of 2 hours lab/tut per week.
Assessment: Lab reports and a 2hr exam at end of semester.
Recommended elective unit of study for Electrical Engineering.
Syllabus

ELEC 4201 Electrical Systems Modelling & Analysis
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: ELEC 3201
Introduction to Electrical Energy Systems. Classes: Two lec and a 2hr lab/tut per week. Assessment: Assignments and a 2hr exam at end of semester.
Recommended elective unit of study for Electrical Engineering.
Syllabus
A range of topics will be presented related to electrical systems analysis, with a particular focus on electric power systems. Modelling of power system components. Analysis of power systems under normal operating conditions. Faults and protection. Transmission line transients. An introduction to various aspects of transient stability, voltage and long-term stability, dynamic stability. The electric power systems of the 21st century. Introduction to software packages such as EUROSTAG, EMPT.

ELEC 4301 Computer Control System Design
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: ELEC 3302
Fundamentals of Feedback Control. Classes: (Two lec and a 2hr lab/tut) per week. Assessment: Assignments, midterm quiz and a 3hr exam at end of semester.
Recommended elective unit of study for Electrical and Computer Engineering.
Syllabus
Discrete models for sampled data systems, sampling and zero order hold equivalent, properties of difference equations including stability. Z transform, input output models (eg, pulse transfer function), stability tests (Jury's test, Nyquist criterion, Lyapunov method), sensitivity and robustness, optimal control including Kalman filter and linear quadratic regulator, approximations of continuous time controllers, finite word length implementations.

ELEC 4302 Image Processing and Computer Vision
4 credit points
Offered: July. Prerequisite: Advisory Prerequisites: ELEC 2301 Signals and Systems, and ELEC 4303 Digital Signal Processing.
Classes: (Two lec and a 1-hr tut) per week. Assessment: Assignments and a 2hr exam at end of semester. Recommended elective unit of study for Electrical, Electrical (Information Systems) and Software Engineering.
Syllabus
Mathematical preliminaries: two-dimensional (2D) signals and systems, image models and image transformation, image digitalisation: visual perception, sampling, quantisation and colour representation. Image enhancement and restoration; histogram modelling, spatial and transform operations, filtering, deconvolution and extrapolation. Image compression: predictive methods, transform coding, vector quantisation and fractal based methods. Image reconstruction: Radon transform and projection theorem computer tomography (CT) and magnetic resonance imaging (MR) systems and three-dimensional (3D) imaging. Image analysis and computer vision; edge detection and boundary extraction, region and object representation, image segmentation and pixel classification, texture analysis and scene detection and matching.

ELEC 4401 Electronic Design
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 2301 Signals and Systems, and ELEC 3302 Fundamentals of Feedback Control and ELEC 3401 Electronic Devices and Circuits.
Classes: (Two lec and a 2hr lab/tut) per week. Assessment: Assignments and/or quizzes, lab work and a 2hr exam at end of semester.
Core unit of study for Electrical (Information Systems) Engineering. Recommended elective unit of study for Electrical, Computer and Telecommunications Engineering.
Syllabus
Electronic design practice, passive and active component models, electronic circuit analysis, linear and nonlinear circuits for digital and analogue communication systems, operational amplifier circuits in practice, theory and application of phase locked loops, integrated circuit techniques, electronic filter design and implementation, analog-digital conversion techniques, distortion and noise in electronic circuits, special topics in electronic design.

ELEC 4402 Integrated Circuit Design
4 credit points
Offered: February. Prerequisite: Advisory Prerequisite: ELEC 3401
Electronic Devices and Circuits. Classes: (Two lec and a 2hr lab/tut) per week. Assessment: A design project and a 2hr exam at end of semester.
Recommended elective unit of study for Electrical, Electrical (Information Systems) and Computer Engineering.
Syllabus
Technology (IC production process, design rules, layout). Design automation and verification (DRC, circuit extraction, simulation and hardware design languages). Basic digital building blocks (inverters, simple logic gates, transmission gates, propagation delays, power dissipation and noise margins). Digital circuits and systems (PLAs, dynamic circuits, RAM, ROM, microprocessors, systolic arrays). Semicustom design (gate arrays and standard cells). Analog VLSI (switches, active resistors, current sources and mirrors, voltage, current references, amplifiers, DAC, ADC, continuous time filters, switch capacitor circuits, analog signal processing circuits).

ELEC 4501 Data Communication Networks
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (Two lec and a 2hr lab/tut) per week. Assessment: Assignments, lab work and a 2hr exam at end of semester.
Core unit of study for Electrical (Information Systems) and Telecommunications Engineering. Recommended elective unit of study for Electrical and Software Engineering.

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Syllabus

ELEC 4502 Digital Communication Systems
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec & 1 hr lab/tut)/wk. Assessment: Assignments, lab work and one 2hr exam at end of Sem 1.
Core unit of study for Electrical (Information Systems) and Telecommunications Engineering. Recommended elective unit of study for Electrical and Computer Engineering.

Syllabus

ELEC 4503 Error Control Coding
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec & 1 hr lab/tut)/wk. Assessment: Assignments and a 2hr exam at end of semester. Recommended elective unit of study for Electrical, Electrical (Information Systems) and Telecommunications Engineering.

Purpose
To introduce students to error control coding fundamentals and applications in communication and data storage systems.

Expected Outcomes
Students will gain a broad appreciation of principles of error control coding techniques, applications in various communication and data storage systems, performance analysis in noisy environment and implementation of codec devices. Assumed Understanding/Previous Coursework Familiarity with the concepts of error probability, studied in ELEC 3502, and introductory information theory, covered in ELEC 3503, is assumed.

Syllabus
Error control coding principles, linear algebra, linear block codes, cyclic codes, BCH codes, Reed-Solomon codes, burst-error correcting codes, design of codec for block codes, applications of block codes in communications and digital recording, convolutional codes, Viterbi algorithm, design of codec for convolutional codes, applications of convolutional codes in communication channels, soft decision decoding of block and convolutional codes, trellis coded modulation, block coded modulation, design of codec for trellis codes, applications of trellis codes in data transmission, multidimensional codes, turbo codes.

ELEC 4601 Computer Design
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 3403 Switching Devices and High Speed Electronics, and ELEC 3601 Digital Systems Design. Classes: (2 lec and a 2hr lab/tut) per week. Assessment: Assignments, lab reports and a 2hr exam at end of semester.
Core unit of study for the degree in Electrical (Information Systems) and Computer Engineering. Recommended elective unit of study for Electrical, Software and Telecommunications Engineering.

Syllabus

ELEC 4602 Real Time Computing
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 3601 Digital Systems Design and COMP 3100 Software Engineering. Classes: (2 lec & one 2hr lab/hwk). Assessment: Lab marks, reports and a 2hr exam at the end of semester.
Core unit of study for Electrical (Information Systems), Computer and Software Engineering. Recommended elective unit of study for Electrical and Telecommunications Engineering.

Syllabus

ELEC 4604 Engineering Software Requirements
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: COMP 3100 Algorithms. COMP 3205 Product Development Project, ELEC 3601 Digital Systems Design and ELEC 3701 Management for Engineers. Classes: (2 lec and 2 hr lab/hwk) per week. Assessment: Lab work, project and a 2h exam at end of semester.
Core unit of study for Software Engineering.

Syllabus
The objective of this course is for students to become aware of issues, tools and techniques involved in the engineering of software to meet specific performance, safety and security requirements; to understand the factors that affect software reliability and be familiar with design techniques that can enhance reliability. Topics covered include: systems design process; system specifications; functional decomposition; safety requirements aspects; security requirements; reliability concepts, models and design techniques.

ELEC 4701 Project Management
4 credit points
Offered: July. Prerequisite: Advisory Prerequisite: ELEC 3701 Management for Engineers. Classes: (Two lec and one 2hr tutorial/ laboratory) per week. Assessment: Assignments and in-course involvement, and a 2hr exam at end of semester.
Recommended elective unit of study for Electrical and Telecommunication Engineering.

Syllabus
The New Technology Based Firm (NTBF) and its role in wealth and job creation. The innovation process, entrepreneurship, the business plan and new venture creation. Research and development, intellectual property, patents, product development and marketing. Relevant legal, liability and commercial issues.

ELEC 4702 Practical Experience
0 credit points
Offered: February. Assessment: Assessment in this unit is by the submission, within the first two weeks of the February semester, of a written (hand or typed) report of about 2500 words of the industrial experience undertaken in accordance with regulations. This report is to be general in nature, indicating the overall structure of the
company, the areas that the student became familiar with and their relationship to the firm and finally, what the student did. Detailed material may be incorporated as appendices if desired, and the student should have the report vetted beforehand by a responsible officer of the company. It is necessary for the student to obtain industrial experience of 12 weeks’ duration. This experience is normally gained at the end of Senior year before entering Senior Advanced Year. The work which is acceptable to the Faculty may range from process-type work in a large industrial complex, where many different engineering processes and labour management relations may be observed, to semi professional or research work with small specialist companies. The responsibility rests with the student to obtain work acceptable to the Faculty. Although the University, through the Department of Electrical Engineering and the Careers and Appointments Service, will assist as much as possible.

Core unit of study for the degrees in Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.

ELEC4703 Thesis
12 credit points
Offered: July. Prerequisite: A minimum of 36 credit points from third and fourth year units of study. Classes: There are no formal classes. The bulk of the work will be carried out during the July semester with some preparatory work in the February semester. Assessment: Thesis, final presentation and interim progress submissions.

Core unit of study for the degrees in Electrical, Electrical (Information Systems), Computer, Software and Telecommunications Engineering.

Syllabus
Each student is required to select a topic, carry out background searches, experimental investigations, and to document such achievements and conclusions as are appropriate. The subject requires a consistent and significant effort equivalent to one or two hours per week in Semester 1, and two days per week in Semester 2.

ELEC 4704 Software Project Management
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: COMP 3100 Algorithms, COMP 3205 Product Development Project and ELEC 3701 Management for Engineers. Classes: (2 lec and 2 hr lab/tut) per week. Assessment: Lab work, project and a 2hr exam at end of semester.

Core unit of study for Software Engineering.

Syllabus
The objective of this course is for students to understand the issues involved in software project management and the factors that affect software quality; to be familiar with a range of standards, techniques and tools developed to support software project management and the production of high quality software; and to be able to develop software project plans, supporting software quality plans and risk management plans. Topics covered include project management issues such as client management; management of technical teams; project planning and scheduling; risk management; configuration management; quality assurance and accreditation; legal issues. Topics on software quality include: factors affecting software quality; planning for quality; software quality assurance plans; software measurement; Australian and international standards.

ELEC 5501 Communication Networks (Advanced)
4 credit points
Offered: July. Prerequisite: Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec and a 1 hr tut) per week. Assessment: Assignments and a 2hr exam at end of semester.

Recommended elective unit of study for Electrical, Electrical (Information Systems) and Telecommunications Engineering.

Syllabus

ELEC 5502 Satellite Communication Systems
4 credit points
Offered: July. Prerequisite: Advisory Prerequisites: ELEC 3502 Random Signals and Communications, ELEC 3503 Introduction to Digital Communications and ELEC 4502 Digital Communication Systems. Classes: (Two lec and a 1 hr tut) per week. Assessment: Assignments and a 2hr exam at end of semester.

Recommended elective unit of study for Electrical, Electrical (Information Systems) and Telecommunications Engineering.

Purpose
The course is designed to provide students with knowledge of satellite communication techniques and applications in fixed and mobile services.

Expected Outcomes
Students will gain detailed knowledge of digital signalling techniques in modern satellite communication systems, with particular emphasis on satellite mobile communications.

Assumed Understanding/Previous Coursework
Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation, studied in ELEC 3502, ELEC 3503 and ELEC 4502, is assumed.

Syllabus
Introduction to satellite communication, satellite link design, propagation characteristics of fixed and mobile satellite links, channel modelling, access control schemes, system performance analysis, system design, mobile satellite services, global satellite systems, national satellite systems, mobile satellite network design, digital modems design, speech codec design, error control code design, low earth orbit communication satellite systems.

ELEC 5503 Optical Communication Systems
4 credit points
Offered: July. Prerequisite: Advisory Prerequisites: ELEC 3402 Communications Electronics, ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (Two lec and a 1 hr tut) per week. Assessment: Assignments and a 2hr exam at end of semester.

Recommended elective unit of study for Electrical, Electrical (Information Systems) and Telecommunications Engineering.

Syllabus
Introduction to optical fibre communications, optical fibre transmission characteristics, semiconductor and fibre laser signal sources, optical transmitters, direct and external modulation, optical amplifiers, optical repeaters, fibre devices and multiplexers, fibre nonlinearity, optical detectors, optical receivers and regenerators, sensitivity and error rate performance, photonic switching and processing, lightweight local area networks, multi-channel multiplexing techniques, optical fibre communication systems.

ELEC 5504 Cellular Radio Engineering
4 credit points
Offered: February. Prerequisite: Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec and a 2hr lab/tut) per week. Assessment: Assignments and a 2hr exam at end of semester.

Recommended elective unit of study for Electrical, Electrical (Information Systems) and Telecommunications Engineering.

Syllabus
Antenna basics: analysis of simple antennas, uniform linear antenna arrays, planar array, base-station antennas, mobile antennas. Mobile radio channel: multipath fading, diversity, log-normal fading, mean propagation loss, propagation models. Cellular technologies: cell types, coverage, frequency allocation, link budget, power budget, traffic capacity, TDMA cellular systems - GSM standard: coding and modulation, special characteristics
and features, logical and physical channels, frame structure, general packet radio services (GPRS), GSM evolution towards UMTS. CDMA cellular systems - IS-95 standard: physical and logical channels, asynchronous data, short message service, packet data services for CDMA cellular/PCS systems, cdma2000 layering structure.

ELEC5506 Optical Networks

4 credit points

Offered: July. Prerequisite: ELEC 3502

Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec and a 1 hr tut) per week.

Assessment: Assignments and a 2hr exam at end of semester.


Recommended elective unit of study for Electrical, Electrical (Information Systems), Computer and Telecommunications Engineering.

Syllabus

Introduction, photonic network architectures: point to point, star, ring, mesh; system principles: modulation formats, link budgets, optical signal to noise ratio, dispersion, error rates, optical gain and regeneration; wavelength division multiplexed networks; WDM components: optical filters, gratings, multiplexers, demultiplexers, wavelength routers, optical crossconnects, wavelength converters, WDM transmitters and receivers; Wavelength switched/routed networks, ultra high speed TDM, dispersion managed links, soliton systems; broadcast and distribution networks, multiple access, subcarrier multiplexed lightwave video networks, optical local area and metropolitan area networks; protocols for photonic networks: IP, Gbit Ethernet, SDH/SONET, FDDI, ATM, Fibre Channel.

ELEC 5608 Electronic Commerce

4 credit points

Offered: July. Prerequisite: COMP 2002

Design and Data Structures and COMP 2004 Programming Practice. Classes: (2 lec and 2 hr lab/tut) per week.

Assessment: Lab mark and an exam at end of semester.


Recommended elective unit of study for Electrical, Electrical (Information Systems), Computer and Software Engineering.

Syllabus


ELEC 5611 Advanced Computer Engineering

4 credit points

Offered: July. Prerequisite: ELEC 4601 Computer Design.

Offered. Classes: (Two lec and a 2hr lab/tut) per week.

Assessment: Laboratory and a 2hr exam at the end of semester.

Recommended elective unit of study for Electrical, Electrical (Information Systems), Computer and Software Engineering.

Syllabus

This unit of study covers one of the following topics: advanced computer architecture, advanced digital engineering and/or hardware software co-design. The school will advise prior to enrolment what material will be covered in a particular year.


Hardware Software Codesign: Hardware Specification; Software Specification; CAD tools Review of Operating System Principles; Review of Computer Bus and I/O Systems; Interrupts and DMA; I/O Device Abstraction; Device Drivers; Microcode Design; Hardware/software partitioning; Reconfigurable computing.

ELEC 7503 Optical Communication Systems

6 credit points

Offered: July. Prerequisite: ELEC 3402 Communications Electronics, ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec and a 1 hr tut) per week.

Assessment: Assignments and a 2hr exam at end of semester.

Recommended elective unit of study for Electrical, Electrical (Information Systems), Computer and Software Engineering.

Syllabus

Introduction, photonic network architectures: point to point, star, ring, mesh; system principles: modulation formats, link budgets, optical signal to noise ratio, dispersion, error rates, optical gain and regeneration; wavelength division multiplexed networks; WDM components: optical filters, gratings, multiplexers, demultiplexers, wavelength routers, optical crossconnects, wavelength converters, WDM transmitters and receivers; Wavelength switched/routed networks, ultra high speed TDM, dispersion managed links, soliton systems; broadcast and distribution networks, multiple access, subcarrier multiplexed lightwave video networks, optical local area and metropolitan area networks; protocols for photonic networks: IP, Gbit Ethernet, SDH/SONET, FDDI, ATM, Fibre Channel.

ELEC 7504 Cellular Radio Engineering

6 credit points

Offered: February. Prerequisite: ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec and a 2hr lab/tut) per week.

Assessment: Assignments and a 2hr exam at end of semester.


ELEC 7506 Optical Networks

6 credit points

Offered: July. Prerequisite: ELEC 3502

Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications. Classes: (2 lec and a 1 hr tut) per week.

Assessment: Assignments and a 2hr exam at end of semester.

Recommended elective unit of study for Electrical, Electrical (Information Systems), Computer and Software Engineering.

Syllabus

ELEC 7608 Electronic Commerce

6 credit points

Offered: July. Prerequisite: COMP 2002

Design and Data Structures and COMP 2004 Programming Practice. Classes: (Two lec and a 2hr lab/tut) per week.

Assessment: Lab mark and an exam at end of semester.
Faculty of Engineering Handbook 2001


**ELEC 7611 Advanced Computer Engineering**
6 credit points
Offered: July.
Prerequisite: Advisory Prerequisite: ELEC 4601 Computer Design. Classes: (Two lex and a 2hr lab) per week.
Assessment: Laboratory and a 2hr exam at the end of the semester.
This unit of study covers one of the following topics: advanced computer architecture, advanced digital engineering and/or hardware software codesign. The school will advise prior to enrolment time what material will be covered in a particular year.


Hardware Software Codesign: Hardware Specification; Soft- ware Specication; CAD tools Review of Operating System Principles; Review of Computer Bus and I/O Systems; Inter- rupts and DMA; I/O Device Abstraction; Device Drivers; Mic- rocode Design; Hardware/software partitioning; Reconfigura- ble computing.

**ELEC 8521 Radio Frequency Engineering**
6 credit points
Offered: February, July.
The course covers several important subjects in radio frequency engineering, leading to the analysis and design of components and systems commonly encountered in radio systems. The course builds on an undergraduate degree in electrical engineer- ing and covers the following areas: transmission lines and cir- cuit descriptions; passive radio frequency components, includ- ing couplers, filters and power dividers; typical radio frequency circuits; radio frequency system characteristics, including noise, linearity, sensitivity, selectivity and distortion; basic radio fre- quency measurements; amplifier and oscillator design; frequen- cy translating circuits; non-linear and large signal characteris- tics; introduction to device modelling and circuit simulation. The course is targeted at engineers involved in the design, specifica- tion, implementation and support of radio frequency systems such as in mobile communications.

**ELEC 8522 Antennas and Propagation**
6 credit points
Offered: February, July.
The course provides the basic knowledge on antennas used in mobile communications and those topics of radio propagation essential to the task of cellular planning. Most attention is paid to antenna array meory and its application for base station an- tenna systems. Radio propagation starts from the basics of the theory, elementary description of fading, diffraction, depolarization and shadowing. The course then addresses issues of radio coverage predication and optimization using models and modern measurement techniques.

**ELEC 8525 GSM Advanced System Techniques**
6 credit points
Offered: February.
The course covers the system characteristics and practical im- plementation aspects of the international mobile telecommuni- cations system using the GSM standard. A systems perspective is taken and the course takes the participant through studies of traffic issues as well as the integration of the GSM network into the terrestrial parts of the network. The GSM protocol is dis- cussed in detail as well as its interpretation in terms of the inter- national OSI reference model. Signalling within the network, call setup, the air interface and the radio frequency layer are covered. Measurement and handover techniques, recommenda- tions of the ETSI organization, and an introduction to the new DCS 1800 standard complete the course.

**ELEC 8621 Signal & Video Processing**
for Multimedia
6 credit points
Offered: February, July.
Multimedia Signal Processing. Contents will be MPEG based, covering standards (MPEG-1, 2, 4 and 7), architecture, image/ video retrieval in a digital video library, content-based process- ing techniques, video coding, media fusion, human computer interaction/communications, intelligent multimedia, and applications.

**ELEC 8701 The Exploitation of New Ideas**
6 credit points
Offered: February, July.
The course covers the broad field of idea generation and how these ideas can be converted into wealth. The central core of the course is the study of technology contracts and how these are relevant in intellectual property (IP) issues. Intellectual property and patents are covered in some detail. The potential commer- cial value of intellectual property is addressed as is the process of licensing and sale of IP. The course includes quite practical advice and understanding from the viewpoint of the inventor/ developer of IP. It utilises a range of educational materials in- cluding videodisc, publications, licensing games, case studies, CD-ROM databases, and Internet-based material. The course includes visiting IP and legal professionals.

**ELEC 8702 New Venture Creation**
6 credit points
Offered: February, July.
This course is linked intimately to the progressive development of a detailed business plan for a commercial outcome. It uses a series of case studies, textbook, publications, visiting entrepre- neurs and video material. During the course the attendees are required to apply the developing new knowledge to the creation of their own business plan. The course encourages development of a team, and a focus on a particular product or service with ket potential. Attendees are encouraged to provide their own busi- ness concept. Otherwise, appropriate concepts will be developed within the course. It is intended that the final session of the course takes the form of a presentation of business plans to be reviewed and commented on by a panel of experienced venture capitalists and business managers. (Note that the February se- mester course will be given on two evenings per week over six weeks with the examination following one week later.)

**ELEC 8703 Integrated Product Design and Dev**
6 credit points
Offered: February, July.
This course presents product design and development as a pro- cess which integrates (a) the ket aspects of understanding cus- tomer and ket needs (as well as competitive products), (b) the technology possibilities which emerge from research and devel- opment and, (c) the design, manufacture, distribution and sup- port of the successful product. It addresses integration across functional areas in an organisation and the sort of demand that effective product development places on the enterprise as a whole. The course is based on proven industrial product devel- opment processes and will provide an effective framework in which product design and development can be managed. For designers, researchers, manufacturers, and keters, the course
Chapter 2 - Undergraduate units of study

ELEC 8704 Business Plan
2 credit points
Offered: February, July.
This one credit point unit is expected to take at least 26 hours of work researching, writing and presenting a significant report addressing the practical application of a major aspect of the Graduate Certificate in Technology Commercialisation courses. A satisfactory report is based on the submitted written document (70%), a poster presentation summary of the report (15%) and a verbal presentation of the report (15%). Suitable topics would include a commercialisation strategy for a specific technology or invention, a product design and development plan, or a business plan for the initial establishment funding of a new technology-based company.

ELEC 8801 Advanced Topics: Wireless Communication
6 credit points
Offered: February, July.
These units contain specific material on recent advances in the designated areas and content will change as necessary to accommodate advances in technology.

ELEC 8802 Advanced Topics in Integrated Systems
6 credit points
Offered: July.
These units contain specific material on recent advances in the designated areas and content will change as necessary to accommodate advances in technology.

ELEC 8803 Advanced Topics in Signal Processing
6 credit points
Offered: February, July.
These units contain specific material on recent advances in the designated areas and content will change as necessary to accommodate advances in technology.

ELEC 8805 Advanced Topics in Photonics
6 credit points
Offered: July.
These units contain specific material on recent advances in the designated areas and content will change as necessary to accommodate advances in technology.

ELEC 8900 Project, Full-Time
12 credit points
Offered: February, July.
The carrying out and writing up of an approved significant project equivalent to about four months full-time work in a topic preferably related to their course-work enrolment. It can be part of the candidate’s normal employment. As a guide, a project topic is likely to be satisfactory if a successful outcome of the work is such that it would lend itself to publication in a learned journal such as the Journal of the Institution of Engineers, Australia. The project may be carried out full-time over one semester or part-time over two semesters (part A followed by part B).

ELEC 8901 Project Part-Time Part A
6 credit points
Offered: February, July.
The carrying out and writing up of an approved significant project equivalent to about four months full-time work in a topic preferably related to their course-work enrolment. It can be part of the candidate’s normal employment. As a guide, a project topic is likely to be satisfactory if a successful outcome of the work is such that it would lend itself to publication in a learned journal such as the Journal of the Institution of Engineers, Australia. The project may be carried out full-time over one semester or part-time over two semesters (part A followed by part B).

ELEC 8904 Seminar
2 credit points
Offered: February, July.
Research and writing of a significant report or essay on an agreed topic within the area of the qualification being sought.

Mechanical Engineering

MECH 1501 Engineering Statics
4 credit points
Offered: July. Prohibition: MECH 1500 Mechanical Engineering.
Classes: 1 x 2hr plus 1 x 1hr lect-tut session/wk. Assessment: In class assessment, projects, exam.
First year core unit of study.
Syllabus
Introduction to Engineering mechanics, vectors, forces, components; moments - 2d and 3d; free body diagrams; 2d equilibrium; 3d equilibrium; trusses, frames and machines; centroids and centres of mass; friction; bearings and wedges
Course Objectives
Students should:
• Develop an understanding of and competence in solving statics problems in engineering.
• Improve their group work and problem solving skills.
Expected Outcomes
Students should be able to:
• Draw a correct free body diagram for any engineering entity
• Calculate the value of unknown forces and moments acting on any three dimensional object from the equilibrium equations
• Calculate the force in an internal member of a simple structure
• Calculate the forces acting as a result of two objects in contact
• Find the centre of mass or centroid of an object
• Work as an effective member of an engineering team
• Be able to outline a logical approach for solving a complex engineering problem
Textbooks

MECH 1511 Introductory Dynamics
4 credit points
Classes: lectures, problem solving workshop, and tutorial. Assessment: In class assessment, projects, exam.
First year elective unit of study for Aerospace Engineering students.
Syllabus
Introduction to kinematics and dynamics; position, velocity and acceleration of a point; straight line (rectilinear) motion; curvilinear motion; other coordinate systems; orbital mechanics; relative motion; force and acceleration; Newton’s 2nd law; equations of motion in Cartesian coordinates; equations of motion in other coordinates; momentum; linear & angular momentum; collisions; energy methods; work; power; kinetic energy; potential energy; mass flows & variable mass systems
Course Objectives
Students should:
• Develop an understanding of and competence in solving kinematic and dynamic problems in engineering.
• Improve their group work and problem solving skills.

Expected Outcomes

Students should be able to:

• Calculate the trajectory for a particle in 3 dimensional space
• Determine the forces acting an object undergoing acceleration
• Use momentum principles to determine the forces and motion of objects undergoing collisions
• Calculate the forces on an object with a variable mass, or mass flows
• Use energy methods to determine the kinematics of a particle under conservative forces
• Work as an effective member of an engineering team
• Be able to outline a logical approach for solving a complex engineering problem

Textbooks

MECH 1530 Engineering Mechanics
3 credit points

Offered: July. Prohibition: CIVIL1052 Statics MECH 1501

Engineering Statics MECH 1511 Introductory Dynamics MECH 1510 Kinematics and Dynamics MECH 1500 Mechanical Engineering 1. Classes: lectures, problem solving workshop and tutorial. Assessment: In-class assessment, projects, exam. First year core unit of study for Mechanical, Mechatronics, Biomedical, Aeronautical and Space Engineering students.

Syllabus

Introduction to Engineering mechanics, vectors, forces, components; moments - 2d and 3d; free body diagrams; 2d equilibrium; 3d equilibrium; trusses, frames and machines; centroids and centres of mass; friction; bearings and wedges; introduction to kinematics and dynamics; position, velocity and acceleration of a point; straight line (rectilinear) motion; curvilinear motion; other coordinate systems; orbital mechanics; relative motion; force and acceleration; Newton’s 2nd law; equations of motion in Cartesian coordinates; equations of motion in other coordinates; moment; linear and angular momentum; collisions; energy methods; work; power; kinetic energy; potential energy; mass flows & variable mass systems

Course Objectives

Students should:

• Develop an understanding of and competence in solving statics, kinematic and dynamic problems in engineering.
• Improve their group work and problem solving skills.

Expected Outcomes

Students should be able to:

• Draw a correct free body diagram for any engineering entity
• Calculate the value of unknown forces and moments acting on any three dimensional object from the equilibrium equations
• Calculate the force in an internal member of a simple structure
• Calculate the forces acting as a result of two objects in contact
• Find the centre of mass or centroid of an object
• Calculate the trajectory for a particle in 3 dimensional space
• Determine the forces acting an object undergoing acceleration
• Use momentum principles to determine the forces and motion of objects undergoing collisions
• Calculate the forces on an object with variable mass, or mass flows
• Use energy methods to determine the kinematics of a particle under conservative forces
• Work as an effective member of an engineering team
• Be able to outline a logical approach for solving a complex engineering problem

Textbooks
Bedford and Fowler Engineering Mechanics: Statics (vol 1) and Dynamics (vol 2) SI Edition, Addison Wesley

MECH 1540 Introductory Mechanical Engineering
5 credit points

Offered: February. Prohibition: AERO 1601 Aerospace Manufacturing, MECH 1500 Mechanical Engineering 1, MECH 1800 Computational Engineering 1A. Classes: Professional Engineering: 3 x 1 hr lecture–tute per week. Assessment: In-class assessments, assignments, exam. First year core unit of study for the degree in Mechanical and Mechatronic Engineering.

Syllabus Summary

Professional Engineering (3 Cr): structure and management of engineering projects, engineering project planning, engineering economics. Engineering management issues, total quality management, ethics, liability, environment, health, etc. Development of both verbal and written communication skills, accessing information.

Mechatronic Design: (2 Cr): Introduction to the design of mechatronic systems. Elements of mechatronic systems; actuators, sensors. Industrial examples.

Objectives

Students will develop skills in

• engineering management techniques
• working in groups
• verbal and written communication
• use of mechatronics elements

Expected outcomes

To develop an understanding of

• the role of professional engineers and their responsibilities
• the design of mechatronic systems

MECH 1545 Introductory Professional Engineering
3 credit points

Offered: February. Prohibition: AERO 1601 Aerospace Manufacturing MECH 1500 Mechanical Engineering 1. Classes: 3 x 1 hr lecture–tute per week. Assessment: In-class assessments, assignments, exam. First year core unit of study for the degree in Mechanical and Mechatronic Engineering.

Syllabus Summary

Structure and management of engineering projects, engineering project planning, engineering economics. Engineering management issues, total quality management, ethics, liability, environment, health, etc. Development of both verbal and written communication skills, accessing information.

Objectives

Students will develop skills in

• engineering management techniques
• working in groups
• verbal and written communication

Expected outcomes

To develop an understanding of

• the role of professional engineers and their responsibilities

MECH 1600 Manufacturing Technology
4 credit points

Offered: July. Prohibition: AERO 1600 Workshop Technology. Classes: One 3 hour lab per week. Assessment: Practical work. First year core unit of study for the degrees in Mechanical and Mechatronic Engineering

(a) Fitting - Measurement, measuring tools, marking tools, testing tools, holding tools, hammers, cutting tools, bolts and studs, tapping and screwing, reaming and scraping.

(b) Machining - Various metals and their machinability, cutting tool materials, cutting tool shape, the machine tools: lame, mill, grinder, drill, shaper, deburring and finishing operations.

(c) Welding - Various welding processes, distortions, flame cutting, resistance welding. Practical work in gas welding and arc welding.

(d) Heat treatment, blacksmithing and forging - Definition and importance of heat treatment, and the process of forging, normalising hardening, case hardening.

(e) Founding - Materials used in the foundry, moulding and core making, the casting process.

Safety requirements: All students are required to comply with the safety regulations. Students who fail to do this will not be permitted to enter the workshops. In particular, approved indus-
trial footwear must be worn, and long hair must be protected by a hair net. Safety glasses must be worn at all times.

Objectives
To develop an understanding of a range of machining and manufacturing processes required to make mechanical components

Expected outcomes
Students should develop skills in machining and manufacturing methods through practical experience

Textbooks
Library Classification: 671.

MECH 1802 C Programming
3 credit points
Offered: July. Classes: 1 hr lec and 2 hr lab/week. Assessment: One 2 hr exam and computer exercises.

First year core unit of study for the degree in Mechatronic Engineering

Syllabus Summary
Introduction to programming, program design, program structures, data types, program control, Preprocessor, tokens, storage classes and types. Basis I/O. Assignment: arithmetic, relational and bit manipulation operators. Control flow: if and switch statements. Arrays, for, do and while loops. Pointers and character strings. Functions, parameter passing. Derived storage classes, structures, unions and bit fields. File I/O. Software project management, debugging techniques, user interfaces.

Objectives
To provide a foundation for the study of systems and embedded programming in the degree in Mechatronic Engineering.

Expected outcomes
Students will develop skills in the design, coding, debugging, testing and documentation of C programs.

Textbooks
Deitel and Deitel C: How to program (Prentice Hall, 1994)
Reference Books
Kernihan and Ritchie The C programming Language 2nd ed (Prentice Hall, 1988)
McConnell Code Complete (Microsoft Press, 1994)

MECH1820 Introduction to Computing
6 credit points

First year core unit of study for Mechanical, Mechatronics, and Aeronautical Engineering.

Syllabus Summary

Programming in Matlab (3 Cr): Basic programming skills and techniques. Matlab as an interactive programming tool. Matlab as a programming language. Basic features: array operations; graphing; relations and logical operations. Linear algebra. Applications in mechanics and numerical analysis.

CAD (2 Cr): Elements of solid modelling systems; basic spatial concepts. The manufacture and assembly of machine components. Kinematics interaction and modelling, with examples taken from machinery.

Objectives
To provide a solid grounding in engineering programming.

Use of computers in engineering applications.

Expected outcomes
Students will develop skills in:

• basics of computer programming
• programming with Matlab
• problem-solving with Matlab
• understanding spatial concepts in design
• solving engineering mechanics problems with a solid modelling package

Textbooks
SolidWorks Course Notes, from Wentworth Copy Centre
The Student Edition of Madlab (Prentice Hall, 1995)
Excerpts from Etter, Engineering problem solving with Matlab (Prentice Hall, 1993)

MECH 2201 Thermodynamics 1
4 credit points
Classes: (2 lec and one 3hr lab/tut)/wk. Assessment: One 2 hr exam, assignments and laboratory work.
Second year core unit of study for the degree in Aeronautical Engineering.

Syllabus summary
Thermodynamics - concepts, work and heat, property of substances, 1st law of thermodynamics, control mass and control volume analysis of power and refrigeration cycles; thermal efficiency, entropy and 2nd law of thermodynamics, reversible and irreversible processes, isentropic efficiency.

Objectives
The understanding of thermodynamics fundamentals.

Expected Outcomes
To be able to understand engineering problems involving power systems, engine and refrigeration cycles.

Textbooks
Cengel and Boles, Thermodynamics, an Engineering Approach, 2nd edn (McGraw Hill)

Library Classification: 536.7, 621.4

MECH 2202 Fluids 1
2 credit points
Offered: July. Prerequisite: MATH 1001, MATH 1002, MATH 1003.

Assessment: One 1 1/2 hr exam, assignments and laboratory work.
Second year unit of study for the degrees in Mechanical and Mechatronic Engineering.

Syllabus Summary
Fluid properties, pressure, shear, hydrostatics, forces, moments, buoyancy, stability, continuity equations, streamlines, Euler, Bernoulli equations, linear momentum, propulsion, angular momentum, turbomachinery, dimensional analysis, boundary layers, pipe flow and friction.

Objectives
The understanding of fluids fundamentals.

Expected outcomes
To be able to analyse engineering problems involving fluid flow.

Textbooks
Potter and Wiggert, Mechanics of Fluids, Prentice-Hall.

Library Classification: 536.7, 621.4,532., 620.106

MECH 2300 Materials 1
4 credit points
Classes: 2 lectures and 1 hr tut/wk plus three 3 hr lab sessions.
Assessment: One 2 hr exam plus assignment work.
Second year core unit of study for the degrees in Mechanical Engineering and Aeronautical Engineering.

Syllabus Summary
Materials classification; understanding materials properties and their relation to structure as a function of forming methods and heat treatment processes; materials behaviour in service; selection criteria and case studies for engineering applications.

Objectives
To understand the classification of engineering materials, their properties in relation to microstructure.

Expected outcomes
Students should be able to appreciate the properties of a range of engineering materials and how and why these are connected with microstructures and forming and treatment methods.

Textbooks
Reference books
Ashby and Jones Engineering Materials 1-An Introduction to their
Properties and Applications (Pergamon, 1981)
Ashby and Jones Engineering Materials 2-An Introduction to
Microstructures, Processing and Design (Pergamon, 1986)
Bailey The Role of Microstructure in Metal (Metallurgical
Services, 1966)
Bailey Introductory Practical Metallography (Metallurgical
Services, 1966)
John Understanding Phase Diagrams (Macmillan, 1974)
Boudny Engineering Drawing (McGraw-Hill)

Syllabus summary
(a) Machine Drawing - freehand sketching of machine com-
ponents. Drafting techniques and standard drawing methods.
Orthogonal projections and sections. Dimensioning, toleranc-
ing, conventional symbols, detail and assembly drawings and
descriptive geometry.
(b) Machine Design - engineering innovation, creativity.
Teamwork. Design process, problem specification, conceptual
techniques and design evaluation. Ergonomic manufacturing
and assembly considerations.

Detail design of components including: design loads, failure
and factor of safety; calculation approach and presentation con-
ventions; stress effects in shape definition and material selec-
tion; introduction to engineering hardware including fasteners,
bearings and mechanical power transmission. Introduction to
involute gears and gear trains (including epicyclic).

Objectives
To develop an understanding of:
• the need for and use of standard drawings in the communica-
tion and definition of parts and assemblies
• creativity
• the design process from initial idea to finished product
• methods use to analyse designs
• standard components

Students will develop skills in:
• working in teams
• freehand sketching and drafting practices
• idea generation methods
• design analysis techniques and layout
• design development and testing
• written and graphical communication.

Textbooks
Boudny Engineering Drawing (McGraw-Hill)

Syllabus summary
(b) Machine Design - engineering innovation, creativity.
Teamwork. Design process, problem specification, conceptual
techniques and design evaluation. Ergonomic manufacturing
and assembly considerations.

Detail design of components including: design loads, failure
and factor of safety; calculation approach and presentation con-
ventions; stress effects in shape definition and material selec-
tion; introduction to engineering hardware including fasteners,
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• standard components

Students will develop skills in:
• working in teams
• freehand sketching and drafting practices
• idea generation methods
• design analysis techniques and layout
• design development and testing
• written and graphical communication.

Textbooks
Boudny Engineering Drawing (McGraw-Hill)
a) identify the gross anatomical features of the human body
b) describe the normal function of the major body systems (nervous, circulatory, respiratory, musculoskeletal, digestive and urogenital)
c) determine how these functions relate to cellular function
d) determine how a biomedical engineering device affects the normal anatomy and function of the body.

MECH 3200 Thermal Engineering 1
7 credit points
Offered: February, Prerequisite: MECH 2201 Thermodynamics 1 or MECH 2200 Thermofluids. Prohibition: MECH 3201
Thermodynamics 2. Classes: (3 lec and 2 x 1 hr tut)/week and laboratory work. Assessment: two 2 hr exams, assignments and laboratory reports.
Third year core unit of study for the degree in Mechanical Engineering.
Thermodynamics (57%): Availability, statistical entropy and second law of thermodynamics, generalised charts for properties, engine characteristics, gas mixtures, psychometry, air conditioning and refrigeration, thermodynamics of combustion.
Heat transfer (43%): Plane and cylindrical conduction convection, thermal networks, fins, heat exchangers, LMTD and NTU methods, unsteady conduction, forced and natural convection heat transfer coefficients, dimensional analysis, radiation introduction.
Objectives
To develop an understanding of the basic principles of heat transfer, thermodynamic cycles, gas mixtures, combustion and chemical equilibrium.

Expected outcomes
Ability to tackle and solve a range of heat transfer, thermodynamics and fluid flow problems including: (i) finned heat exchangers, cooling by fluids, quenching, insulation and solar radiation;
(ii) complex thermodynamics cycles, air conditioning, combustion, chemical equilibrium, problems involving gas mixtures.

Textbooks
Incropera and DeWitt Fundamentals of Heat and Mass Transfer (Wiley)
Cengel and Boles Thermodynamics, and Engineering Approach (McGraw-Hill) 2nd Edn.
Library Classification: 536.7, 621.4,536.2

MECH 3201 Thermodynamics 2
4 credit points
Offered: February, Prerequisite: MECH 2200 Thermofluids or MECH 2201 Thermodynamics 1. Prohibition: MECH 3200 Thermal Engineering 1. Classes: (2 lec and 1 x 1 hr tut)/week and laboratory work. Assessment: One 2 hr exam, assignments and laboratory reports.
Third year year core unit of study for the degree in Aeronautical Engineering.
Syllabus summary
Thermodynamics: availability, statistical entropy and second law of thermodynamics, generalised charts for properties, engine characteristics, gas mixtures, psychometry, air conditioning and refrigeration, thermodynamics of combustion.
Objectives
To develop an understanding of the basic principles of thermodynamic cycles, gas mixtures, combustion and chemical equilibrium.

Expected outcomes
Ability to tackle and solve a range of complex thermodynamics cycles, air conditioning, combustion, chemical equilibrium, problems involving gas mixtures.

Textbooks
Cengel and Boles Thermodynamics, an Engineering Approach (McGraw-Hill) 2nd Edn.
Library Classification: 536.7, 621.4

MECH 3202 Heat Transfer
3 credit points
Offered: February, Prerequisite: MECH 2201 Thermodynamics 1. Classes: 1 lec, 1 tut/week and laboratory work. Assessment: One 2 hr exam, assignments and laboratory reports.

Third year core unit of study for the degree in Mechanical Engineering.

Syllabus Summary
Heat Transfer. Plane and cylindrical conduction convection, thermal networks, fins, heat exchangers, LMTD and NTU methods, unsteady conduction, forced and natural convection heat transfer coefficients, dimensional analysis, radiation introduction.
Objectives
To develop an understanding of the basic principles of heat transfer.

Expected Outcomes
Ability to tackle and solve a range of heat transfer problems including finned heat exchangers, cooling by fluids, quenching, insulation and solar radiation.

MECH 3211 Fluid Mechanics 2
4 credit points
Offered: July, Prerequisite: AERO 2201 Fluid Mechanics 1 or MECH 2202 Fluids 1. Prohibition: AERO 3250 Aerodynamics 2.
Classes: (2 lec, one 1 hr tut)/wk one 3 hr lab. Assessment: 2hr exam, assignments/lab reports.
3rd Year core course for the degree in Mechanical Engineering.

Syllabus Summary

Objectives/ Outcomes
To develop an understanding of the fundamental equations governing aerodynamics and their application to aeronautical problems. Students will gain skills in problem solving in area of flow theory, boundary layers and gas dynamics.

Reference books
Potter & Wiggert, Mechanics of Fluids, Prentice Hall
Mc Cormick Aerodynamics, Aeronautics and Flight Mechanics (Wiley, 1979)
Bertin and Smith Aerodynamics for Engineers (Prentice Hall 1979)
Houghton and Brock Aerodynamics for Engineering Students (Edward Arnold)
Liepmann and Roshko Elements of Gas Dynamics (Wiley 1957)
Schlichting Boundary Layer Theory (McGraw Hill, 1960)

MECH 3300 Materials 2
4 credit points
Offered: July, Prerequisite: MECH 2300 Materials 1 and AERO 2300 Mechanics of Solids 1. Classes: 2 lec/ww plus 1 tut/wk & two labs. Assessment: One 2 hr closed book exam plus assignments and lab reports as specified at the commencement of the semester.
Third year core unit of study for the degree in Aeronautical and Mechanical Engineering.

Syllabus summary
Short-term and long-term mechanical properties, introductory fracture and fatigue mechanics, dislocations, polymers and polymer composite materials, ceramics and glasses, structure-property relationships, selection of materials in mechanical design.
Objectives
(a) to understand the relationship between properties of materials and their microstructures; and
(b) to improve mechanical design based on knowledge of mechanics and properties of materials.

Expected outcomes
Students should gain the capabilities to select proper materials for simple engineering design.
Mechanics of Solids 2

4 credit points


Third year core unit of study for the degree in Mechanical and Mechatronic Engineering

Syllabus Summary

The following areas of design are usually included, together with others which may be added: 3 Dimensional drawings and solid models. Application programming from within a CAD system. Modelling of linear and nonlinear mechanical systems; equations of motion; state-space communication links, distribute work load and make adjustments leading to desired conclusions.

Textbooks

Reference books

Chandrupatla and Belegundu Introduction to Finite Elements in Engineering (Prentice Hall, 1991)
Johnson and Mellor, Engineering Plasticity (D. Van Wostrand Company Ltd, 1973)
Timoshenko and Goodier Theory of Elasticity (McGraw-Hill, 1951)

MECH 3400 Mechanical Design 2A

4 credit points

Offered: February. Prerequisite: MECH 2400 Mechanical Design 1. Classes: 2 lectures & 1 hr drawing office session/wk. Assessment: Assignments and quizzes.

Third year core unit of study for the degrees in Mechanical and Mechatronic Engineering

Syllabus Summary

The following areas of design are usually included, together with others which may be added: 3 Dimensional drawings and solid models. Application programming from within a CAD system. Modelling of linear and nonlinear mechanical systems; equations of motion; state-space communication links, distribute work load and make adjustments leading to desired conclusions.

Textbooks

Reference books

Chandrupatla and Belegundu Introduction to Finite Elements in Engineering (Prentice Hall, 1991)
Johnson and Mellor, Engineering Plasticity (D. Van Wostrand Company Ltd, 1973)
Timoshenko and Goodier Theory of Elasticity (McGraw-Hill, 1951)

MECH 3500 Engineering Dynamics 2

4 credit points

Offered: February. Prerequisite: MECH 2500 Engineering Dynamics 1 and (MATH 2001 & MATH 2005). Classes: 2 lectures and 1 lab session per week. Assessment: One 2 hr exam, assignments and laboratory work.

Third year core unit of study for the degrees in Mechanical and Mechatronic and Aeronautical Engineering

Syllabus Summary

Vibration of machines and structures. Modelling of linear and nonlinear mechanical systems; equations of motion; state-space representation; numerical solution. Linear system analysis in the
frequency and time domains; transfer functions. Matrix formulation for multi-degree-of-freedom systems; natural frequencies; modal analysis. Introduction to the analysis of vibration and whirl of simple distributed systems such as beams and shafts.

Objectives
To provide techniques from mechanics and system theory applicable to the dynamics of machines and structures.

Expected outcomes
(a) Competence in modelling the dynamics of mechanical systems, setting up their equations of motion and solving them numerically or analytically.
(b) Familiarity with the occurrence, isolation and measurement of mechanical vibration.

Reference books
Rao Mechanical Vibrations (Addison-Wesley, 1995)
Dimarogonas Vibration for Engineers (Prentice-Hall, 1996)
Ogata System Dynamics (Prentice-Hall, 1992)
Ettet Engineering Problem Solving with MATLAB (Prentice-Hall)

MECH 3600 Manufacturing Engineering
6 credit points
Offered: February. Prerequisite: MECH 1600 Manufacturing Technology. Classes: 2 hrs/wk lec; plus an average of 2hrs/wk for tut, lab and industrial visits. Assessment: One 2 hr exam plus labs, poster and industrial visits.

Third year core unit of study for the degrees in Mechanical and Mechatronic Engineering.

Manufacturing processes
- several manufacturing processes will be considered from the points of view of fundamentals of the process, limitations on the production rates and runs and product quality, general purpose and specialised machinery, automation, numerical control and computer-aided manufacture. Processes considered include machining, casting, powder metallurgy, metal working, welding, polymer processing, blending and composite manufacture.

Manufacturing systems
- economics of automation, flexible manufacturing. Just in Time, group technology, materials requirements planning, quality control, introduction of new technology, human factors, plant layout.

Objectives
To understand some fundamental manufacturing processes and systems

Expected outcomes: Students will learn how to manufacture mechanical parts and understand the principles, merits and disadvantages of some commonly used manufacturing techniques

Textbooks

Lecture notes
Reference books

MECH 3610 Team Project
2 credit points
Offered: July. Prerequisite: 30 credit points of second year units of study. Classes: One hr/week for team consultations and several lectures on relevant topics; presentations in final two weeks of Semester. Assessment: On the basis of progressive contribution to the group effort and on the quality of the final presentations.

Third year core unit of study for the degrees in Mechanical and Mechatronic Engineering.

Syllabus Summary
Team building, considerations of conceptual design, economic analysis, project management outline, environmental impact and consideration of benefits to society in major projects. This part of the unit of study will culminate in team presentations.

Objectives
To plan a multidisciplinary project, to consider technical, managerial, economic, environmental and societal factors in bringing a project from concept to conclusion and to make a verbal presentation.

Expected outcomes
Students will learn how to work in a team, to plan and assign responsibilities and to achieve common objectives. Tasks will include information searches, conceptual planning and design and consideration of all the complexities of modern project planning.

MECH 3620 Industrial Management
5 credit points
Offered: July.

Third year core unit for the degree in Aeronautical Engineering.

Microeconomics, the Australian business environment, the role of government, accounting systems and procedures, the accounting cycle, financial statements, internal performance, financial structures, intellectual property, contract law, legal obligations of business, capital budgeting and investment analysis, introduction to contract administration.

Reference books
Stanley How to Read and Understand a Balance Sheet (Schwartz & Wilkinson, Melbourne)
The Small Business Handbook (Small Business Development Corp., Victoria)
Eyre Mastering Basic Management (Macmillan)
Stoner, Collins and Vetton Management in Australia (Prentice-Hall)
Blank and Tanquin Engineering Economy (McGraw-Hill)

MECH 3700 Mechatronics 2
5 credit points
Offered: February. Prerequisite: MECH 2700 Mechatronics 1.

Classes: 2 hr lectures plus a 3 hr lab/wk. Assessment: 2 hr exam plus project work.

Third year core unit of study for the degree in Mechatronic Engineering.

Syllabus Summary
Mechatronics Systems Architectures: Single processor systems, multiple and distributed processing systems, special purpose architectures (DSPs etc) and their application. Development of Advanced Mechatronic Systems: Use of multi-tasking, message passing and multi-threading in environments such as NT and/or Unix. Oriented oriented programming in languages such as C++.

Design of Modern Mechatronic Systems: Standard interfacing of sensor and actuation systems: ADC/DAC, SSI, parallel, Can Bus etc. Organisation of components and overall design is-
sues including safety, verifiability, modularity, etc. Analysis of detailed case study.

Objectives
To provide an advanced understanding of modern industrial mechatronics systems.

Expected outcomes
Understanding of modern hardware and software architectures as related to the design of mechatronic systems. Practical knowledge of the design and implementation of mechatronic systems, including organisation, safety and reliability and interaction with hardware components.

Reference books
An extensive list of reference books will be distributed

Library Classification: 004.22, 004.35, 005.133

MECH3800 Systems Control
4 credit points
Offered: July. Prerequisite: MATH 2001 and MATH 2005. Classes: 2 lec and 1 tut/week plus laboratory sessions. Assessment: One 1 1/2 hr exam, assignments and laboratory work.

Third year core unit of study for the degrees in Mechanical and Mechatronic Engineering

Syllabus Summary
A number of case studies based on practical examples will be presented. The unit of study will concentrate on linear systems and will be based on classical control theory. Topics covered will include system modelling, time and frequency response, stability, root locus and Bode diagrams, and control using computers. Computer programs Madab and Simulink will be used to illustrate the concepts presented in the lectures and for the design and simulation exercises associated with the case studies.

Objectives
To introduce the methods used for the analysis and design of feedback control systems.

Expected outcomes
Students will be able to develop a mathematical model and design a suitable feedback controller for a wide range of physical systems. Students will also be able to examine the behaviour of these physical systems and the performance of their controllers using computer simulations.

Reference books
G. F. Franklin, J. D. Powell and A. Emami-Naeini, "Feedback Control of Dynamic Systems", Addison-Wesley
A. K. Ogata, "Modern Control Engineering", Prentice-Hall
B. C. Kuo, "Automatic Control Systems", Prentice-Hall
N. S. Nise, "Control Systems Engineering", Benjamin/Cummings

Library classifications: 629.8.629.83, 629.8312, 629.832

MECH 3910 Biomedical Technology
3 credit points
Offered: February, July. Assessment: Assignment and final exam.

Objectives
Students will gain an understanding of the uses of biomedical products and devices. They will be able to develop a mathematical model and design a suitable system for a wide range of physical biomedical systems. Students will also be able to examine the behaviour of these physical systems and the performance of their controllers using computer simulations.

Reference books
G. F. Franklin, J. D. Powell and A. Emami-Naeini, "Feedback Control of Dynamic Systems", Addison-Wesley
A. K. Ogata, "Modern Control Engineering", Prentice-Hall
B. C. Kuo, "Automatic Control Systems", Prentice-Hall
N. S. Nise, "Control Systems Engineering", Benjamin/Cummings

Library classifications: 629.8.629.83, 629.8312, 629.832

MECH 3920 Biomedical Design Project
2 credit points
Offered: July. Prohibition: MECH 3610 Team Project. Assessment: On the basis of progressive contribution to the project and on the quality of final presentation.

Objectives
To plan a biomedical project, to consider technical, managerial, economic, environmental and societal factors in taking a biomedical project from concept to conclusion.

Syllabus summary
Team building, considerations of conceptual design, economic analysis, project management outline and potential benefit to the health care system.

MECH 4101 Thesis A
0 credit points
Offered: February, July. Prerequisite: 36 credit points of Third Year units of study. Assessment: Satisfactory or Unsatisfactory on the basis of the Proposal, Progress Report and actual progress as verified by the supervisor.

Fourth year core unit of study for the degree in Mechanical and Mechatronic Engineering.

Objectives
To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.

Expected outcomes
Ability to plan, submit a Proposal, to autonomously carry out a project and to write a Progress Report at the end of semester.

The student can only progress to Thesis B on attainment of a Satisfactory result in Thesis A.

Syllabus summary
In the Fourth year of the unit of study, each candidate works towards and writes an undergraduate dissertation from work carried out in Thesis A and B.

Towards the end of each academic year a list of suggested topics and supervisors for thesis work is published for the information of current Third year students. In the case of students enrolling in Thesis A in 2nd semester, topics will be made available in 1st semester. Each prospective Fourth year student is then required to consult with prospective supervisors to apply for a topic.

In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is directly responsible to his or her supervisor for the execution of his or her practical work and the general layout of the thesis itself.

Thesis A is the first part of Thesis A and Thesis B and requires the student to make significant progress toward the objectives outlined in the Proposal. This includes any workshop drawings and experimental setup. Generally about 50% of the total Thesis A & B time should be spent in Thesis A. Progress is assessed by the supervisor through regular contact with the student and through the formal Progress Report.

MECH 4102 Thesis B
12 credit points
Offered: February, July. Prerequisite: MECH 4101 Thesis A (the Head of Department may allow Thesis A as corequisite in exceptional circumstances). Assessment: On the basis of the submitted thesis and the report by the supervisor of the student's contribution.

Fourth year core unit of study for the degree in Mechanical and Mechatronic Engineering.

Objectives
To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.

Expected outcomes
Ability to plan and execute a complete piece of scientific work and to report their study in a thesis.

Syllabus summary
In the Fourth year of the unit of study, each candidate works towards and writes an undergraduate thesis, at least one copy of which should be submitted in completed form before a date to be announced. Thesis B is the second part of Thesis A and Thesis B and requires the student to continue from the progress attained in Thesis A.

In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any...
event the student is directly responsible to his or her supervisor for the execution of his or her practical work and the general layout of the thesis itself.

Theses should be typewritten on A4 with text, diagrams, graphs, photographs, etc., properly displayed. One copy should be submitted, hard-bound for the departmental library, on or before the due date. The penalty rate for late submissions will be advertised. Students are responsible for supplying their own thesis production materials.

The Charles Rolling Prize may be awarded for the best graduation thesis.

MECH 4103 Interdisciplinary Thesis A
0 credit points
Offered: February, July. Prerequisite: 36 credit points of Third Year units of study. Assessment: Satisfactory or Unsatisfactory on the basis of the Proposal, Progress Report and actual progress as verified by the supervisor.

NB: The student can only progress to Thesis B on attainment of a Satisfactory result in Thesis A.

Objectives: To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.

Expected outcomes: Ability to plan, submit a Proposal, to autonomously carry out a project and to write a Progress Report at the end of the semester.

The student can only progress to Thesis B on attainment of a Satisfactory result in Thesis A.

Syllabus summary: In this unit of study, each candidate works towards and writes an undergraduate thesis from work carried out in Thesis A and B.

Towards the end of each academic year a list of suggested topics and supervisors for thesis work is published for the information of current Third Year students. In the case of students enrolling in Thesis A in 2nd semester, topics will be made available in 1st semester. Each prospective Fourth year student is then required to consult with prospective supervisors to apply for a topic.

In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is directly responsible to his or her supervisor for the execution of his or her practical work and the general layout of the thesis itself.

Thesis A is the first part of Thesis A and Thesis B and requires the student to make significant progress toward the objectives outlined in the Proposal. This includes any workshop drawings and experimental set up. Generally about 50% of the total Thesis A & B time should be spent in Thesis A. Progress is assessed by the supervisor through regular contact with the student and through the formal Progress Report.

MECH 4104 Interdisciplinary Thesis B
12 credit points
Offered: February, July. Prerequisite: MECH 4103 Interdisciplinary Thesis A (The Head of Department may allow Thesis A as corequisite in exceptional circumstances.). Assessment: On the basis of the submitted thesis and the report by the supervisor of the student’s contribution.

NB: Core unit of study for the combined degrees BE (Mechanical or Mechatronic Engineering) / Bachelor of Medical Science. The Charles Rolling Prize may be awarded for the best graduation thesis.

Objectives: To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.

Assessment: On the basis of the submitted thesis and the report by the supervisor of the student’s contribution.

Expected outcomes: Ability to plan and execute a complete piece of scientific work and to report their study in a thesis.

Syllabus summary: In this unit of study, each candidate works towards and writes an undergraduate thesis, at least one copy of which should be submitted in completed form before a date to be announced. Thesis B is the second part of Thesis A and Thesis B and requires the student to continue from the progress attained in Thesis A.

In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is directly responsible to his or her supervisor for the execution of his or her practical work and the general layout of the thesis itself.

Theses should be typewritten on A4 with text, diagrams, graphs, photographs, etc., properly displayed. One copy should be submitted, hard-bound for the departmental library, on or before the due date. The penalty rate for late submissions will be advertised. Students are responsible for supplying their own thesis production materials.

The Charles Rolling Prize may be awarded for the best graduation thesis.

MECH 4110 Professional Engineering
4 credit points
Offered: February. Prerequisite: 36 credit points of Senior units of study. Classes: Lectures/consultations/student presentations - 4hrs/week for one semester. Assessment: Student assignments/presentations and 2hr exam.

Fourth year core unit of study for the degree in Mechanical and Mechatronic Engineering.

Syllabus summary: Project management: specific aspects of project management including initial establishment of projects and design criteria, and capital cost estimating. Design management: topics will cover design integration, codes and standards, specification preparation, and sources of information. Plant engineering management: the areas will include decision making, computerised maintenance, understanding unit operations’ environment protection measures, engineering as an element in the cost of production, continuous improvement, provision of plant and ancillary services, and the engineer as a trainer.

Objectives: To impart knowledge resulting in a more global approach to the practice of engineering and engineering management, as well as to provide a vehicle for improving communication skills.

Expected outcomes: A good understanding of the management of projects and engineering plants.

MECH 4120 Professional Communication
4 credit points
Offered: July. Prerequisite: 32 credit points of third year units of study. Classes: Some instructional sessions will be arranged to provide basic techniques for preparation and presentation of technical material to an audience by audio-visual means. Assessment: Satisfactory performance in the seminar as assessed by the participants, and seminar workshops as assessed by the course coordinator.

Fourth year core unit of study for the degree in Mechanical and Mechatronic Engineering.

During the latter part of the year, one or two whole days are set aside for the presentation of student addresses at a public conference. Each final year student, usually in consultation with his or her thesis supervisor, prepares an abstract of the seminar for distribution one week in advance of the conference. Although it is not obligatory, the subject for the seminar is normally closely related to the student’s thesis work; thus it tends to deal in depth with some relatively narrow technical field. At the conference (where the audience comprises senior, senior advanced and postgraduate students, departmental staff and visitors), oral presentation of the thesis is followed by critical discussion under formal chairmanship.

Objectives: To improve student competence and confidence in developing and presenting a formal technical presentation.

Expected outcomes: The ability to structure and deliver a competent and informative technical presentation.
MECH 4130 Practical Experience  
0 credit points  
**Offered:** February, July.  
**Prerequisite:** 28 credit points of second year units of study.  
**Classes:** 12 weeks of practical work experience.  
**Assessment:** A written report is required. Pass/Fail grade only is awarded. Marks will not be given. (This unit of study will not contribute to the weighted averages used to determine Honours.)  
Fourth year core unit of study for the degree in Mechanical and Mechatronic Engineering.  

Syllabus summary  
Each student is required to work as an employee of an approved engineering organisation and to submit a satisfactory written report of his or her work. Normally 12 weeks of practical work experience (375 hours minimum) is required and this is undertaken after the completion of some or all of the prescribed third year core units of study and before enrolment in the final year of study. The University Careers and Appointments Service is available to assist students to obtain suitable employment. This unit of study must be passed in order to graduate.  
The industrial experience report must be submitted early in Semester 1. The report is assessed on content in accordance with details that are distributed to students earlier. The report should contain a section on management.  

Objectives  
To give students the opportunity to work in an engineering organisation and gain some professional experience. To enhance student abilities and experience in technical report writing.  

Expected outcomes  
(i) A better appreciation of the role of engineers in the workplace.  
(ii) The ability to present structured observations and reflections in the mode of a formal written report.  

MECH 4210 Computational Fluid Dynamics  
4 credit points  
**Offered:** July.  
**Prerequisite:** MECH 3210 Fluid Mechanic.  
**Classes:** 2 lectures and one tutorial per week.  
**Assessment:** Tut work, projects and one 2hr exam.  
Fourth year elective unit of study.  

Syllabus summary  
Conservation equations of fluid flow; boundary conditions, classification of flow problems. Numerical solution schemes based on pressure correction; the SIMPLE algorithm and its variants, convection schemes. Solution of the resulting algebraic equations. Turbulence modelling; implementation of boundary conditions in turbulent flow. Coupled heat transfer: convection, combustion, radiation heat transfer. Multiphase flow. Introductions to compressible flow, the physical significance of hyperbolic equations; characteristic based methods; FCT and TVD schemes. Pitfalls to avoid in CFD.  

Objectives  
To give students an understanding of basic Navier-Stokes solution methods and turbulence models.  

Expected outcomes: Ability to write a simple Navier-Stokes solver and to use a state-of-the-art CFD package.  

Reference books  
Fletcher Computational Techniques for Fluid Dynamics, vols 1 and 2 (Springer, 1988)  
Patankar Numerical Heat Transfer and Fluid Flow (Hemisphere, 1983)  

MECH 4220 Environmental Engineering  
6 credit points  
**Offered:** February.  
**Prerequisite:** MECH 3220 Environmental Engineering.  
**Classes:** 5 hrs/wk plus two Saturday field-trips.  
**Assessment:** One 1.5 hr exam, plus assignments.  
Fourth year elective unit of study.  

Syllabus summary  
The unit of study will consist of the following components: Environmental acoustics and noise control (2 credit points) - Basic acoustics theory, sound generation and propagation, impedance, absorbing materials, industrial noise sources, isolation methods of noise control, enclosures, instrumentation and measurement, frequency analysis, noise regulations. Computational methods in acoustics.  
Energy and the Environment (4 credit points) - Economic analysis of energy systems. Urban air pollution, ozone hole and greenhouse problems, waste disposal, water pollution. Montreal Protocol, Rio and Kyoto Accords. Sustainable energy, renewable energy, energy efficiency, C02 capture and sequestration and other emerging control technologies.  

Objectives  
To acquaint students with the methods engineers use to assess and deal with the environmental consequences of industry and other human activities, with particular emphasis on impact assessment and noise.  

Expected outcomes  
Students will appreciate the social, economic, and legislative aspects of environmental protection. They will understand the requirements of an environmental impact statement. They will be able to make the calculations and measurements necessary to estimate acoustic noise levels in machinery, buildings and the outside environment and to make recommendations as to how best to reduce them.  

Reference books  
Hassall and Zaveri Acoustic Noise Measurement (Bruel & Kjaer, 1988).  

Library Classification: 534.8, 620.23, 620.8, 628.1  

MECH 4230 Environmental Acoustics & Noise Control  
2 credit points  
**Offered:** February.  
**Prerequisite:** MECH 4220 Environmental Engineering.  
**Classes:** 2 lec and 1 tut/w.  
**Assessment:** One 1.5 hr exam.  
Fourth year elective unit of study.  

Syllabus summary  
Basic acoustics theory, sound generation and propagation, impedance, absorbing materials, industrial noise sources, isolation methods of noise control, enclosures, instrumentation and measurement, frequency analysis, noise regulations. Computational methods in acoustics.  

Objectives  
To acquaint students with the methods engineers use to assess and deal with the environmental noise due to industry and other human activities.  

Expected outcomes  
Students will appreciate the social, economic, and legislative aspects of environmental noise. They will be able to make the calculations and measurements necessary to estimate sound levels and noise in machinery, buildings and the outside environment and to make recommendations as to how best to reduce them.  

Reference books  
Hassall and Zaveri Acoustic Noise Measurement (Bruel & Kjaer, 1988).  

Library Classification: 534.8, 620.23  

MECH 4240 Energy and the Environment  
4 credit points  
**Offered:** February.  
**Prerequisite:** 24 credit points of Senior units of study.  
**Prohibition:** MECH 4220 Environmental Engineering.  
**Classes:** 3hrs per week.  
**Assessment:** Assignments and classwork.  
Fourth year elective unit of study.  

Syllabus summary  

Expected outcomes
Students will be able to carry out economic and environmental impact analyses for energy systems.

**Textbooks**
No text or reference books are set. Preliminary reading can be made on the web at [www.ieagreen.org.uk](http://www.ieagreen.org.uk).

**MECH 4250 Air Conditioning and Refrigeration**
3 credit points

**Offered:** February. **Prerequisite:** MECH 3200 Thermal Engineering

1. **Classes:** 1.5hr lecture and 1 h tu/wk. **Assessment:** Assignments, project and one 2hr exam.

Fourth year elective unit of study.

**Syllabus summary**
- Applied psychrometrics, air conditioning systems, design principles, cooling load calculations, heating load calculations, introduction and use of computer-based load estimation packages software, air distribution, fans, ducts, air conditioning controls.
- Refrigeration cycles, evaporators, condensers, cooling towers, compressors, pumps, throttling valves, piping, refrigerants, control, refrigeration equipment, stimulation of refrigeration systems, food refrigeration and industrial applications.
- Use of CFD packages as tools to simulate flows in building and to optimise air conditioning design, energy estimation methods and software, energy management in buildings.

**Objectives**
To develop a practical understanding of air conditioning and refrigeration applications.

**Expected outcomes**
Students will be able to determine thermal loads on structures, and design an air conditioning or refrigeration system with attention to air distribution and energy consumption.

**MECH 4260 Combustion and Fire Safety**
3 credit points

**Offered:** February. **Prerequisite:** MECH 3200 Thermal Engineering

1. **Classes:** 1.5hr lecture and 1 hr tu/wk. **Assessment:** Assignments, project and one 2 hr exam.

Fourth year elective unit of study.

**Syllabus summary**
- Basics of combustion and chemical kinetics, flames and simple reacting systems, basics of fire dynamics: initiation, development and spread of smoke and fire, pollutants formation, use of CFD in fire modelling.

**Objectives**
To give students a basic understanding of combustion and fire protection, and safety issues.

**Expected outcomes**
Students will be able to perform a simple analysis of simple reacting systems. They will also be capable of assessing fire risks and fire protection systems in buildings.

**MECH 4310 Advanced Engineering Materials**
6 credit points

**Offered:** July. **Prerequisite:** MECH 3300 Materials 2. **Prohibition:** MECH 4315 Advanced Aerospace Materials. **Classes:** 3 lec/wk plus 3 tut & lab/wk. **Assessment:** One 2 hr exam plus assignments and lab reports as specified at the commencement of the semester.

Fourth year elective unit of study.

**Syllabus summary**
- Postyield fracture mechanics, embrittlement, creep rupture, damage tolerance, structure integrity and reliability, thin film science and technology, advanced polymer matrix composites, toughening mechanisms, processing and manufacturing, superalloys, advanced joining methods.

**Objectives**
To understand (a) how to conduct failure diagnosis of engineering structures, (b) how to define the relationship between properties and microstructures of advanced engineering materials, and (b) how to improve the mechanical design with the knowledge of mechanics and properties of materials.

**Expected outcomes**
- Students should gain the capabilities: (a) to conduct failure diagnosis of simplified failure cases of engineering structures, (b) to define structure-property relationships of advanced engineering materials, and (c) to improve the performance of engineering structures through tailoring materials microstructure and manufacturing processes.

**Textbooks**
Textbooks
Lecture notes
**Reference books**
Ashby, Materials Selection in Mechanical Design (Pergamon, 1993)
Atkins and Mai, Elastic and Plastic Fracture (Ellis Horwood, 1985)
Chawala, Composite Materials (Springer-Verlag, 1987)
Davidge, Mechanical Behaviour of Ceramics (C.U.P., 1979)
Eckold, Design and Manufacture of Composite Structures (McGraw-Hill, 1994)
Richerson, Modern Ceramic Engineering (M Dekker, 1982)

**MECH 4315 Advanced Aerospace Materials**
6 credit points

**Offered:** July. **Prerequisite:** MECH 3300 Materials 2. **Prohibition:** MECH 4310 Advanced Engineering Materials. **Classes:** 3 lec/wk plus 3 tut & lab/wk. **Assessment:** One 2 hr exam plus assignments and lab reports as specified at the commencement of the semester.

Fourth year elective unit of study.

**Syllabus summary**
- Postyield fracture mechanics, embrittlement, creep rupture, damage tolerance, structure integrity and reliability, thin film science and technology, advanced polymer matrix composites, toughening mechanisms, processing and manufacturing, superalloys, advanced joining methods.

**Objectives**
To understand (a) how to conduct failure diagnosis of engineering structures, (b) how to define the relationship between properties and microstructures of advanced engineering materials, and (b) how to improve the mechanical design with the knowledge of mechanics and properties of materials.

**Expected outcomes**
Student should gain the capabilities: (a) to conduct failure diagnosis of simplified failure cases of engineering structures, (b) to improve the performance of engineering structures through tailoring materials microstructure and manufacturing processes.

**Textbooks**
Textbooks
Lecture notes
**Reference books**
Ashby, Materials Selection in Mechanical Design (Pergamon, 1993)
Atkins and Mai, Elastic and Plastic Fracture (Ellis Horwood, 1985)
Chawala, Composite Materials (Springer-Verlag, 1987)
Davidge, Mechanical Behaviour of Ceramics (C.U.P., 1979)
Eckold, Design and Manufacture of Composite Structures (McGraw-Hill, 1994)
Richerson, Modern Ceramic Engineering (M Dekker, 1982)
MECH 4410 Advanced Design and Analysis 1
3 credit points
Offered: February. Prerequisite: MECH 3400 Mechanical Design 2A and MECH 3410 Mechanical Design 2B. Classes: 2 hrs/wk.
Assessment: Assessment is based on one major assignment and two minor projects, as well as attendance, participation and evidenced effort during classes in the drawing office as well as the Mech PC laboratory.
Fourth year elective unit of study.

Objectives:
To develop a fuller understanding of and familiarity with the practical design processes expected in industry, including application of analysis techniques (in particular the Finite Element Method) and knowledge obtained from other courses studied.

Expected outcomes:
Students should be able to undertake with a measure of confidence basic design and related analysis tasks likely to be encountered in early industrial employment, and should have an understanding of the many aspects associated with such an activity. Strong competence and understanding of the application of the Finite Element Method in stress and vibration analysis will be expected.

Syllabus summary:
The course draws together the various subjects studied and introduces the student to the practical aspects of design in the commercial environment, with particular emphasis on classical machinery such as fans, ore grinding mills and vibrating screens. The course includes considerable application of the finite element method in stress and vibration analysis, with specific use of the STRAND FE code in the faculty workstation laboratory.

Textbooks
Shigley and Mischke, 'Mechanical Engineering Design' 5th Edition
Reference books
Lecture notes.
Norton, 'Machine Design - an integrated approach'
Adams and Askenazi, 'Building Better Products with Finite Element Analysis'
Gurney, 'Fatigue of Welded Structures'
Wills, 'Mineral processing technology' 6th ed.
Bladder, 'Considerations in Design'

MECH 4420 Advanced Design and Analysis 2
3 credit points
Offered: July. Prerequisite: MECH 3400 Mechanical Design 2A and MECH 3410 Mechanical Design 2B. Classes: 2 hrs/wk.
Assessment: Assessment is based on one major assignment and two minor projects, as well as attendance, participation and evidenced effort during classes in the drawing office as well as the Mech PC laboratory.
Fourth year elective unit of study.

Objectives:
To develop a fuller understanding of and familiarity with the nominated elements of the complete design process, including application of analysis techniques (in particular the Finite Element Method) and knowledge obtained from other courses studied.

Expected outcomes:
Students should be able to undertake with a measure of confidence course related tasks likely to be encountered in early industrial employment, and should have an understanding of the aspects associated with them. Competence and understanding of the application of the Finite Element Method in stress and vibration analysis will be expected.

Syllabus summary:
This course is independent of MECH 4410 but inherently complements it with respect to the design and analysis related topics covered. These include structural dynamics and design for fatigue, operational troubleshooting/failure modes/design rectification techniques, design audits, quality management, machinery monitoring (strain, vibration), safety features and guarding for machines. The course includes application of the finite element method in class tasks as well as the major assignment which is related to design improvement of a given machine element, with specific use of the STRAND FE code in the faculty workstation laboratory.

Textbooks
Shigley and Mischke, 'Mechanical Engineering Design' 5th Edition
Reference books
Lecture Notes.
Norton, 'Machine Design - an integrated approach'
Adams and Askenazi, 'Building Better Products with Finite Element Analysis'
Gurney, 'Fatigue of Welded Structures'
Wills, 'Mineral processing technology' 6th ed.
Bladder, 'Considerations in Design'

MECH 4510 Machine Vibration and Monitoring
3 credit points
Offered: July. Prerequisite: MECH 3500 Engineering Dynamics 2. Classes: 3 hrs/wk including tutorials and practical sessions.
Assessment: One 2 hr exam plus assignments.
Fourth year elective unit of study.

Syllabus summary:
Review of dynamics, including modal analysis of lumped and continuous systems and appropriate methods for nonlinear systems. Aspects of applied problems, especially the dynamics of rotating machinery, the measurement of vibration and condition monitoring of machines. Some aspects of random vibrations, including measurement and prediction of failure.

Objectives:
To acquaint students with:
- the types of vibration which can arise in machinery
- mathematical models which can be used to analyse vibration
- vibration measuring devices and analysis of measurements
- machine condition monitoring by vibration measurements

Expected outcomes:
Students will be able to identify the causes of damaging vibration from measurements and analysis, predict the likelihood of failure due to vibration, and determine how to deal with it in order to minimise cost and loss of production.

MECH 4605 Industrial Engineering
8 credit points
Classes: 3 lec/wk plus associated tut and lab work and industrial visits.
Assessment: Assignments plus exams.
Fourth year elective unit of study.

Industrial ergonomics - refer to syllabus summary for MECH 4620 Industrial Ergonomics.

Operations research - refer to syllabus summary for MECH 4635 Introduction to Operations Research.

Industrial and Engineering Management - total quality management, production planning and control, costing and pricing, inventory management and control, management reporting systems, value analysis, problem resolution strategies, dispute management, project management, contract administration, marketing management, business planning, the management of engineering enterprises, professional engineering skills.

Objectives:
To develop an understanding of:
- principles and practices of industrial and engineering management
- effects of globalisation on Australia's economic performance, and the competitiveness of Australian firms
- insight into the importance of innovation
- roles appropriate to governments
- ergonomics
- information handling
- safety
• training
• work performance
• the role of operations research in modern industry
• problem formulation and analysis techniques for operations research problems
• the importance of reliability analysis in part and system designs
• the use of maintenance and repair to extend the useful life of systems

Expected outcomes

Students should develop skills and abilities in:

• the application of problem solving solutions to management issues
• an appreciation of the interrelationships and complexities associated with the management of a modern industrial organisation
• the development of logical, thoughtful and creative presentations concerning industrial management
• ergonomic analysis
• information processing
• consideration of the workspace
• consideration of the workers and their skills
• the solution of a range of operations research and reliability problems

Textbooks

Tana, Operations Research - An introduction (Prentice Hall, 1997)

MECH 4610 Industrial Engineering and Management

2 credit points


Classes: 2hrs lec and tut/wk plus industrial visits. Assessment: Assignments and one 2hr exam.

Fourth year elective unit of study.

Syllabus summary

Total quality management, production planning and control, costing and pricing, inventory management and control, management reporting systems, value analysis, problem resolution strategies, dispute management, project management, contract administration, marketing management, business planning, the management of engineering enterprises, professional engineering skills.

Objectives

To develop an understanding of:

• principles and practices of industrial and engineering management
• effects of globalisation on Australia’s economic performance, and the competitiveness of Australian firms
• insight into the importance of innovation
• roles appropriate to governments.

Expected outcomes

Students should develop skills and abilities in:

• the application of problem solving solutions to management issues
• an appreciation of the interrelationships and complexities associated with the
• management of a modern industrial organisation
• the development of logical, thoughtful and creative presentations concerning industrial management.

Textbooks

Textbooks

Samson D., Management for Engineering (Longmans)

Reference books

Hicks, Introduction to Industrial Engineering and Management Science (McGraw-Hill, 1977)
Harding, Production Management 2nd edn (MacDonald & Evans, 1974)
Hussey, Introducing Corporate Planning (Pergamon, 1972)
Currie, Work, Study 4th edn (Pitman, 1977)
Heyde, Concise MODAPTS (AAPTSS&R, 1975)
Hunt, Managing People at Work (McGraw-Hill, 1979)

Blakemore, The Quality Solution (Australian Business Library, Vic.)
Koller, Fitzroy, Shaw, Australian Marketing Management (Prentice-Hall)
Macnamara, Australian Marketing and Promotion Handbook (Australian Business Library)

Case Studies in Australian Strategic Management

MECH 4620 Industrial Ergonomics

2 credit points


Classes: 2 hrs lec and tut/wk plus associated lab work. Assessment: Assignment.

Fourth year elective unit of study.

(a) Lectures - History and scope of ergonomics; biomechanics; receiving and processing information; presentation of information; anthropometry and seating; ergonomic aspects of noise; human factors in safety; selection, skill and training; industrial lighting; fatigue, shiftwork and the organisation of work; absenteeism; mental health and automation; design of equipment and workspace; biomechanics of handling materials; ergonomic job analysis; personal factors in work performance.

(b) Laboratory - Demonstration of protective clothing and equipment. Methods of measurement of work environment. Climatic chamber:

Objectives

To introduce ergonomics and increase awareness of ergonomics issues;

To provide information about humans particularly in the workplace.

Expected outcomes

Students will have sufficient practical information to allow them to optimise the human-environment performance in the workplace.

Reference books

As advised during classes

Library Classification: 150, 331.1, 611, 612, 620, 658

MECH 4635 Introduction to Operations Research

4 credit points


Classes: 4 hrs/wk. Assessment: One 2hr paper plus assignments.

Syllabus summary:

History and methods of operations research. Linear programming; simplex method; transportation models. Network models; project scheduling; critical path methods. Deterministic and probabilistic inventory control models. Simulation modeling. Optimization.

Introduction to reliability analysis. Component and system reliability; effect of maintenance and repair.

Objectives:

To develop an understanding of:

• the role of operations research in modern industry problem formulation and analysis techniques.
• the importance of reliability analysis in part and system design.
• the use of maintenance and repair to extend the useful life of systems.

Expected outcomes:

Students should develop skills in:

• problem formulation.
• the solution of a range of operations research problems.
• the solution of a range of reliability problems.

Textbooks


MECH 4640 Product Life Cycle Design

2 credit points


Fourth year elective unit of study.
Syllabus summary
It is becoming more and more critical that product design incorporates the implications of disposal at the end of the operational life cycle of the product. For manufacturers this is emerging as a legislative issue as environmental implications enforce their responsibility over the entire life cycle of the product. This requires consideration of processing technology, materials and parts recycling, and design for disassembly. The course content addresses these issues via examples of consumer products manufacture and their design.

An assignment based on small consumer product redesign to improve recyclability will form an important component of the course. More specifically the contents focus on:

- Product life cycle engineering based on environmental and legislative issues.
- Net recovery value analysis based materials, parts, processes and energy models.
- Task analysis for disassembly planning based on clustering.
- Product profile and redesign to improve recyclability.

Objectives
To provide students with necessary knowledge and techniques to plan at the design stage the life cycle problems of the product.

Expected outcomes
Students will learn the major issues involved in product life cycle engineering, relevant methods to improve recyclability and the principal considerations on legislative, environmental, materials, processes etc.

MECH 4650 Workplace Industrial Relations
2 credit points
Offered: July. Prerequisite: 36 credit points of senior units of study.
Classes: 20 hrs of lectures and tutorials. Assessment: Examination will be based on the level of participation in the course.
Fourth year elective unit of study.

Syllabus summary
Introduction to industrial relations, principal players in the system, Industrial relations law. Awards and agreements, working with unions, responsibility of managers, handling individual grievances, identifying and resolving conflict.

Objectives
To give students an understanding of industrial relation issues in Australia.

Expected outcomes
Students will develop skills to handle industrial relations in the workplace and deal with conflicts and disputes.

MECH 4720 Sensors and Signals
6 credit points
Offered: February. Prerequisite: MECH 3500 Engineering Dynamics 2.
Classes: 2 lec, and one 2hr lab/tut/wk. Assessment: 1 1/2 hr exam plus assignment, project and lab work.
Fourth year elective unit of study.

Syllabus summary
This unit of study comprises three equal parts: Devices, Signals and Systems. Devices deals with sensors to computers and machines. Signals deals with the modeling, conditioning and analysis of sensor signals. Systems deals with the use of sensor signals in control and systems design, with reference to key mechatronics applications:

(a) Devices: Process and machine instrumentation: sensor types (temperature, pressure, force, proximity) and properties; interfacing considerations, hardware and applications. Automotive, aerospace and robotic sensors: sensor types (accelerometers, gyroscopes, lasers, ultrasonics, radar) and measurement principles; interfacing considerations, hardware and applications. One 6-hour laboratory on sensor interfacing example.

(b) Signals: Introduction to signals and noise as stochastic processes; signal characterisation, signal conditioning. Signal analysis in the time domain; signal analysis in the frequency domain; modeling and processing of signals; introduction to estimation theory. Two 2-hour computer laboratories; signal characterisation and signal modeling.

(c) Systems: Signal processing systems, hardware and software; special purpose and digital signal processing hardware; introduction to data fusion theory. Condition monitoring; reliability and fault detection. Example applications; process monitoring and automotive systems. One 10-hour computer laboratory on system design.
Objectives
To provide and understanding of essential sensor data processing algorithms and an understanding of a variety of different sensor technologies.
Expected outcomes: Understanding of common signals and the means of processing and interpreting sensory information.
An appreciation of available sensor technologies and where they may be used.

MECH 4730 Computers in Real-Time Control and Inst 6 credit points
Offered: February. Prerequisite: ELEC 3601 Digital Systems Design and ELEC 3401 Electronics Devices & Circuits. Classes: (3 lec and one 2hr lab/tut/wk. Assessment: Project and assignment work, plus 2 hr exam. Satisfactory performance in project and assignment work is required. Fourth year elective unit of study.
Syllabus summary
Design of interactive graphical displays; man-machine communication.
Objectives
Microcomputer and microprocessor system, operating in real time have become very common components in today’s engineering applications. The objective of this unit of study is to teach the fundamentals of real time software and to build competence in the engineering use of such systems through lectures emphasising standard computer architectures, programming, and through intensive laboratory work with microcomputer systems interacting with experimental mechatronic processes.
Expected outcomes
The student will have a basic knowledge of the hardware components available in a microcomputer system and a detailed knowledge of facilities and capabilities typically present in a professional real time operating system. The student will have the competence to design, implement and debug interrupt-driven multitasking systems with graphical user interfaces.

Textbooks
Auslander DM, Tham CH, Real Time Software for Control, (Prentice Hall, 1990)

Library reference number: 629.8955133 1, Engineering Reserve

MECH 4900 Orthopaedic Engineering 4 credit points
Fourth year elective unit of study.
Syllabus summary
Musculoskeletal anatomy, physiology and function, including basic medical terminology, anatomy and physiology, normal and abnormal joints, bones, cartilage, ligaments and tendons. Introduction to orthopaedic injuries, including fractures, bone healing, fracture fixation, electrical stimulation of bone healing. Overview of the design, manufacture and use of artificial ligaments, hip, knee and shoulder joint prostheses, bone cement, finite element modelling of prostheses, material considerations, testing of orthopaedic implants, failure of implants.
Objectives
To introduce students to tie biomechanics of the musculoskeletal system and to the fundamentals of biomedical engineering as applied to orthopaedic devices used for the replacement and repair of the diseased or damaged skeleton.
Expected outcomes
Students will become acquainted with tie physical properties of human bones and joints. They will understand how the skeleton functions as an engineering structure. They will learn the physical characteristics of the materials from which the musculoskeletal system is fabricated and be able to adapt basic engineering principles to the design and fabrication of prosthetic joints and to other devices used for replacement and repair of bones and joints.

MECH 4910 Biomechanics and Biomaterials 4 credit points
Offered: July. Prerequisite: 36 credit points of third year units of study. Classes: 4 hrs of lecture/tut/lab per week. Assessment: Continual assessment and exam. Fourth year elective unit of study.
Syllabus summary
Introduction to biomaterials, characteristics of materials, including mechanical testing and advanced analysis techniques, metallic, polymeric, ceramic, composite implant materials and their properties; structure/property relationships to biological materials and the study of biomimetics (mimicry of biological materials), tissue response to implants, soft tissue replacement, hard tissue replacement and laboratory testing of biomaterials and biological materials.
Introduction to biomechanics, modelling the human body from the macroscopic level to the microscopic level, soft tissue mechanics - non-linear and viscoelastic descriptions, muscle mechanics, joint mechanics, kinematics and dynamics of human gait, biomechanics of cells, physiological fluid flow, biomechanics of injury, functional and mechanical response of tissues to mechanical loading.
Objectives
To gain a basic understanding of the major areas of interest in both tie biomaterials and biomechanics fields, learn to apply basic engineering principles to biomedical systems, and understand the challenges and difficulties of biomedical systems.
Expected outcomes
Students should be able to:
• Apply static and dynamic mechanical analyses to the human body to describe motion.
• Understand the mechanical behaviour of biological tissues and the types of models used to describe this behaviour.
• Understand all the factors involved in the selection of a biomaterial for tissue replacement, including mechanical, bio-compatibility, material property and fixation factors.
• Improve their written and oral communication skills in a technical setting.
The students should gain a basic understanding of the major areas of current research in both the biomaterials and biomechanics fields, learn to apply basic engineering principles to biomedical systems, and understand the challenges and difficulties of biomedical systems.
Reference books
J. Black Orthopaedic biomaterials in research and practice (Churchill Livingstone, 1988)
Y.-C. Fung Biomechanics of Living Tissues (Springer-Verlag)

MECH 5202 Computational Fluid Dynamics 4 credit points
Offered: July. Assessment: Tut work, projects and one 2hr exam. Objectives: To provide the skills necessary to use a state-of-the-art computational fluid dynamics package.
Expected outcomes: Students are required to obtain solutions for a number of standard flows and one complex flow in computer laboratory sessions which are carried out on a commercial CFD package.
Syllabus: The governing equations are classified according to mathematical character. Finite difference and finite volume methods, accuracy and stability for the advection equation, diffusion equation and advection/diffusion equation are covered. Direct and iterative solution techniques for the resulting algebraic equations are considered. Solution of the full Navier-Stokes equations, including the pressure/continuity coupling is described. The k-epsilon turbulence model is derived and applied to standard flows.
MECH 5624  Energy and the Environment
4 credit points
Offered: February. Prohibition: MECH 4220 Environmental Engineering MECH 4240 Energy and the Environment. Classes: (3 hr lecture, 2 hour lab) wk. Assessment: Group assignment submissions, as indicated at the commencement of the course, oral examination. Objective: To develop an understanding of the economic and environmental constraints on the selection and design of energy systems.
Expected outcomes: Students will have learnt how to make economic assessment of energy system alternatives and to mitigate and evaluate their environmental impact.

MECH 5701  Computers in Real Time Control and Inst
6 credit points
Offered: February. Prohibition: MECH 4730 Computers in Real-Time Control and Inst MECH 4710 Microprocessors in Engineered Products. Classes: (2 lect and 2 hr lab/tut)/wk. Assessment: Assignment submissions, laboratory demonstration and final exam. Syllabus summary:
Course Objectives:
Microcomputer and microprocessor system, operating in real time have become very common components in today's engineering applications. The objective of this course is to teach the fundamentals of real time software and to build competence in the engineering use of such systems through lectures emphasising standard computer architectures, programming, and through intensive laboratory work with microcomputer systems interacting with experimental Mechatronic processes.
Expected outcome:
The student will have a basic knowledge of the hardware components available in a microcomputer system and a detailed knowledge of facilities and capabilities typically present in a professional real time operating system. The student will have the competence to design, implement and debug interrupt-driven multitasking systems with graphical user interfaces.
Textbooks
Auslander DM, Tham CH, Real Time Software for Control, (Prentice Hall, 1990)

MECH 5711  Microprocessors in Engineered Products
6 credit points
Offered: February. Prohibition: MECH 4710 Microprocessors in Engineered Products. Classes: (2 lect and 2 hr lab/tut)/wk. Assessment: Project and assignment work, plus one 2 hr exam. Satisfactory performance in project and assignment work is required.
Syllabus summary:
Specific requirements for microprocessor-based products. Problem definition and system design. CPU, memory and interface circuits. Tools for design, development and testing of prototype systems. The unit of study will include a major project, where groups of students design, develop and commission a microprocessor-based product.
Objectives:
To provide experience, confidence and basic competence in the design and implementation of microprocessor-based products and instruments. To impart a detailed knowledge of the software and hardware architecture of a typical modern microcontroller, and an understanding of the use of these resources in product design. To give experience with modern cross-development tools. To provide experience of working in a project team to prototype a realistic product to meet a specification.
Expected outcomes:
The student will have a detailed knowledge of the software and hardware architecture of a modern microcontroller. This knowledge will include an in-depth understanding of the relationship between assembly language, high-level language, and the hardware, of the utilisation and interfacing of microcontroller hardware resources, and of the design and development of software comprised of multiple interrupt-driven processes. The student will have the competence to develop prototype microprocessor-based products.
Textbooks
- 80C196KC Data Book. (Intel Corp.)
- Petman. Design with microcontrollers. (McGraw Hill)
Reference books: An extensive reference list will be distributed.

MECH 5722  Robotics Systems
4 credit points
Offered: July. Assessment: Assignment, project and lab work and one 122 hr exam. Syllabus summary:
Expected outcomes:
Students should gain an appreciation for the important factors that need to be considered in the selection and use of robotics for industrial applications.
Reference books
- Fu, Gonzalez and Lee, Robotics: Control, Sensing, Vision and Intelligence, McGraw-Hill
- McKerrow, Introduction to Robotics, Addison-Wesley
- Asada and Slotine, Robotic Analysis and Control, John Wiley, 1985
- Craig, Introduction to Robotics: Mechanical and Control, Addison-Wesley, 1986

MECH 5900  Thesis, Semester 1, Full Time
12 credit points
Offered: February. Assessment: On the basis of the submitted thesis and the report by the supervisor of the student's contribution.
NB: Theses should be typewritten on A4 with text, diagrams, graphs, photographs, etc, properly displayed. One copy should be submitted, hard-bound for the university library. Students are responsible for supplying their own thesis production materials.
Syllabus:
Each prospective student is required to consult with prospective supervisors to apply for a topic. In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is directly responsible to his or her supervisor for the execution of his and her practical work and the general layout of the thesis itself.
Objectives:
To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.
Expected outcomes:
Ability to plan and execute a complete piece of scientific work and to report their study in a thesis.

MECH 5901  Thesis, Semester 2, Full Time
12 credit points
Offered: July. Assessment: On the basis of the submitted thesis and the report by the supervisor of the student's contribution.
NB: Theses should be typewritten on A4 with text, diagrams, graphs, photographs, etc, properly displayed. One copy should be submitted, hard-bound for the university library. Students are responsible for supplying their own thesis production materials.
Syllabus:
Each prospective student is required to consult with prospective supervisors to apply for a topic. In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is directly responsible to his or her supervisor for the execution of his and her practical work and the general layout of the thesis itself.

Objectives:

To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.

Expected outcomes:

Ability to plan and execute a complete piece of scientific work and to report their study in a thesis.

MECH5902  Thesis, Semester 1, Part Time
6 credit points
Offered: February. Assessment: On the basis of the submitted thesis and the report by the supervisor of the student's contribution.

NB: Offered for part-time students who want to do a thesis project commencing in February or July, respectively. Theses should be typewritten on A4 with text, diagrams, graphs, photographs, etc, properly displayed. One copy should be submitted, hard-bound for the university library. Students are responsible for supplying their own thesis production materials.

Syllabus:

Each prospective student is required to consult with prospective supervisors to apply for a topic. In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is directly responsible to his or her supervisor for the execution of his and her practical work and the general layout of the thesis itself.

Objectives:

To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.

Expected outcomes:

Ability to plan and execute a complete piece of scientific work and to report their study in a thesis.

MECH5903  Thesis, Semester 2, Part Time
6 credit points
Offered: July. Assessment: On the basis of the submitted thesis and the report by the supervisor of the student's contribution.

NB: Theses should be typewritten on A4 with text, diagrams, graphs, photographs, etc, properly displayed. One copy should be submitted, hard-bound for the university library. Students are responsible for supplying their own thesis production materials.

Syllabus:

Each prospective student is required to consult with prospective supervisors to apply for a topic. In the normal course of events some or all of the theoretical, developmental, and experimental aspects of research or design work are expected in a thesis. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is directly responsible to his or her supervisor for the execution of his and her practical work and the general layout of the thesis itself.

Objectives:

To involve students in a research or major design project and give them the opportunity to conduct systematic investigations.

Expected outcomes:

Ability to plan and execute a complete piece of scientific work and to report their study in a thesis.

MECH5904  Seminar, Semester 1
2 credit points
Offered: February. Classes: Some instructional sessions will be arranged to provide basic techniques for preparation and presentation of technical material to an audience by audio-visual means. Assessment: Satisfactory performance in a seminar as assessed by the participants.

Syllabus summary:

Each student, usually in consultation with his or her supervisor, prepares a abstract of the seminar for distribution one week in advance of the seminar. Although it is not obligatory, the subject for the seminar is normally closely related to the student's thesis project (MECH 5900); thus it tends to deal in depth with some relatively narrow technical field. At the seminar (where the participants comprise departmental staff, postgraduate students and visitors), oral presentation of the thesis is followed by critical discussion under formal chairmanship.

Objectives:

To improve student competence and confidence in developing and presenting a formal technical presentation.

Expected outcomes:

The ability to structure and deliver a competent and informative technical presentation.

MECH 5905  Seminar, Semester 2
2 credit points
Offered: July. Classes: Some instructional sessions will be arranged to provide basic techniques for preparation and presentation of technical material to an audience by audio-visual means. Assessment: Satisfactory performance in a seminar as assessed by the participants.

Syllabus summary:

Each student, usually in consultation with his or her supervisor, prepares a abstract of the seminar for distribution one week in advance of the seminar. Although it is not obligatory, the subject for the seminar is normally closely related to the student's thesis project (MECH 5900); thus it tends to deal in depth with some relatively narrow technical field. At the seminar (where the participants comprise departmental staff, postgraduate students and visitors), oral presentation of the thesis is followed by critical discussion under formal chairmanship.

Objectives:

To improve student competence and confidence in developing and presenting a formal technical presentation.

Expected outcomes:

The ability to structure and deliver a competent and informative technical presentation.

MECH 5912  Environmental Acoustics & Noise Control
3 credit points
Offered: February. Prohibition: MECH 4230 Environmental Acoustics and Noise Control. Assessment: One 1.5hr exam.

Syllabus summary:

Basic acoustics theory, sound generation and propagation, impedance, absorbing materials, industrial noise sources, isolation methods of noise control, enclosures, instrumentation and measurement, frequency analysis, noise regulations. Computational methods in acoustics.

Objective:

To acquaint students with the methods engineers use to assess and deal with the environmental noise due to industry and other human activities.

Expected outcomes:

Students will appreciate the social, economic, and legislative aspects of environmental noise. They will be able to make the calculations and measurements necessary to estimate sound levels and noise in machinery, buildings and the outside environment and to make recommendations as to how best to reduce them.

Reference books

Bies and Hansen Engineering Noise Control (Allen & Unwin, 1988)
Hassall and Zaveri Acoustic Noise Measurement (Bruel & Kjaer, 1988)

Interdisciplinary units of study

ENGG1001 Interdisciplinary Project
12 credit points
Offered: February. Prerequisite: UAI score of at least 98. Students considering this option are advised to see their Head of Department. Prohibition: Mutually exclusive with a number of other first year units of study. As these will vary depending on the branch of
Engineering, students considering this option are advised to see
their Head of Department prior to enrolment. **Assessment:** A written
report on the project undertaken and other oral and written
presentations as specified.

First year unit of study for all degree branches in Engineering.
The project is a major component of this unit of study. Al-
mong the project will be supervised by a senior Faculty mem-
ber, the emphasis here is on the team members setting and
achieving their own goals, and presenting their work in both oral
and written form. Groups will be expected to make an engineer-
ing project by the end of Semester 1.

**ENGG 1002 Introduction to Engineering Leadership**
2 credit points
**Offered:** July. **Classes:** Weekly lectures/tutorials will be
supplemented by a practical session at the end of the Semester.
**Assessment:** Assessment will be on the basis of an examination
and assignments. Satisfactory tutorial performance and group
participation is also required.

**Objectives/Outcomes:** To develop an understanding of supervisory leadership, this
unit gives students the opportunity to build their leadership skills
throughout their undergraduate course and beyond

**Syllabus:**
Leadership theory and practice; traditional leadership styles;
personal qualities; moral; situational approach to leadership;
bases of influence; delegation; and communication. At the con-
clusion of the unit, students undertake a series of consolidating
exercises in practical leadership.

**ENGG 2002 Advanced Engineering Project**
2 credit points
**Offered:** July. **Prerequisite:** Only students who have been named
on the Dean's list at the end of Year 1 will be eligible. **Classes:** 2
hours tutorials per week for one semester. This Unit of study will be
offered in either February or July Semesters. **Assessment:** A
written report and oral presentations. Satisfactory tutorial
performance is also required.

**Syllabus:** Students will work in groups on a defined Industrial
Project, or continue with one of the projects previously carried
out in study ENGG 1001. Each group will be expected to pro-
vide details and insight into how their findings could be used or
exploited commercially.

**Objectives/Outcomes:** This unit of study is designed to pro-
vide students with an insight into engineering practice in indus-
try. By its end, it is expected that students will be able to carry
out the following tasks:
• analyse an industrial problem
• carry out the background research required to fully define and
solve the problem
• work effectively as a team member at all stages of the project
• write a coherent report, outlining the problem and its solu-
tion, as well as making an oral presentation
• prepare a business plan with respect to an industrial or re-
search project.

**ENGG 2003 Introduction to Engineering Management**
4 credit points
**Offered:** July. **Prohibition:** ELEC 3701, MECH 3620. **Classes:** Two
(1 hr) lectures and one (1 hr) tutorial per week one semester.
**Assessment:** Tutorial and project assignments plus a final (2 hr)
examination.
Year 2 core unit of study for the "Management" stream within
the degrees in Aeronautical, Chemical, Electrical, Mechanical
and Mechatronics Engineering.

**Syllabus:** Engineers and management; communication; mi-
cro- and macro-economics; strategic management; business
planning; legal responsibilities; industrial hazard management;
human resource management; industrial relations; project man-
agement; quality assurance; operations management; account-
ning and financial management.

**Objectives/Outcomes:** To introduce students to a range of
management concepts and techniques, and to develop an under-
standing of the role and challenges of management.

**ENGG 2004 Introductory Engineering Studies**
4 credit points
**Offered:** January (short).

**ENGG 2005 Introductory Engineering Project**
8 credit points
**Offered:** January (short).

**ENGG 2006 Advances in Engineering Leadership**
2 credit points
**Offered:** July. **Prerequisite:** ENGG 1002. **Classes:** Weekly lectures/
tutorials will be supplemented by a practical session at the end of
the Semester. **Assessment:** Assessment will be on the basis of an
examination and assignments. Satisfactory tutorial performance and
group participation is also required.

**Objectives/Outcomes:** To develop an understanding of managerial leadership, this
course builds on the foundations laid in ENGG 1002. The focus
shifts from supervisory leadership to higher level management
leadership.

**Syllabus:**
Decision making; problem solving; task and relationship behav-
ior; task organisation; priority setting; group decision making;
duty of care; motivation; and conflict resolution. At the con-
clusion of the unit students undertake a series of practical lead-
ership exercises.

**ENGG 3001 Technology Education**
2 credit points
**Offered:** July. **Prerequisite:** Only students who have been named
on the Dean's list at the end of Year 2 will be eligible. **Classes:** 2
hours tutorials per week for one semester. This unit of study will be
offered in either February or July Semesters. **Assessment:** A
written report and oral demonstrations. Satisfactory tutorial
performance is also required.

**Syllabus:** Students will work alone or with a partner to develop
an educational unit for Year 9 High School Students which will
involve them in some aspect of engineering science or technolo-
gy and which will, at the same time, raise an awareness of, and
an interest in, engineering. The units will need to be designed
with due regard to the teaching and learning process. Activities
undertaken as part of the units should reflect, wherever possible,
aspects of professional engineering practice.

**Objectives/Outcomes:** This elective will help understand en-
GINEERING principles and applications by investigating, explain-
ing and practising with them with Year 9 school students. At the end of
this elective it is expected that students will be able to:
Investigate, identity, design, develop, implement, and evalu-
ate experiential activities for non-engineers which reflect engi-
neering practice; Develop skills in the management and use of
personal and material resources and processes; Effectively com-
municate engineering principles and practices to others. Present
work in written, graphical, and oral forms.

**ENGG 4001 Innovation/International Competitiveness**
4 credit points
**Offered:** February. **Classes:** (1 lec/1 seminar)/wk. **Assessment:**
Essay, group project case study, assignments and written exam.

**Syllabus Summary:** The course is designed to provide students
with an understanding of the forces of international competition
that are setting the rules for the future of private and public sec-
tor organisations in which engineers are employed. Introduction
To challenges of modern management; understanding of the new
rules of international competitiveness; effects of globalisation
Australia's economic performance; the competitiveness of
Australian firms; the generation of employment and wealth; the
changing requirements on the engineer; tie engineer as manag-
er and strategist; the role of innovation in business management;
product innovation and commercialisation.

**Textbooks**
Text and reference books
See list supplied by lecturer
ENGG 4002 New Business Creation
4 credit points

Offered: July. Assessment: In-course involvement (attendance and discussion); product development assignment; business case study assignment; examination.

In the new economic environment, graduates must be better prepared to take control of their own employment futures which increasingly must include the option of entrepreneurship and the creation and growth of one’s own company. For those graduates with a technical or engineering background, the new technology-based firm offers extremely large potential to create jobs and wealth. This unit of study provides a student with a clear understanding of the venture creation process with particular emphasis on technology-based ventures. A range of skills are developed relating to R&D management, intellectual property, technology contracts, product development, marketing, financial management and business planning. As a result, it is expected that this unit of study could be the first step for a number of its attendees to progress to active involvement in new technology based firms either in Australia or internationally.

ENGG 4003 Economic, Social & Ethical Aspects of En
4 credit points

Offered: July. Assessment: Attendance at group discussions (10%); presentation of case study, and the leading of the discussion (40%); final exam (50%).

The unit of study will proceed primarily by lecture, case study presentation and group discussion. All students undertaking the unit of study are required to present, and lead the discussion on, at least one case study. Appropriate visiting professionals will form part of the delivery.

In selecting the projects for the unit of study, the organisers will include projects across a wide range of the fields of engineering studied and researched within the Faculty of Engineering at the University of Sydney.

In preparing the case studies, presenters will aim to cover the following:
- Outline the historical context of the project.
- Outline the justification for the project from the point of view of those who promoted the project.
- Identify the resources required for the project and the sources of those resources.
- Identify the main engineering objectives and challenges of the project.
- Identify the social and ethical issues involved in the project from the points of view of (a) the society of the time and (b) Australian society today.
- Provide an assessment of the ‘success’ of the project in terms of (a) the people who promoted the project and (b) the personal opinions of the presenter of the case study.

ENGG 4004 Advanced Engineering Design Project
12 credit points

Offered: February, July. Prerequisite: Only students on the Dean's List at the end of Year 3 will be invited to join this interdisciplinary group. Prohibition: AERO 4900, AERO 4950, CHNG 4201, CHNG 4202, CIVL4013, CIVL4014, ELEC 4703, MECH 4102. Classes: Literature Survey, project formulation and detailed design of a major integrated facility to be carried out in interdisciplinary groups in February or July Semesters. Assessment: Assessment will be on the basis of a written report and oral presentations. Satisfactory tutorial performance and group participation is also required.

Objectives/Outcomes:
- To develop an understanding of the practice of engineering, utilising a diverse range of skills to solve complex problems.
- Students will gain skills in design, analysis and management by undertaking a significant research project in a multi-disciplinary team comprising students from across the faculty. Each student will be required to work in a team to produce an integrated design in greater detail than is possible in ordinary classes and to write a significant design report presenting the results of the process. The ability to work in a team of engineers from different disciplines will be assessed as part of this design project which will be centred around a major industrial facility.

Syllabus:

# Table 1: Aeronautical Engineering

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core units of study</strong></td>
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<tr>
<td><strong>First Year</strong></td>
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<tr>
<td>AERO 1600 Workshop Technology</td>
<td>4</td>
<td>N) MECH 1600 Manufacturing Technology AERO 1601 Aerospace Manufacture.</td>
<td>February</td>
<td></td>
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</tr>
<tr>
<td>AERO 1701 Introduction to Aerospace Engineering</td>
<td>3</td>
<td></td>
<td>February</td>
<td></td>
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</tr>
<tr>
<td>PHYS 1003 Physics 1 (Technological)</td>
<td>6</td>
<td>A) HSC 2-unit Physics or HSC 4-unit Science or PHYS 1001 or 1002 or 1901 or equivalent. C) For Science students: Recommended concurrent units MATH 1003 and 1005 or 1903 and 1905. N) For Science students: May not be counted with PHYS 1004 or 1902.</td>
<td>February, July</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics, N) May not be counted with MATH 1901 or 1011.</td>
<td>February, January (short)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics, N) May not be counted with MATH 1902 or 1012.</td>
<td>February, January (short)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001. N) May not be counted with MATH 1903 or 1013.</td>
<td>July, January (short)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 10051 Statistics</td>
<td>3</td>
<td>A) HSC 2-unit Mathematics, N) May not be counted with MATH 1905 or 1015.</td>
<td>July, January (short)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECH 1820 Introduction to Computing</td>
<td>6</td>
<td>N) MECH1800 Computational Engineering 1A MECH1801 Computational Engineering 1CINFO11001 Information Technology Tools.</td>
<td>February</td>
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</tbody>
</table>
## Table 1: Aeronautical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 2300 Materials 1</td>
<td>4</td>
<td>N) CXVL 2101 Properties of Materials.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 2400 Mechanical Design 1</td>
<td>6</td>
<td></td>
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<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 2500 Engineering Dynamics 1</td>
<td>4</td>
<td>P) MATH 1001 MATH 1002 and MECH 1530 Engineering Mechanics or MECH 1510 Kinematics and Dynamics.</td>
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<td>July</td>
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<tr>
<td><strong>Third Year</strong></td>
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<tr>
<td>AERO 3200 Aerodynamics 1</td>
<td>4</td>
<td>P) AERO 2201 Fluid Mechanics 1.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 3301 Aerospace Structures 1</td>
<td>4</td>
<td>P) AERO 2300 Mechanics of Solids 1.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 34002 Aircraft Design 1</td>
<td>3</td>
<td>P) MECH 2400 Mechanical Design 1. N) AERO 3401 Aerospace Design 1.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 34502 Aircraft Design 2</td>
<td>3</td>
<td>P) MECH 2400 Mechanical Design 1.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 3201 Thermodynamics 2</td>
<td>4</td>
<td>P) MECH 2200 Thermo fluids or MECH 2201 Thermodynamics 1. N) MECH 3200 Thermal Engineering 1.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MECH 3500 Engineering Dynamics 2</td>
<td>4</td>
<td>P) MECH 2500 Engineering Dynamics 1 and (MATH 2001 &amp; MATH 2005).</td>
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<td>February</td>
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<tr>
<td><strong>Fourth Year</strong></td>
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<tr>
<td>AERO 4200 Aerodynamics 3</td>
<td>3</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 4201 Propulsion</td>
<td>4</td>
<td>P) MECH 3201 Thermodynamics 2.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4303 Aerospace Structures 3</td>
<td>6</td>
<td>P) AERO 3350 Aircraft Structures 2 or AERO 3351 Aerospace Structures 2. N) AERO 4301 Applied Numerical Stress Analysis.</td>
<td></td>
<td></td>
<td>February</td>
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<tr>
<td>AERO 4400 Aircraft Design 3</td>
<td>6</td>
<td>P) AERO 3450 Aircraft Design 2 AERO 3401 Aerospace Design.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 4500 Flight Mechanics 2</td>
<td>6</td>
<td>P) AERO 3500 Flight Mechanics 1.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 4600 Practical Experience</td>
<td>0</td>
<td>P) 40 credit points of 3rd year UOS.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4950 Thesis Preparation</td>
<td>2</td>
<td>P) 40 credit points of 3rd year UOS.</td>
<td></td>
<td></td>
<td>February, July</td>
</tr>
<tr>
<td>AERO 4990 Thesis or Design Project</td>
<td>10</td>
<td>P) 40 Credit Points of 3rd Year UOS AERO 4950 Thesis Preparation.</td>
<td></td>
<td></td>
<td>February, July</td>
</tr>
<tr>
<td>AERO 49203 Seminar</td>
<td>2</td>
<td>P) 40 credit points of 3rd Year UOS.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

### Notes to Table 1

1. MATH 1004 Discrete Mathematics is an acceptable alternative to MATH 1005
2. Students enrolled in BE/BCom enrol in AERO 3401 Aerospace Design as an alternative to AERO 3400 & AERO 3450.
3. Students enrolled in BE/BCom are exempt from this unit.
Table 1: Aeronautical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
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</table>

Resolutions of the Faculty of Engineering relating to Table 1

Degree eligibility

BE(Aeronautical)
In addition to gaining credit for the 148 credit points of core units of study set out in Table 1, candidates are required to complete at least 44 credit points of elective units of study from the table of recommended elective units of study for BE(Aeronautical). A minimum of 192 credit points is required to be eligible for the award of the degree of BE (Aeronautical).

BE(Aeronautical)/BSc or BA
In addition to gaining credit for the 148 credit points of core units of study set out in Table 1, candidates are required to complete at least 80 credit points of units of study given by either the Faculty of Science for BE/BSc or Arts for BE/BA. An additional 12 credit points of elective units of study from the table of recommended elective units of study for BE(Aeronautical) are also required. A minimum of 240 credit points is required to be eligible for the combined degree. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the Faculty in which they are undertaking the combined degree.

BE(Aeronautical)/BCom
In addition to gaining credit for the 144 credit points of core units of study set out in Table 1, candidates are required to complete recommended units of study given by the Faculty of Commerce. A minimum of 240 credit points is required to be eligible for the combined degree BE/BCom. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the Faculty Commerce.

BE (Aeronautical Engineering)/(Management)
In addition to gaining credit for the 144 credit points of core units of study set out in Table 1, candidates are required to complete at least 24 credit points of units of study from the table of recommended elective units of study for BE (Aeronautical Engineering). Further credit of 24 credit points shall be gained by completing the units of study listed in the table of additional units of study for BE (Aeronautical Engineering) - (Management).

Acceptable alternative units of study
Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent Advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced options should seek advice from their Department before enrolling. Students undertaking Study Abroad in their final year of the degree must enrol in the AERO 4620 Aeronautical International Exchange Program unit of study as an alternative to a semester's standard units.

Recommended elective units of study

First Year

<table>
<thead>
<tr>
<th>AERO 1400</th>
<th>Intro to Aircraft Construction &amp; Design</th>
<th>6</th>
<th>July</th>
</tr>
</thead>
</table>

Second Year

<table>
<thead>
<tr>
<th>AERO 2101</th>
<th>Aeronautical Engineering Computing</th>
<th>4</th>
<th>P) AERO 1801 Computer Engineering Applications.</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 202</td>
<td>Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902.</td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2052</td>
<td>Numerical Methods</td>
<td>2</td>
<td>C) MATH 2001 or 2901. N) MATH 2952.</td>
<td>July</td>
</tr>
</tbody>
</table>

Third Year

<table>
<thead>
<tr>
<th>AERO 3501</th>
<th>Flying Operations</th>
<th>2</th>
<th>P) AERO 2500 Introductory Flight Mechanics and Performance; AERO 2201 Fluid Mechanics 1.</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 3600</td>
<td>Aviation Technology</td>
<td>4</td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 3602</td>
<td>Aviation Operation and Management</td>
<td>4</td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ENGG 2003</td>
<td>Introduction to Engineering</td>
<td>4</td>
<td>N) ELEC3701, MECH3620.</td>
<td>July</td>
</tr>
</tbody>
</table>
### Table 1: Aeronautical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fourth Year</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AERO 4250 Aerodynamics 4</td>
<td>3</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
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<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4290 Rotary Wing Aircraft</td>
<td>4</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
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<td>February</td>
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<tr>
<td>AERO 4291 Advanced Computational Aerodynamics</td>
<td>3</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
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<td>July</td>
</tr>
<tr>
<td>AERO 4292 Aeroelasticity</td>
<td>3</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
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<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4351 Aerospace Structures 4</td>
<td>3</td>
<td>P) AERO 3351 Aerospace Structures 2, AERO 3350 Aircraft Structures 2.'</td>
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<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4390 Smart Materials and Structures</td>
<td>3</td>
<td>P) AERO 3351 Aerospace Structures 2, AERO 3350 Aircraft Structures 2.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4490 Advanced Aircraft Design</td>
<td>4</td>
<td>P) AERO 3450 Aircraft Design 2, AERO 3401 Aerospace Design.</td>
<td></td>
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<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Notes to Table 2**

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Approved elective units of study given by Departments other than the School of Aerospace, Mechanical and Mechatronic Engg may be taken as alternatives, subject to the approval of the head of school.

### Additional units of study for BE(Aeronautical Engineering - Management)

| ENGG 2003i Introduction to Engineering Management | 4 | N) ELEC3701, MECH3620. | July    |
| ENGG 3002i Industrial and Engineering Management | 4 | N) ELEC3701, MECH3620. | Not offered in 2001 (4 credit points). |
| AERO 3602 Aviation Operation and Management | 4 | | July    |
| CHNG 3401 Project Economics | 4 | | July    |
| CHNG 4403 Engineering Business Skills | 4 | | July    |
| CHNG 4404 Environmental Decision Making | 4 | | July    |
| ENGG 4001 Innovation/International Competitiveness | 4 | | February |
| ENGG 4002 New Business Creation | 4 | | July    |
| MECH 4050 Workplace Industrial Relations | 2 | P) 36 credit points of senior units of study. | July    |

Choose one of:

- CHNG 4401 Project Engineering | 4 | | February |

or

- ELEC 4701 Project Management | 4 | P) Advisory Prerequisite: ELEC3701 Management for Engineers. | July    |

or

- MECH 4110 Professional Engineering | 4 | P) 36 credit points of Senior units of study. | February |

**Note**

1. The required total of 24 credit points shall comprise ENGG 2003, ENGG 3002 and 16 credit points from the remaining units of study.
Candidates for the degree of Bachelor of Engineering in Chemical Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional credit points of elective units of study, as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points. See note (1) relating to core units of study offered by faculties other than Engineering.

## Core units of study
### First Year
- **First Year**
  - **MATH 1001** Differential Calculus 3 A) HSC 3-unit Mathematics. N) May not be counted with MATH 1901 or 1911. February, January (short).
  - **MATH 1002** Linear Algebra 3 A) HSC 3-unit Mathematics. N) May not be counted with MATH 1902 or 1912. February, January (short).
  - **MATH 1003** Integral Calculus and Modelling 3 A) HSC 4-unit Mathematics or MATH 1001. N) May not be counted with MATH 1903 or 1913. July, January (short).
  - **CHNG 1301** Computing for Chemical Engineers 1B 4 P) Advisory prerequisite: CHNG1301 Computing for Chemical Engineering 1A. July.
  - **CHEM 1101** Chemistry 1A 4 A) HSC Mathematics 2 unit course; and the Chemistry component of the 4-unit or 3-unit HSC Science course, or 2-unit Chemistry. C) Recommended concurrent unit of study: Preferred - MATH 1001 and 1002 or 1901 and 1902; otherwise - MATH 1011 and 1012. February, January (short).
  - **CHEM 1102** Chemistry 1B 4 Q) CHEM 1101 or a Distinction in CHEM 1001 or equivalent. C) Recommended concurrent unit of study: Preferred - MATH1003 and 1005 or 1003 and 1004 or 1903 and 1905 or 1903 and 1904; otherwise-MATH 1004 and 1005 or 1013 and 1015. N) May not be counted with CHEM 1002 or 1902 or 1904. February, January (short).
  - **CHNG 1101** Chemical Engineering Applications 4 February.
  - **CHNG 1101** Chemical Engineering 1A 4 February.
  - **CHNG 1102** Chemical Engineering 1B 4 P) CHNG 1101 Chemical Engineering 1A. July.
  - **CHNG 1201** Chemical Process Case Studies 4 July.
  - **CHNG 1301** Computing for Chemical Engineers 1A 4 February.

### Second Year
- **Second Year**
  - **MATH 2001** Vector Calculus and Complex Variables 4 P) MATH (1001 or 1901) and 1906 and (1002 or 1902) and (1003 or 1903 or 1907). N) May not be counted with MATH 2901. February, January (short).
  - **MATH 2002** Matrix Applications 4 P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902. February, January (short).
  - **MATH 2005** Fourier Series & Differential Equations 4 P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907). N) May not be counted with MATH 2905. July, January (short).
  - **MATH 2051** Linear Programming 2 C) MATH 2001 or 2901, and MATH 2002 or 2902. N) MATH 2953. July.
  - **MATH 2052** Numerical Methods C) MATH 2001 or 2901. N) MATH 2952. July.
### Table 2: Chemical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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</thead>
</table>
| CHEM 2101 Chemistry 2 (Environmental)      | 8             | Q) CHEM 1102 or 1902 or 1904 or 1909.  
P) 6 credit points of Junior Mathematics.  
N) May not be counted with CHEM 2001 or 2301 or 2502 or 2901. |               |                 |                                  | February |
| CHNG 2101 Chemical Engineering 2A          | 4             |                     |               |                                  | February |
| CHNG 2102 Chemical Engineering 2B          | 4             |                     |               |                                  | July     |
| CHNG 2301 Chemical Engineering Computations| 4             | P) Advisory prerequisites: MATH1001, MATH1002, MATH1003, MATH1005, CHNG1301. |               |                                  | February, July |
| CHNG 2501 Environmental Chem Eng Fundamentals | 4             |                     |               |                                  | July     |
| CHNG 2601 Materials and Corrosion          | 4             |                     |               |                                  | July     |

#### Third Year

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<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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<tbody>
<tr>
<td>CHNG 3001 Chemical Engineering Laboratory</td>
<td>4</td>
<td>P) Advisory prerequisite: CHNG2101 Chemical Engineering 2A; CHNG2102 Chemical Engineering 2B.</td>
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<td>CHNG 3101 Unit Ops (Heat Transfer)</td>
<td>4</td>
<td>P) Advisory prerequisite: CHNG2101 Chemical Engineering 2A; CHNG2102 Chemical Engineering 2B.</td>
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<td>CHNG 3102 Unit Ops (Mass Transfer)</td>
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<td>P) advisory prerequisites: CHNG2101 Chemical Engineering 2A; CHNG2102 Chemical Engineering 2B.</td>
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<td>CHNG 3103 Unit Ops (Particle Mechanics)</td>
<td>4</td>
<td>P) advisory prerequisites: CHNG2101 Chemical Engineering 2A; CHNG2102 Chemical Engineering 2B.</td>
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<td>CHNG 3104 Unit Ops (Fluid Mechanics)</td>
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<td>CHNG 3105 Thermodynamics 1</td>
<td>4</td>
<td>P) advisory prerequisites: CHNG2101 Chemical Engineering 2A; CHNG2102 Chemical Engineering 2B.</td>
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<td>CHNG 3106 Thermodynamics 2</td>
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<td>P) Advisory prerequisite: CHNG3105 Thermodynamics 1.</td>
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<tr>
<td>CHNG 3107 Reaction Engineering 1</td>
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<tr>
<td>CHNG 3301 Process Modelling</td>
<td>4</td>
<td>P) Advisory prerequisite: CHNG2301 Chemical Engineering Computations.</td>
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<tr>
<td>CHNG 3302 Process Control 1</td>
<td>4</td>
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<td>February</td>
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<tr>
<td>CHNG 3401 Project Economics</td>
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#### Fourth Year

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<th>Unit of study</th>
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<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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<tbody>
<tr>
<td>CHNG 4001 Practical Experience</td>
<td>0</td>
<td>P) advisory prerequisite: 28 credit points of 3rd year units.</td>
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<td>July</td>
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<tr>
<td>CHNG 4002 Thesis</td>
<td>8</td>
<td>P) Advisory prerequisite: Students should have completed (or be enrolled in) all other 4th Year core units.</td>
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<td>CHNG 4201 Chemical Engineering Design 1</td>
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<td>CHNG 4202 Chemical Engineering Design 2</td>
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<tr>
<td>CHNG 4401 Project Engineering</td>
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<tr>
<td>CHNG 4402 Process Plant Risk Management</td>
<td>4</td>
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</table>
Table 2: Chemical Engineering - continued

<table>
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<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>C) Corequisite</td>
<td>N) Prohibition</td>
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</tr>
</tbody>
</table>

Notes to Table 2
1. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge and/or prerequisite requirements will be as prescribed by that Faculty. 
2. Students doing any of the combined degree options BE/BA, BE/BCom or BE/BSc will be exempt from First Year core units of study MATH 1052 and CHNG 1201. 
3. Students doing the combined degree option BE/BCom will also replace the Second Year core units of study MATH 2001, MATH 2002, MATH 2005, MATH 2051 and MATH 2052 with STAT 2002 and STAT 2004. 
4. Acceptable alternatives to CHEM 2101 are CHEM 2001 and CHEM 2201.

Resolutions of the Faculty of Engineering relating to Table 2
Bachelor of Engineering in Chemical Engineering
Candidates for this degree are required to complete all the core units of study in Table 2 (total 164 credit points). They are also required to gain at least 12 credit points from the Fourth Year electives listed in the table of Recommended Elective Units of Study for BE (Chem) as shown below.

Bachelor of Engineering in Chemical Engineering (Bio-Process Engineering)
Candidates for this degree are required to complete all the core units of study in Table 2 (total 164 credit points). They are also required to complete CHNG 2701, CHNG 2702, MICR 2007, MICR 2008 and CHNG 4501, as well as gaining at least 4 credit points from the Fourth Year electives listed in the table of Recommended Elective Units of Study for BE (Chem) as shown below.

Bachelor of Engineering in Chemical Engineering (Computer-Aided Process Engineering)
Candidates for this degree are required to complete all the core units in Table 2 (total 164 credit points). They are also required to complete CHNG 2302 and CHNG 3303, as well as gaining at least 12 credit points of suitable electives (as indicated by the Department).

Bachelor of Engineering in Chemical Engineering (Environmental and Energy Engineering)
Candidates for this degree are required to complete all the core units in Table 2 (total 164 credit points). They are also required to complete CHNG 2502 and CHNG 3501, as well as gaining at least 12 credit points of suitable electives (as indicated by the Department).

Bachelor of Engineering in Chemical Engineering (Management)
Candidates for this degree are required to complete all the core units in Table 2 (total 164 credit points). They are also required to complete ENGG 2003 and ENGG 3002, as well as gaining at least 8 credit points from the following electives:

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>Offered</th>
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<tbody>
<tr>
<td>CHNG 4403 Engineering Business Skills</td>
<td>4</td>
<td>July</td>
</tr>
<tr>
<td>CHNG 4504 Environmental Decision Making</td>
<td>4</td>
<td>July</td>
</tr>
<tr>
<td>ENGG 4001 Innovation/International Competitiveness</td>
<td>4</td>
<td>February</td>
</tr>
<tr>
<td>ENGG 4002 New Business Creation</td>
<td>4</td>
<td>July</td>
</tr>
<tr>
<td>MATH 4650 Workplace Industrial Relations</td>
<td>2 P) 36 credit points of senior units of study.</td>
<td>July</td>
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</tbody>
</table>

Combined Degree (Bachelor of Engineering in Chemical Engineering with either a Bachelor of Arts or Bachelor of Science)
Candidates in these combined degree options are required to complete all the core units of study in Table 2 except where specific exemptions are noted. They are also required to gain at least 4 credit points from the Fourth Year electives listed in the table of Recommended Elective Units of Study for BE (Chem) as shown below. This total of 160 credit points is only sufficient to be awarded a Bachelor of Engineering in Chemical Engineering as part of these combined degree programs.

Combined Degree (Bachelor of Engineering in Chemical Engineering with a Bachelor of Commerce)
Candidates in this combined degree option are required to complete all the core units of study in Table 2 except where specific exemptions are noted. They are also required to gain at least 4 credit points from the Fourth Year electives listed in the table of Recommended Elective Units of Study for BE (Chem) as shown below. This total of 152 credit points is only sufficient to be awarded a Bachelor of Engineering in Chemical Engineering as part of this combined degree program.

Acceptable alternative units of study
Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced options should seek advice from their Department before enrolling.
## Table 2: Chemical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>C) Corequisite</th>
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<td><strong>Recommended elective units of study</strong></td>
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<tr>
<td>CHNG 2701 Fundamentals of Bioprocess</td>
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<td>P) Advisory prerequisite: CHEM1101, CHEM1201.</td>
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<td>Engineering 1</td>
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<td>CHNG 2702 Fundamentals of Bioprocess</td>
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<td>P) advisory prerequisite: CHEM1101, CHEM1201.</td>
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<td>Engineering 2</td>
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<td>CHNG 2302 Process Data Management</td>
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<td>CHNG 2502 Clean Products and Processes</td>
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<tr>
<td>ENGG 2003 Introduction to Engineering</td>
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<td>N) ELEC3701, MECH3620.</td>
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<td>Management</td>
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<tr>
<td>AERO 2300 Mechanics of Solids 1</td>
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<td>P) 12 credit points of first year Maths (i.e Maths 1001,1002,1003,1005).</td>
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<td>ELEC 1001 Introductory Electrical</td>
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<td>P) Advisory Prerequisite: MATH1001 Differential Calculus.</td>
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<td>Engineering</td>
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<td>N) ELEC1102 Foundations of Electronic Circuits.</td>
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<td>MICR 2007 Microbiology for Engineers</td>
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<td>MICR 2008 Microbiology for Engineers</td>
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<td>CHNG 4004 Advances in Chemical Engineering</td>
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<td>CHNG 4101 Separation Processes</td>
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<td>CHNG 4102 Transport Phenomena</td>
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<td>CHNG 4103 Advances in Polymer Engineering</td>
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<td>CHNG 4203 Major Industrial Project</td>
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<td>P) Passed at least 144 credit points. Students wishing to do this unit of study are required to discuss the matter with the Head of Department prior to enrolment.</td>
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Table 2: Chemical Engineering - continued

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<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>P) Prerequisite</th>
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<td>CHNG 4304 Process Control 2</td>
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<td>CHNG 3302 Process Control 1.</td>
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<tr>
<td>CHNG 4403 Engineering Business Skills</td>
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<td>CHNG 4501 Biochemical Engineering</td>
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<td>P) CHNG 2701 &amp; CHNG 2702 Fundamentals of Bioprocess Engineering 1 &amp; 2; MICR 2007 Microbiology for Engineers A; MICR 2008 Microbiology for Engineers B.</td>
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<tr>
<td>CHNG 4504 Environmental Decision Making</td>
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<tr>
<td>CHNG 4506 Advanced Environmental Engineering</td>
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<td>P) All four components of Unit Operations; CHNG 3106 Thermodynamics 2. NB: Not offered in 2001.</td>
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<tr>
<td>CHNG 4604 Chemical Modelling of Aqueous Systems</td>
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<td>P) CHNG3101, CHNG3102, CHNG3103, CHNG3104 and CHNG 3106.</td>
<td></td>
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<td></td>
<td>February</td>
</tr>
</tbody>
</table>

Note
Choice of electives as shown in the above table will depend upon subject availability, timetabling and prerequisite conditions. Choices and combinations of elective units of study are subject to approval by the Head of Department.

Additional units of study for BE Chemical Engineering (Management)

Core unit of study

| ENGG 2003 Introduction to Engineering Management | 4 | N) ELEC3701, MECH3620. | July |
| ENGG 3002 Industrial and Engineering Management | | | | |
| ENGG 4001 Innovation/International Competitiveness | 4 | | February |
| MECH 4110 Professional Engineering | 4 | P) 36 credit points of Senior units of study. | February |
| CHNG 4403 Engineering Business Skills | 4 | | July |
| CHNG 4504 Environmental Decision Making | 4 | | July |
| MECH 4650 Workplace Industrial Relations | 2 | P) 36 credit points of senior units of study. | July |
| ENGG 4002 New Business Creation | 4 | | July |

Note
ENGG 2003, and ENGG 3002 are compulsory units of study for the management stream. The remaining 8 credit points required come from the Table above.
In the year 2000, there will only be entry into first year (ie, no advanced standing into the later years of this stream will be possible).
Candidates for the degree of Bachelor of Engineering in Civil Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study, as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points. See note (1) relating to core units of study offered by faculties other than Engineering.

### Core units of study

#### First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1001 or 1011.</td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1002 or 1012.</td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001.</td>
<td></td>
<td>N) May not be counted with MATH 1003 or 1013.</td>
<td>July, January (short)</td>
</tr>
<tr>
<td>MATH 1005 Statistics</td>
<td>3</td>
<td>A) HSC 2-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1005 or 1015.</td>
<td>July, January (short)</td>
</tr>
<tr>
<td>CIVL 1051 Dynamics</td>
<td>5</td>
<td>A) Mathematics 3 unit course and Science 4 unit course (or the Physics core of 3-4 unit Science) at the HSC.</td>
<td>N) MECH 1510.</td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CHEM 1401 Chemistry 1E</td>
<td>6</td>
<td>P) Mathematics 2-unit course and a satisfactory knowledge of 2-unit Chemistry or the Chemistry component of the 3 or 4 unit Science HSC course.</td>
<td>N) CHEM 1101, CHEM 1102.</td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>GEOL 1501 Engineering Geology 1</td>
<td>6</td>
<td>N) GEOL 1002.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 1001 Civil Engineering 1</td>
<td>4</td>
<td>A) Mathematics 3 unit course and a satisfactory knowledge of 2 unit Chemistry or the Chemistry component of the 3 or 4 unit Science HSC course and of the 2 unit Physics course or the Physics component of the 3 or 4 unit Science HSC course.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 1032 Statics</td>
<td>5</td>
<td>A) Mathematics 3 unit course at the HSC.</td>
<td>N) MECH1500 Mechanical Engineering 1, MECH1501 Engineering Statics.</td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 1004 Computational Engineering</td>
<td>4</td>
<td>N) COMP 1001 Introductory Programming or COMP 1002 Introductory Computer Science.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

#### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907).</td>
<td>N) May not be counted with MATH 2901.</td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2002 Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012.</td>
<td></td>
<td>N) May not be counted with MATH 2902.</td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907).</td>
<td>N) May not be counted with MATH 2905.</td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td>MATH 2051 Linear Programming</td>
<td>2</td>
<td>C) MATH 2001 or 2901, and MATH 2002 or 2902.</td>
<td>N) MATH 2953.</td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MATH 2052 Numerical Methods</td>
<td>2</td>
<td>C) MATH 2001 or 2901.</td>
<td>N) MATH 2952.</td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 2409 Engineering Geology 2</td>
<td>4</td>
<td>A) Either GEOL 1002 or GEOL 1501 Engineering Geology.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A) Assumed Knowledge</td>
<td>Q) Qualifying</td>
<td>P) Prerequisite</td>
<td>Offered</td>
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</tr>
<tr>
<td>CIVL 2201 Structural Mechanics</td>
<td>6</td>
<td>A) CIVL 1051 Dynamics and CIVL 1052 Statics.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 2610 Fluids 1</td>
<td>6</td>
<td>A) MATH 1001, MATH 1002, MATH 1003, MATH 1005.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 2004 Engineering Communications 1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 2801 Engineering Construction 1</td>
<td>4</td>
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<td></td>
<td>July</td>
</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 3204 Structural Analysis</td>
<td>6</td>
<td>A) CIVL 2201 Structural Mechanics and MATH 2002 Matrix Applications plus MATH 2005 Fourier Series and Differential Equations.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3206 Steel Structures 1</td>
<td>6</td>
<td>A) CIVL 2201 Structural Mechanics.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3223 Concrete Structures: Behaviour</td>
<td>3</td>
<td>A) CIVL 2201 Structural Mechanics and CIVL 2203 Structural Design. N) CIVL 3205 Concrete Structures I.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3224 Concrete Structures: Design</td>
<td>3</td>
<td>A) CIVL 2201 Structural Mechanics and CIVL 2203 Structural Design. N) CIVL 3205 Concrete Structures I.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3401 Soil Mechanics A</td>
<td>4</td>
<td>A) CIVL 2201 Structural Mechanics.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3402 Soil Mechanics B</td>
<td>4</td>
<td>A) CIVL 3401 Soil Mechanics A.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3501 Surveying 1</td>
<td>4</td>
<td>A) MATH 1001, MATH 1002, MATH 1003, MATH 1005.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3602 Fluids 2</td>
<td>4</td>
<td>A) CIVL 2610 Fluids 1.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3701 Transportation Engineering and Planning</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3005 Engineering Communications 2</td>
<td>2</td>
<td>A) CIVL 2004 Engineering Communications 1.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3207 Risk and Reliability Analysis</td>
<td>2</td>
<td>A) MATH 1001, MATH 1002, MATH 1003, MATH 1005, CIVL 2201 Structural Mechanics, CIVL 2204 Introduction to Structural Concepts, CIVL 2205 Introduction to Structural Design.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3802 Engineering Construction 2</td>
<td>4</td>
<td>A) Completion of CIVL 2801 Engineering Construction 1 or equivalent knowledge.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>

### Fourth Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 4014 Thesis/Design/Project</td>
<td>5</td>
<td>P) 40 credit points of Senior Subjects. N) CIVL 4013 Honours Thesis/Design/Project or CIVL 4015.</td>
<td></td>
<td></td>
<td>February, Full Year (starts Feb)</td>
</tr>
<tr>
<td>CIVL 4008 Practical Experience</td>
<td>0</td>
<td>P) 28 credit points of Senior courses.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4013 Engineering Management</td>
<td>4</td>
<td>N) CIVL 3803 Project Appraisal.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4016 Professional Practice- Civil Engineering</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 4903 Civil Engineering Design</td>
<td>6</td>
<td>A) CIVL 3225 or CIVL 3223 Concrete Structures - Behaviour, CIVL 3226 or CIVL 3224 Concrete Structures - Design and CIVL 3227 or CIVL 3206 Steel Structures I.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>

Notes to Table 3
1. For core units of study offered by the Faculty of Engineering, any assumed knowledge, prerequisite and corequisite requirements will be as prescribed by the Faculty.
Table 3: Civil Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
</table>

**Resolutions of the Faculty of Engineering relating to Table 3**

**Degree Eligibility**
Candidates for the degree of Bachelor of Engineering in Civil Engineering are expected to complete all the core units for the study in Table 3 (160 credit points). They are also required to gain at least 30 credit points from the elective units of study listed under “Resolutions of the Department of Civil Engineering”. Of the 30 elective units of study, at least 20 of these must be from Senior Advanced Units of Study. Candidates commencing one of the combined degree options from 1999 onwards (that is, Bachelor of Engineering in Civil Engineering with either a Bachelor of Arts, Bachelor of Science or Bachelor of Commerce) are required to complete all of the core units of study in Table 3 (160 credit points), except for Bachelor of Commerce where ELEC 1001, CIVL 3207 and CIVL 3005 are not required, therefore only 152 credit points are needed. This total of 160 credit points (or 152 credit points for Bachelor of Commerce) is only sufficient to be awarded a Bachelor of Engineering in Civil Engineering as part of an approved combined degree program. The remaining credit points for the combined degree will be taken in the appropriate Faculty (Arts, Science or Economics) and candidates should refer to the Joint Resolutions of the Faculty of Engineering and the relevant Faculty requirements.

**Note**
Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level units of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced options should seek advice from their Department before enrolling.

**Acceptable alternative units of study**
Pursuant to Resolution 3, the Faculty has prescribed the following acceptable alternatives to core units of study listed in Table 3.

<table>
<thead>
<tr>
<th>Acceptable alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1401 Chemistry IE</td>
</tr>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations</td>
</tr>
<tr>
<td>CIVL 1004 Computational Engineering</td>
</tr>
<tr>
<td>CIVL 1052 Statics</td>
</tr>
<tr>
<td>CIVL 1051 Dynamics</td>
</tr>
<tr>
<td>ELEC 1001 Introductory Electrical Engineering</td>
</tr>
<tr>
<td>CIVL 2409 Engineering Geology 2</td>
</tr>
<tr>
<td>CIVL 4014 Thesis/Design/Project</td>
</tr>
</tbody>
</table>

**Recommended elective units of study**

**First Year**

| COMP 1001 Introductory Programming | 6 | A) HSC 3-unit Mathematics. C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1004 and 1005 or 1903 and 1904 or 1904 and 1905 in their first year. N) May not be counted with COMP 1901. |
| ELEC 1001 Earth and its Environment | 6 | A) No previous knowledge of Geology assumed. |
| COMP 1002 Introductory Computer Science | 6 | P) COMP 1001 or 1901. N) May not be counted with COMP 1902. |
| GEOL 1002 Earth Processes and Resources | 6 | A) No previous knowledge of Geology assumed. |

February, July, January (short)
February, July, January (short)
February
### Table 3: Civil Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Second Year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASNS 1001 Modern Asian History and Culture 1</td>
<td>6</td>
<td></td>
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<td></td>
<td>February</td>
</tr>
<tr>
<td>ASNS 1002 Modern Asian History and Culture 2</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ARPH 1001 Introduction to Archaeology</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>ARPH 1002 Introduction to Australian Archaeology</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>DESC 9101 Introduction to Autocad</td>
<td>4</td>
<td>Q) Preference given to Design Computing and Digital Media students. N) Available to CH005 and CH006 and CH008 and CH009 students only with written permission from the lecturer. Same applies to students from other faculties (e.g. Engineering) and Study Abroad.</td>
<td></td>
<td></td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td>DESC 9100 Introduction to Archicad</td>
<td>4</td>
<td>Q) Preference given to Design Computing and Digital Media students. N) Available to CH005, CH006, and new undergraduate degrees students only with written permission from the lecturer. Same applies to students from other Faculties (e.g. Engineering) and Study Abroad.</td>
<td></td>
<td></td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td>INFO 1000 Information Technology Tools</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td><strong>Fourth Year</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>IREL 1001 Macro Industrial Relations</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4222 Finite Element Methods</td>
<td>5</td>
<td>A) CIVL 3204 Structural Analysis.</td>
<td></td>
<td></td>
<td>February</td>
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<tr>
<td>CHNG 4504 Environmental Decision Making</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 4220 Environmental Engineering</td>
<td>6</td>
<td>P) 24 credit points of third year units of study. N) MECH4240 Energy and the Environment and MECH4230 Environmental Acoustics and Noise Control.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4221 Bridge Engineering</td>
<td>5</td>
<td>A) CIVL 3225 or CIVL3223 Concrete Structures - Behaviour, CIVL 3226 or CIVL3224 Concrete Structures - Design and CIVL 3227 or CIVL3206 Steel Structures 1.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4218 Concrete Structures 2</td>
<td>5</td>
<td>A) CIVL 3223 or CIVL 3225 Concrete Structures - Behaviour, CIVL 3224 or CIVL, 3226 Concrete Structures - Design.</td>
<td></td>
<td></td>
<td>July</td>
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<tr>
<td>CIVL 4219 Structural Dynamics</td>
<td>5</td>
<td>A) CIVL 3204 Structural Analysis.</td>
<td></td>
<td></td>
<td>February</td>
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<tr>
<td>CIVL 4220 Steel Structures 2</td>
<td>5</td>
<td>A) CFVL3206 or CIVL 3227 Steel Structures 1.</td>
<td></td>
<td></td>
<td>July</td>
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<tr>
<td>CIVL 4406 Environmental Geotechnics</td>
<td>5</td>
<td>A) CIVL 3401 Soil Mechanics A, CIVL 3402 Soil Mechanics B.</td>
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<td>July</td>
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<tr>
<td>CIVL 4407 Geotechnical Engineering</td>
<td>5</td>
<td>A) CIVL 3401 Soil Mechanics A, CIVL 3402 Soil Mechanics B.</td>
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<tr>
<td>CIVL 4607 Environmental Fluids 1</td>
<td>5</td>
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<td></td>
<td>February</td>
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<tr>
<td>CIVL 4608 Environmental Fluids 2</td>
<td>5</td>
<td>A) Material covered in Environmental Fluids 1.</td>
<td></td>
<td></td>
<td>July</td>
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<tr>
<td>CIVL 4609 Water Resources Engineering</td>
<td>5</td>
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<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 4807 Project Formulation</td>
<td>5</td>
<td>A) Completion of CIVL 3803 Project Appraisal or equivalent knowledge.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>GEOL 2004 Environmental Geology: Hazards</td>
<td>4</td>
<td>P) 24 credit points of Science units of study. See prerequisites for Senior Geology.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>
Table 3: Civil Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 2005</td>
<td>4</td>
<td>P) 24 credit points of Science units of study. See prerequisites for Senior Geology.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3804</td>
<td>5</td>
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<td>July</td>
</tr>
<tr>
<td>CIVL 3805</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4808</td>
<td>4</td>
<td>A) Sufficient knowledge of information technology systems &amp; communications capabilities.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4809</td>
<td>4</td>
<td>A) Completion of CIVL2801 Engineering Construction 1 and CIVL3802 Engineering Construction 2 or the equivalent knowledge.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 4810</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

Notes

1. Choice of electives as shown in the above table will depend upon subject availability, timetabling and prerequisite conditions.
2. For the BE degree (Civil), students must take at least 20 elective units of study at Senior Advanced level, however, 2 x 4 credit points of study may be replaced by at least 8 credit points available elsewhere in the Faculty of Engineering and subject to the approval of the Head of Civil Engineering.
3. Honours candidates replace the core unit of study CIVL 4014 Thesis by CIVL 4013 Thesis Honours.
4. CIVL 4014 may be completed in one semester only with written approval from the Head of Civil Engineering.
5. Recommended elective streams are:
   - Construction Engineering and Management Stream: CIVL 4807, CIVL 4221, CIVL 4222, CIVL 4218, CIVL 4219, CIVL 4220
   - Structural Engineering Stream: CIVL 4406, CIVL 4607, CIVL 4608, CIVL 4609, CHNG 4504, (MECH 4220)
   - Environmental Stream: CIVL 4406, CIVL 4607, CIVL 4608, CIVL 4609, CHNG 4504, (MECH 4220)
   - Geotechnical Engineering Stream: CIVL 4222, CIVL 4406, CIVL 4407, GEOL 2004, GEOL 2005
### Core units of study

Candidates for the degree of Bachelor of Engineering in Computer Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study recommended or approved by the Faculty.

#### First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 1001 Introductory Programming</td>
<td>6</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1005 or 1003 and 1904 or 1904 and 1905 in their first year.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with COMP 1901.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP 1002 Introductory Computer Science</td>
<td>6</td>
<td>P) COMP 1001 or 1901.</td>
<td></td>
<td>N) May not be counted with COMP 1902.</td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td>ELEC 1101 Foundations of Computer Systems</td>
<td>6</td>
<td>A) HSC Maths 3 unit.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MATH 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1901 or 1011.</td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1902 or 1012.</td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001.</td>
<td></td>
<td>N) May not be counted with MATH 1903 or 1013.</td>
<td>July, January (short)</td>
</tr>
<tr>
<td>PHYS 1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A) HSC Physics or HSC 4-unit Science.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C) Recommended concurrent units of study: MATH 1001 and 1002 or 1901 and 1902.</td>
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<tr>
<td></td>
<td></td>
<td>N) May not be counted with PHYS 1002 or 1901.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PHYS 10032 Physics 1 (Technological)</td>
<td>6</td>
<td>A) HSC 2-unit Physics or HSC 4-unit Science or PHYS 1001 or 1002 or 1901 or equivalent.</td>
<td>C) For Science students: Recommended concurrent units MATH 1003 and 1005 or 1903 and 1905.</td>
<td>N) For Science students: May not be counted with PHYS 1004 or 1902.</td>
<td>February, July</td>
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</table>

#### Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 2002 Design and Data Structures</td>
<td>4</td>
<td>Q) COMP 1002 or 1902.</td>
<td></td>
<td>N) May not be counted with COMP 2902.</td>
<td>February</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook.</td>
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<tr>
<td>COMP 2003 Languages and Logic</td>
<td>4</td>
<td>Q) COMP 1002 or 1902.</td>
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<td>P) MATH 1004 or 1904 or Econometrics or MATH 2009.</td>
<td>July</td>
</tr>
<tr>
<td>COMP 2004 Programming Practice</td>
<td>4</td>
<td>Q) COMP 1002 or 1902.</td>
<td></td>
<td>N) May not be counted with COMP 2904.</td>
<td>July, January (short)</td>
</tr>
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<td></td>
<td></td>
<td>NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook.</td>
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<td></td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A) Assumed Knowledge</td>
<td>C) Corequisite</td>
<td>Q) Qualifying</td>
<td>N) Prohibition</td>
</tr>
<tr>
<td>--------------------------</td>
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<td>----------------------</td>
<td>----------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>ELEC 2301 Signals and Systems</td>
<td>4</td>
<td>P) Advisory Prerequisite: MATH1001 Differential Calculus, and MATH1002 Linear Algebra, and MATH1003 Integral Calculus and Modelling, and MATH1004 Discrete Mathematics. N) MATH3019 Signal Processing and MATH3909 Signal Processing (Adv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901or 1906) and (1002 or 1902) and (1003 or 1903 or 1907). N) May not be counted with MATH 2901.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MATH 2002 Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902.</td>
<td></td>
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</tr>
<tr>
<td>MATH 2505 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907). N) May not be counted with MATH 2905.</td>
<td></td>
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<tr>
<td>PHYS 2203 Physics 2Fse</td>
<td>4</td>
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<td></td>
</tr>
<tr>
<td><strong>Third year</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ELEC 3401 Electronic Devices and Circuits</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC2401 Introductory Electronics andELEC2101 Circuit Analysis.</td>
<td></td>
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</tr>
<tr>
<td>ELEC 3403 Switching Devices-High Speed Electronics</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits.</td>
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<td></td>
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</tr>
<tr>
<td>ELEC 3502 Random Signals and Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite:ELEC2301 Signals and Systems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 3503 Introduction to Digital Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fourth year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 4601 Computer Design</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC 3403 Switching Devices and High Speed Electronics, and ELEC 3601 Digital Systems Design.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ELEC 4602 Real Time Computing</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3601 Digital Systems Design and COMP3100 Software Engineering.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 4702 Practical Experience</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 4703 Thesis</td>
<td>12</td>
<td>P) A minimum of 36 credit points from third and fourth year units of study.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### Table 4: Computer Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying Knowledge</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
</table>

### Notes to Table 4

1. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite and corequisite requirements will be as prescribed by that Faculty.
2. PHYS 1203 Physics 1EE is an acceptable alternative to PHYS 1003 Physics (Technological).
3. Students who have completed one or more of these units of study toward the Bachelor of Science degree shall, in their place, complete an equivalent number of credit points from units of study in the table below of Recommended Elective Units of Study for BE (Computer Engineering) or such other units of study as are approved by the Head of School.

### Resolutions of the Faculty of Engineering relating to Table 4

#### BE (Computer Engineering)

In addition to gaining credit for the 152 credit points of core units of study set out in Table 4, candidates are required to complete at least 28 credit points of units of study from the table of recommended elective units of study for BE (Computer Engineering). Further credit for a total of not less than 192 credit points shall be gained by completing additional elective units of study approved by the Faculty.

#### BE (Computer Engineering)/BSc or BA

In addition to gaining credit for the 152 credit points of core units of study set out in Table 4, candidates must complete at least 8 credit points of units of study (at least 4 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Computer Engineering). Candidates should refer to the joint resolutions of the Faculty of Engineering and the Faculty in which they are undertaking the combined degree program.

#### BE (Computer Engineering)/BMedSc

Candidates are required to gain credit for the 140 credit points of core units of study in Table 4 excluding ELEC 4703 Thesis. They are also required to complete the 12 credit point unit of study ELEC 4705 Interdisciplinary Thesis and at least 8 credit points of units of study (at least 4 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Computer Engineering). Candidates should refer to the joint resolutions of the Faculties of Engineering and Science.

#### BE (Computer Engineering)/BCom

In addition to gaining credit for the 152 credit points of core units of study set out in Table 4, candidates must complete at least 8 credit points of units of study (at least 4 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Computer Engineering). Candidates are also required to complete at least 100 credit points of units of study in the Faculty of Economics (listed in Table A for the Bachelor of Commerce degree). The Computer Science units of study in Table 4 may be counted, to a maximum of 20 credit points, in the 100 credit points. They may also be used to satisfy the requirement for a minor (or second major) for the Bachelor of Commerce. No other units of study in Table 4 or the table of recommended electives may be counted in the 100 credit points or used to satisfy a minor or major.

Candidates should refer to the joint resolutions of the Faculties of Engineering and Economics for additional information.

### Alternative units of study

Most Mathematics, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met.

### Recommended elective units of study

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Points</th>
<th>Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 3701</td>
<td>Management for Engineers</td>
<td>4</td>
<td>P) Advisory Prerequisite: Nil.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4101</td>
<td>Computer Control System Design</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC3302 Fundamentals of Feedback Control.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4401</td>
<td>Electronic Design</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC2301 Signals and Systems, and ELEC3302 Fundamentals of Feedback Control and ELEC3401 Electronic Devices and Circuits.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4402</td>
<td>Integrated Circuit Design</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC3401 Electronic Devices and Circuits.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4502</td>
<td>Digital Communication Systems</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 5506</td>
<td>Optical Networks</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>July</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
</table>

**Note**
The units of study in this table may not all be available every year.
Table 5: Electrical Engineering

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>C) Corequisite</td>
<td></td>
<td>N) Prohibition</td>
<td></td>
</tr>
<tr>
<td>Core units of study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Candidates for the degree of Bachelor of Engineering in Electrical Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study recommended or approved by the Faculty.
| First year                    |               |                      |               |                 |               |
| COMP 1001 Introductory Programming | 6           | A) HSC 3-unit Mathematics. |               |                 |               |
|                               |               | C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1005 or 1903 and 1904 or 1905 in their first year. |               |                 |               |
|                               |               | N) May not be counted with COMP 1901. |               |                 |               |
| COMP 1002 Introductory Computer Science | 6           | P) COMP 1001 or 1901. |               |                 |               |
|                               |               | N) May not be counted with COMP 1902. |               |                 |               |
| ELEC 1101 Foundations of Computer Systems | 6           | A) HSC Maths 3 unit. |               |                 |               |
| ELEC 1102 Foundations of Electronic Circuits | 6           | A) HSC Physics 2 unit. |               |                 |               |
|                               |               | P) Advisory Prerequisite: MATH1001 Differential Calculus. |               |                 |               |
| MATH 1001 Differential Calculus | 3           | A) HSC 3-unit Mathematics. |               |                 |               |
|                               |               | N) May not be counted with MATH 1901 or 1011. |               |                 |               |
| MATH 1002 Linear Algebra      | 3           | A) HSC 3-unit Mathematics. |               |                 |               |
|                               |               | N) May not be counted with MATH 1902 or 1012. |               |                 |               |
| MATH 1003 Integral Calculus and Modelling | 3           | A) HSC 4-unit Mathematics or MATH 1001, |               |                 |               |
|                               |               | N) May not be counted with MATH 1903 or 1013. |               |                 |               |
| MATH 1004 Discrete Mathematics | 3           | A) HSC 3-unit Mathematics. |               |                 |               |
|                               |               | N) May not be counted with MATH 1904. |               |                 |               |
| PHYS 1001 Physics 1 (Regular) | 6           | A) HSC Physics or HSC 4-unit Science. |               |                 |               |
|                               |               | C) Recommended concurrent units of study: MATH 1001 and 1002 or 1901 and 1902. |               |                 |               |
|                               |               | N) May not be counted with PHYS 1002 or 1901. |               |                 |               |
| PHYS 10032 Physics 1 (Technological) | 6           | A) HSC 2-unit Physics or HSC 4-unit Science or PHYS 1001 or 1002 or 1901 or equivalent. |               |                 |               |
|                               |               | C) For Science students: Recommended concurrent units MATH 1003 and 1005 or 1903 and 1905. |               |                 |               |
|                               |               | N) For Science students: May not be counted with PHYS 1004 or 1902. |               |                 |               |
| Second year                   |               |                      |               |                 |               |
| COMP 2002 Design and Data Structures | 4           | Q) COMP 1002 or 1902. |               |                 |               |
|                               |               | N) May not be counted with COMP 2902. |               |                 |               |
|                               |               | NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook |               |                 |               |
| COMP 2004 Programming Practice | 4           | Q) COMP 1002 or 1902. |               |                 |               |
|                               |               | N) May not be counted with COMP 2904. |               |                 |               |
|                               |               | NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook |               |                 |               |
| ELEC 2101 Circuit Analysis    | 4           | P) Advisory Prerequisite: ELEC1102 Foundations of Electronic Circuits. |               |                 |               |
|                               |               | N) ELEC2001 Electrical and Electronic Engineering, and ELEC2002 Electrical Technology, and ELEC2003 Electrical and Electronic Engineering A. |               |                 |               |
| ELEC 2301 Signals and Systems | 4           | P) Advisory Prerequisite: MATH1001 Differential Calculus, andMATH1002 Linear Algebra, and MATH1003 Integral Calculus and Modelling, and MATH1004 Discrete Mathematics. |               |                 |               |
Table 5: Electrical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P: MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907). N: May not be counted with MATH 2901.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2002 Matrix Applications</td>
<td>4</td>
<td>P: MATH 1002 or 1902 or Distinction in MATH 1012. N: May not be counted with MATH 2902.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P: MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907). N: May not be counted with MATH 2905.</td>
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<td></td>
<td>July, January (short)</td>
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<tr>
<td>PHYS 2203 Physics 2Ee</td>
<td>4</td>
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<td>July</td>
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</table>

### Third year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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<tbody>
<tr>
<td>ELEC 3102 Engineering Electromagnetics</td>
<td>4</td>
<td>P: Advisory Prerequisites: PHYS2203 Physics2EE and ELEC2101 Circuit Analysis.</td>
<td></td>
<td></td>
<td>February</td>
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<tr>
<td>ELEC 3201 Electrical Energy Systems Fundamentals</td>
<td>4</td>
<td>P: Advisory Prerequisite: ELEC 2101 Circuit Analysis.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3401 Electronic Devices and Circuits</td>
<td>4</td>
<td>P: Advisory Prerequisites: ELEC2401 Introductory Electronics and ELEC2101 Circuit Analysis.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3502 Random Signals and Communications</td>
<td>4</td>
<td>P: Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3503 Introduction to Digital Communications</td>
<td>4</td>
<td>P: Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

### Fourth year

<table>
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<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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</thead>
<tbody>
<tr>
<td>ELEC 4702 Practical Experience</td>
<td>0</td>
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<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4703 Thesis</td>
<td>12</td>
<td>P: A minimum of 36 credit points from third and fourth year units of study.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Notes to Table 5**

1. For units of study offered by a Faculty other than the Faculty of Engineering, any assumed knowledge, prerequisites and corequisites, will be as prescribed by that Faculty.
2. PHYS 1203 Physics 1EE is an acceptable alternative to PHYS 1003 (Technological).

**Resolutions of the Faculty of Engineering relating to Table 5**

**BE(Electrical Engineering)**

In addition to gaining credit for the 132 credit points of core units of study set out in Table 5, candidates are required to complete at least 48 credit points of units of study (at least 32 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Electrical Engineering). Further credit for a total of not less than 192 credit points shall be gained by completing additional elective units of study approved by the Faculty.
Table 5: Electrical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
</table>

BE (Electrical Engineering - Management)

In addition to gaining credit for the 132 credit points of core units of study set out in Table 5, candidates are required to complete at least 36 credit points of units of study (at least 28 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Electrical Engineering) excluding ELEC 3701 Management for Engineers and ELEC 4701 Project Management. Further credit of 24 credit points shall be gained by completing the units of study listed in the table of additional units of study for BE (Electrical Engineering - Management).

BE (Electrical Engineering)/BSc or BA

In addition to gaining credit for the 132 credit points of core units of study set out in Table 5, candidates are required to complete at least 28 credit points of units of study (at least 20 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Electrical Engineering). Candidates should refer to the joint resolutions of the Faculties of Engineering and Science or of the Faculties of Engineering and Arts.

BE (Electrical Engineering)/BMedSc

Candidates are required to gain credit for the 120 credit points of core units of study in Table 5 excluding ELEC 4703 Thesis. They are also required to complete the 12 credit point unit of study ELEC 4705 Interdisciplinary Thesis and at least 28 credit points of units of study (at least 20 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Electrical Engineering). Candidates should refer to the joint resolutions of the Faculties of Engineering and Science.

BE (Electrical Engineering)/BCom

In addition to gaining credit for the 132 credit points of core units of study set out in Table 5, candidates are required to complete at least 28 credit points of units of study (at least 20 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Electrical Engineering). Candidates are also required to complete at least 100 credit points of units of study in the Faculty of Economics (listed in Table A for the Bachelor of Commerce degree). The 20 credit points of Computer Science units of study in Table 5 may be counted in the 100 credit points and may be used to satisfy the requirement for a minor (or second major) for the Bachelor of Commerce. No other units of study in Table 5 or the table of recommended electives may be counted in the 100 credit points or used to satisfy a minor or major. Candidates should refer to the joint resolutions of the Faculty of Engineering and the Faculty of Economics and Business for additional information.

BE (Electrical Engineering)/BCom and admitted to first year prior to 1998

Candidates who commenced first year prior to 1998, in addition to satisfying the core requirements set out in Table 5, are required to gain credit for at least 24 credit points of units of study (at least 8 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Electrical Engineering). Candidates should refer to the joint resolutions of the Faculty of Engineering and the Faculty of Economics and Business for additional information.

Acceptable alternative units of study

Most Mathematics, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met.

Recommended elective units of study

■ Third year

| COMP 3100 | Software Engineering | 4 | P) COMP 2004 or 2904. | July |
| ELEC 3101 | Circuit Theory and Design | 4 | P) Advisory Prerequisites: ELEC2101 Circuit Analysis, and ELEC2301 Signals and Systems. | July |
| ELEC 3103 | Electrical Engineering Design | 4 | P) Advisory Prerequisites: ELEC2101 Circuit Analysis, ELEC2301 Signals and Systems, ELEC2401 Introductory Electronics, and ELEC2601 Microcomputer Systems. | July |
| ELEC 3202 | Power Electronics and Drives | 4 | P) Advisory Prerequisites: ELEC2101 Circuit Analysis, and ELEC2401 Introductory Electronics. | July |
| ELEC 3402 | Communications Electronics | 4 | P) Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits. | July |
| ELEC 3403 | Switching Devices-High Speed Electronics | 4 | P) Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits. | July |
Table 5: Electrical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 3701 Management for Engineers</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisite: Nil.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3801 Fundamentals of Biomedical Engineering</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisite: ELEC2401 Introductory Electronics or ELEC2001 Electrical and Electronic Engineering A.</td>
<td>February</td>
</tr>
<tr>
<td><strong>Fourth year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 4301 Computer Control System Design</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisite: ELEC3302 Fundamentals of Feedback Control.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4302 Image Processing and Computer Vision</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC2301 Signals and Systems, and ELEC4303 Digital Signal Processing.</td>
<td>July</td>
</tr>
<tr>
<td>ELEC 4401 Electronic Design</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC2301 Signals and Systems, and ELEC3302 Fundamentals of Feedback Control and ELEC3401 Electronic Devices and Circuits.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4402 Integrated Circuit Design</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisite: ELEC3401 Electronic Devices and Circuits.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4501 Data Communication Networks</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4502 Digital Communication Systems</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4503 Error Control Coding</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4601 Computer Design</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC 3403 Switching Devices and High Speed Electronics, and ELEC 3601 Digital Systems Design.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4602 Real Time Computing</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3601 Digital Systems Design and COMP3100 Software Engineering.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4701 Project Management</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisite: ELEC3701 Management for Engineers.</td>
<td>July</td>
</tr>
<tr>
<td>ELEC 4801 Biomedical Engineering Systems</td>
<td>4</td>
<td></td>
<td>A) ELEC3801 Fundamentals of Biomedical Engineering.</td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5501 Communication Networks (Advanced)</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, ELEC3503 Introduction to Digital Communications and ELEC 4501 Data Communication Networks.</td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5503 Optical Communication Systems</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3402 Communications Electronics, ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5504 Cellular Radio Engineering</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>February</td>
</tr>
<tr>
<td>ELEC 5505 Advanced Digital Transmissions</td>
<td>4</td>
<td></td>
<td>A) ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5506 Optical Networks</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5603 Biologically Inspired Signal Processing</td>
<td>4</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>July</td>
</tr>
</tbody>
</table>
### Table 5: Electrical Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEC 5610</strong> Computer and Network Security</td>
<td>4</td>
<td>A) ELEC4601 Computer Design and ELEC4501 Data Communication Networks.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>ELEC 5611</strong> Advanced Computer Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC4601 Computer Design. Offered.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Notes**
1. For units of study offered by a Faculty other than the Faculty of Engineering, any assumed knowledge, prerequisites and corequisites will be as prescribed by that Faculty.
2. The units of study in this table may not all be available every year

### Additional units of study for BE(Electrical Engineering - IVManagement)

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGG 2003</strong> Introduction to Engineering Management</td>
<td>4</td>
<td>N) ELEC3701, MECH3620.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>ENGG 3002</strong> Industrial and Engineering Management</td>
<td>4</td>
<td>Not offered in 2001 (4 credit points).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENGG 4001</strong> Innovation/International Competitiveness</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>CHNG 3401</strong> Project Economics</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>CHNG 4401</strong> Project Engineering</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>ELEC 4701</strong> Project Management</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC3701 Management for Engineers.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH 4110</strong> Professional Engineering</td>
<td>4</td>
<td>P) 3 6 credit points of Senior units of study.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>CHNG 4403</strong> Engineering Business Skills</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>CHNG 4504</strong> Environmental Decision Making</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH 4650</strong> Workplace Industrial Relations</td>
<td>2</td>
<td>P) 36 credit points of senior units of study.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>ENGG 4002</strong> New Business Creation</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Note**
The required total of 24 credit points shall comprise ENGG 2003, ENGG 3002 and 16 credit points from the remaining units of study in the table.
**Table 5A: Electrical Engineering (Information Systems)**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 1001 Introductory Programming</td>
<td>6</td>
<td>A) HSC 3-unit Mathematics.</td>
<td>C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1005 or 1903 and 1904 or 1905 in their first year.</td>
<td>N) May not be counted with COMP 1901.</td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td>COMP 1002 Introductory Computer Science</td>
<td>6</td>
<td>P) COMP 1001 or 1901.</td>
<td>N) May not be counted with COMP 1902.</td>
<td></td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td>ELEC 1101 Foundations of Computer Systems</td>
<td>6</td>
<td>A) HSC Maths 3 unit</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MATH 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td>N) May not be counted with MATH 1901 or 1902.</td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics,</td>
<td>N) May not be counted with MATH 1902 or 1903.</td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001,</td>
<td>N) May not be counted with MATH 1903 or 1904.</td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td>MATH 1004 Discrete Mathematics</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics,</td>
<td>N) May not be counted with MATH 1904.</td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td>PHYS 1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A) HSC Physics or HSC 4-unit Science.</td>
<td>C) Recommended concurrent units of study: MATH 1001 and 1002 or 1901 and 1902.</td>
<td>N) May not be counted with PHYS 1002 or 1901.</td>
<td>February</td>
</tr>
<tr>
<td>PHYS 10032 Physics 1 (Technological)</td>
<td>6</td>
<td>A) HSC 2-unit Physics or HSC 4-unit Science or PHYS 1001 or 1002 or 1901 or equivalent.</td>
<td>C) For Science students: Recommended concurrent units MATH 1003 and 1005 or 1903 and 1905.</td>
<td>N) For Science students: May not be counted with PHYS 1004 or 1902.</td>
<td>February, July</td>
</tr>
<tr>
<td>COMP 2002 Design and Data Structures</td>
<td></td>
<td>Q) COMP 1002 or 1902.</td>
<td>N) May not be counted with COMP 2902.</td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>COMP 2004 Programming Practice</td>
<td></td>
<td>Q) COMP 1002 or 1902.</td>
<td>N) May not be counted with COMP 2904.</td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td>ELEC 2301 Signals and Systems</td>
<td></td>
<td>P) Advisory Prerequisite: MATH1001 Differential Calculus, and MATH1002 Linear Algebra, and MATH1003 Integral Calculus and Modelling, and MATH1004 Discrete Mathematics.</td>
<td>N) MATH3019 Signal Processing and MATH3909 Signal Processing (Adv).</td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Core units of study**

This degree stream is available only to students enrolled prior to 1998. Candidates for the degree of Bachelor of Engineering in Electrical Engineering (Information Systems) are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study as prescribed by the Faculty.

**First year**

- **COMP 1001 Introductory Programming**: 6 points
  - A) HSC 3-unit Mathematics.
  - C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1005 or 1903 and 1904 or 1905 in their first year.
  - N) May not be counted with COMP 1901.

- **COMP 1002 Introductory Computer Science**: 6 points
  - P) COMP 1001 or 1901.
  - N) May not be counted with COMP 1902.

**Second year**

- **COMP 2002 Design and Data Structures**: Q) COMP 1002 or 1902.
  - N) May not be counted with COMP 2902.

- **COMP 2004 Programming Practice**: Q) COMP 1002 or 1902.
  - N) May not be counted with COMP 2904.

- **ELEC 2101 Circuit Analysis**: P) Advisory Prerequisite: ELEC1102 Foundations of Electronic Circuits.
  - N) ELEC2001 Electrical and Electronic Engineering, and ELEC2002 Electrical Technology, and ELEC2003 Electrical and Electronic Engineering A.

- **ELEC 2301 Signals and Systems**: P) Advisory Prerequisite: MATH1001 Differential Calculus, and MATH1002 Linear Algebra, and MATH1003 Integral Calculus and Modelling, and MATH1004 Discrete Mathematics.
Table 5A: Electrical Engineering (Information Systems) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>G) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907). N) May not be counted with MATH 2901.</td>
<td></td>
<td></td>
<td>February (short)</td>
</tr>
<tr>
<td>MATH 2002 Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902.</td>
<td></td>
<td></td>
<td>February (short)</td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907). N) May not be counted with MATH 2905.</td>
<td></td>
<td></td>
<td>July (short)</td>
</tr>
<tr>
<td>PHYS 2303 Physics 2Ee</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Third year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP 3100 Software Engineering</td>
<td>4</td>
<td>P) COMP 2004 or 2904. N) May not be counted with COMP 3 800.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 3102 Engineering Electromagnetics</td>
<td>4</td>
<td>P) Advisory Prerequisites: PHYS2203 Physics2EE and ELEC2101 Circuit Analysis.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3401 Electronic Devices and Circuits</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC2401 Introductory Electronics and ELEC2101 Circuit Analysis.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3402 Communications Electronics</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 3403 Switching Devices-High Speed Electronics</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 3502 Random Signals and Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3503 Introduction to Digital Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>■ Fourth year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 4401 Electronic Design</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC2301 Signals and Systems, and ELEC3302 Fundamentals of Feedback Control and ELEC3401 Electronic Devices and Circuits.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4501 Data Communication Networks</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4502 Digital Communication Systems</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4601 Computer Design</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC 3403 Switching Devices and High Speed Electronics, and ELEC 3601 Digital Systems Design.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4602 Real Time Computing</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3601 Digital Systems Design and COMP3100 Software Engineering.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4702 Practical Experience</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 4703 Thesis</td>
<td>12</td>
<td>P) A minimum of 36 credit points from third and fourth year units of study.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>
Table 5A: Electrical Engineering (Information Systems) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 3701 Management for Engineers</td>
<td>4</td>
<td>P) Advisory Prerequisite: Nil.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4302 Image Processing and Computer Vision</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC2301 Signals and Systems, and ELEC4303 Digital Signal Processing.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 4402 Integrated Circuit Design</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC3401 Electronic Devices and Circuits.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 4503 Error Control Coding</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 5501 Communication Networks (Advanced)</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, ELEC3503 Introduction to Digital Communications and ELEC 4501 Data Communication Networks.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5503 Optical Communication Systems</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3402 Communications Electronics, ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5504 Cellular Radio Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 5505 Advanced Digital Transmissions</td>
<td>4</td>
<td>A) ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications. NB: Not offered in 2001.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 5506 Optical Networks</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications. NB: Not offered in 2001.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

Notes to Table 5A
1. For units of study offered by a Faculty other than the Faculty of Engineering, any assumed knowledge, prerequisites and corequisites, will be as prescribed by that Faculty.
2. PHYS 1203 Physics 1EE is an acceptable alternative to PHYS 1003 (Technological).

Resolutions of the Faculty of Engineering relating to Table 5A
BE (Electrical Engineering - Information Systems)
In addition to gaining credit for the core units of study set out in Table 5A, candidates are required to complete at least 12 credit points of elective units of study from the table of recommended elective units of study for BE (Electrical and Information Engineering - Information Systems). Further credit for a total of not less than 192 credit points shall be gained by completing additional elective units of study approved by the Faculty.

BE (Electrical Engineering - Information Systems)/BCom
Candidates are not required to gain credit for any additional elective units of study.

Acceptable alternative units of study
Most Mathematics, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met.

Recommended units of study for BE(Electrical Engineering - Information Systems)

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Title</th>
<th>Credit Points</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ELEC 3701</td>
<td>Management for Engineers</td>
<td>4</td>
<td>P) Advisory Prerequisite: Nil.</td>
</tr>
<tr>
<td></td>
<td>ELEC 4402</td>
<td>Integrated Circuit Design</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC3401 Electronic Devices and Circuits.</td>
</tr>
<tr>
<td></td>
<td>ELEC 4503</td>
<td>Error Control Coding</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
</tr>
<tr>
<td></td>
<td>ELEC 5501</td>
<td>Communication Networks (Advanced)</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, ELEC3503 Introduction to Digital Communications and ELEC 4501 Data Communication Networks.</td>
</tr>
<tr>
<td></td>
<td>ELEC 5503</td>
<td>Optical Communication Systems</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3402 Communications Electronics, ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
</tr>
<tr>
<td></td>
<td>ELEC 5504</td>
<td>Cellular Radio Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
</tr>
<tr>
<td></td>
<td>ELEC 5505</td>
<td>Advanced Digital Transmissions</td>
<td>4</td>
<td>A) ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications. NB: Not offered in 2001.</td>
</tr>
<tr>
<td></td>
<td>ELEC 5506</td>
<td>Optical Networks</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications. NB: Not offered in 2001.</td>
</tr>
</tbody>
</table>
### Table 5A: Electrical Engineering (Information Systems) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 5610  Computer and Network Security</td>
<td>4</td>
<td>A) ELEC4601 Computer Design and ELEC4501 Data Communication Networks.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 5611  Advanced Computer Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC4601 Computer Design. Offered.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**
The units of study in this table may not all be available every year.
Candidates for the degree of Bachelor of Engineering in Mechanical Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional credit points of elective units of study as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points. See note (1) relating to core units of study offered by faculties other than Engineering.

### Core units of study

#### First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATH</strong> 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1901 or 1011.</td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td><strong>MATH</strong> 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1902 or 1012.</td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td><strong>MATH</strong> 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001.</td>
<td></td>
<td>N) May not be counted with MATH 1903 or 1013.</td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td><strong>MATH</strong> 1005 Statistics</td>
<td>3</td>
<td>A) HSC 2-unit Mathematics.</td>
<td></td>
<td>N) May not be counted with MATH 1905 or 1015.</td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td><strong>MECH</strong> 1530 Engineering Mechanics</td>
<td>8</td>
<td>N) CIVL1052 Statics MECH1501 Engineering Statics MECH1511 Introductory Dynamics MECH1510 Kinematics and Dynamics MECH1500 Mechanical Engineering 1.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH</strong> 1540 Introductory Mechanical Engineering</td>
<td>5</td>
<td>N) AERO 1601 601 Aerospace Manufacturing, MECH1500 Mechanical Engineering 1, MECH1800 Computational Engineering 1A.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>MECH</strong> 1600 Manufacturing Technology</td>
<td>4</td>
<td>N) AERO 1600 Workshop Technology.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH</strong> 1820 Introduction to Computing</td>
<td>6</td>
<td>N) MECH1800 Computational Engineering 1A MECH1801 Computational Engineering 1C INFO 1000 Information Technology Tools.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>AERO</strong> 1801 Computer Engineering Applications</td>
<td>3</td>
<td>NB: Web page: problemsolvers. aero. usyd. edu. au.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>CHEM</strong> 14013 Chemistry IE</td>
<td>6</td>
<td>P) Mathematics 2-unit course and a satisfactory knowledge of 2-unit Chemistry or the Chemistry component of the 3 or 4-unit Science HSC course. N) CHEM 1101, CHEM 1102.</td>
<td></td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
</tbody>
</table>

#### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATH</strong> 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907). N) May not be counted with MATH 2901.</td>
<td></td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td><strong>MATH</strong> 2002.6 Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902.</td>
<td></td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td><strong>MATH</strong> 2005 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH 1001 or 1901 or 1906 and MATH 1002 or 1902 and MATH (1003 or 1903 or 1907). N) May not be counted with MATH 2905.</td>
<td></td>
<td></td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td><strong>MATH</strong> 2002.6 Numerical Methods</td>
<td>2</td>
<td>C) MATH 2001 or 2901. N) MATH 2952.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH</strong> 2201 Thermodynamics 1</td>
<td>4</td>
<td>N) MECH 2200 Thermofluids.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>MECH</strong> 2300 Materials 1</td>
<td>4</td>
<td>N) CIVL 2101 Properties of Materials.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH</strong> 2400 Mechanical Design 1</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH</strong> 2500 Engineering Dynamics 1</td>
<td>4</td>
<td>P) MATH 1001 MATH 1002 and MECH 1530 Engineering Mechanics or MECH 1510 Kinematics and Dynamics.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>
Table 6: Mechanical Engineering (Mechanical) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 2201 Fluid Mechanics 1</td>
<td>4</td>
<td>P) MATH 1001, MATH 1002, MATH 1003. N) AERO2701 Space Engineering!.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO 2300 Mechanics of Solids 1</td>
<td>4</td>
<td>P) 12 credit points of first year Maths (i.e Maths 1001,1002,1003,1005).</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Third Year

| MECH 32005 Thermal Engineering 1 | 7 | P) MECH 2201 Thermodynamics 1 or MECH 2200 Thermofluids. N) MECH 3201 Thermodynamics 2. |  |  |  | February |
| MECH 32115 Fluid Mechanics 2 | 4 | P) AERO 2201 Fluid Mechanics 1 or MECH 2202 Fluids 1. N) AERO3250 Aerodynamics 2. |  |  |  | July |
| MECH 3400 Mechanical Design 2A | 4 | P) MECH 2400 Mechanical Design 1. |  |  |  | February |
| MECH 3410 Mechanical Design 2B | 4 | P) MECH 2400 Mechanical Design 1. |  |  |  | July |
| MECH 3500 Engineering Dynamics 2 | 4 | P) MECH 2500 Engineering Dynamics 1 and (MATH 2001 & MATH 2005). |  |  |  | February |
| MECH 3600 Manufacturing Engineering | 6 | P) MECH 1600 Manufacturing Technology. |  |  |  | February |
| MECH 3610 Team Project | 2 | P) 30 credit points of second year units of study. |  |  |  | July |
| MECH 3620 Industrial Management | 5 |  |  |  |  | July |

### Fourth Year

| MECH 4101s Thesis A | 0 | P) 36 credit points of Third Year units of study. |  |  |  | February, July |
| MECH 4102s Thesis B | 12 | P) MECH 4101 Thesis A (the Head of Department may allow Thesis A as corequisite in exceptional circumstances). |  |  |  | February, July |
| MECH 4110 Professional Engineering | 4 | P) 36 credit points of Senior units of study. |  |  |  | February |
| MECH 4120 Professional Communication | 4 | P) 32 credit points of third year units of study. |  |  |  | July |
| MECH 4130 Practical Experience | 0 | P) 28 credit points of second year units of study. |  |  |  | February, July |
Table 6: Mechanical Engineering (Mechanical) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
</table>

Notes to Table 6

1. For core units offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite requirements, will be as prescribed by that Faculty.

2. These units of study are core for candidates for the degree of Bachelor of Engineering in Mechanical Engineering and the combined degree BE/BSc, but not for candidates for the combined degrees of BE/BCom, BE/LLB and BE/BA.

3. For CHEM 1401, note (2) above also applies. Candidates for the combined degree BE/BSc may take as an alternative to CHEM 1401 other units of study from the Faculties of Science or Health Services, up to 12 credit points and subject to timetabling constraints. Candidates for the combined degree BE/BMedSci should enrol in CHEM 1102 (instead of CHEM 1401) as well as BIOL 1003.

4. Candidates for the combined degrees BE/BCom, BE/LLB and BE/BA should enrol in ELEC 2003 Electrical and Electronics Engineering A (4 cp).

5. Candidates for the combined degrees BE/BCom, BE/LLB and BE/BA should enrol in MECH 3202 Heat Transfer (3 cp) and should enrol in an additional 12 credit points selected from the following units of study: MECH 3201, MECH 3210, MECH 3300 and MECH 3310.

6. These units of study are core for candidates for the degree of Bachelor of Engineering in Mechanical Engineering and the combined degree BE/BSc, but not for candidates for the combined degrees of BE/BMedSci.

7. Candidates for the combined degree BE/BSc should enrol in MECH 2202 (2cp) instead of AERO 2201 (4cp) and should take an additional unit of study in mathematics, MATH 2051 (2cp).

8. Candidates for the combined degree BE/BmedSci should enrol in MECH 4103 and MECH 4104 (instead of MECH 4101 and MECH 4102).

Resolutions of the Faculty of Engineering relating to Table 6

Candidates for the degree of Bachelor of Engineering in Mechanical Engineering and candidates for the degree of Bachelor of Engineering in Mechanical Engineering combined with Bachelor of Science are required to gain credit for all core units of study set out in Table 6. Additional credit necessary to satisfy Section 9 shall be gained by completing at least 30 credit points of elective units of study. At least 24 of these credit points must be chosen from mainstream electives.

Candidates for the degree of Bachelor of Engineering in Mechanical Engineering combined with Bachelor of Arts or Bachelor of Commerce or Bachelor of Law are required to gain credit for all core units of study set out in Table 6 except those marked as (2). Additional credit necessary to satisfy Section 9 shall be gained by completing at least 11 credit points of elective units of study which must be chosen from mainstream electives.

Candidates for the degree of Bachelor of Engineering in Mechanical Engineering combined with Bachelor of Medical Science required to gain credit for all core units of study set out in Table 6 except those marked as (6). Additional credit necessary to satisfy Section 9 shall be gained by completing at least 20 credit points of elective units of study which must be chosen from mainstream electives.

Acceptable alternative units of study

Pursuant to Resolution 3, the Faculty has prescribed the following acceptable alternatives to core units of study listed in Table 6.

<table>
<thead>
<tr>
<th>Acceptable alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1401 Chemistry IE</td>
</tr>
<tr>
<td>MECH 1520 Engineering Mechanics</td>
</tr>
<tr>
<td>MECH 1820 Introduction to Computing</td>
</tr>
<tr>
<td>AERO 1821 Computer Engineering Applications</td>
</tr>
<tr>
<td>CHEM 1101</td>
</tr>
<tr>
<td>PHYS1001</td>
</tr>
<tr>
<td>COMP1001</td>
</tr>
<tr>
<td>COMP 1001</td>
</tr>
</tbody>
</table>

Note

Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced Level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced Levels should seek advice from their Department before enrolling.

Resolutions of the Department of Mechanical and Mechatronic Engineering relating to Table 6

Note

Units of study not included in this table may also be selected subject to the approval of the Head of Department, Mechanical and Mechatronic Engineering.

Recommended elective units of study

Mainstream electives

| MECH 4210 Computational Fluid Dynamics |
| 6 P) MECH 3210 Fluid Mechanics |
| 4 July |

| MECH 4220 Environmental Engineering |
| 6 P) 24 credit points of third year units of study |
| N) MECH4240 Energy and the Environment and MECH4230 Environmental Acoustics and Noise Control |
| February |

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### Table 6: Mechanical Engineering (Mechanical) - continued

<table>
<thead>
<tr>
<th>Uni of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying Knowledge</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 4230 Environmental Acoustics &amp; Noise Control</td>
<td>2</td>
<td>P) 24 credit points of third year units of study.</td>
<td></td>
<td></td>
<td></td>
<td>MECH 4220 Environmental Engineering.</td>
<td>February</td>
</tr>
<tr>
<td>MECH 4240 Energy and the Environment</td>
<td>4</td>
<td>P) 24 credit points of Senior units of study.</td>
<td></td>
<td></td>
<td></td>
<td>MECH 4220 Environmental Engineering.</td>
<td>February</td>
</tr>
<tr>
<td>MECH 4250 Air Conditioning and Refrigeration</td>
<td>3</td>
<td>P) MECH 3200 Thermal Engineering 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MECH 4260 Combustion and Fire Safety</td>
<td>3</td>
<td>P) MECH 3200 Thermal Engineering 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MECH 4410 Advanced Design and Analysis 1</td>
<td>3</td>
<td>P) MECH 3400 Mechanical Design 2A and MECH 3410 Mechanical Design 2B.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MECH 4420 Advanced Design and Analysis 2</td>
<td>3</td>
<td>P) MECH 3400 Mechanical Design 2A and MECH 3410 Mechanical Design 2B.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 4510 Machine Vibration and Monitoring</td>
<td>3</td>
<td>P) MECH 3500 Engineering Dynamics 2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 4610 Industrial Engineering and Management</td>
<td>2</td>
<td>P) MECH 3620 Industrial Management.</td>
<td></td>
<td></td>
<td></td>
<td>MECH 4605 Industrial Engineering.</td>
<td>February</td>
</tr>
<tr>
<td>MECH 4620 Industrial Ergonomics</td>
<td>2</td>
<td>P) MECH 4605 Industrial Engineering.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MECH 4640 Product Life Cycle Design</td>
<td>2</td>
<td>P) MECH3600 Manufacturing Engineering.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 4650 Workplace Industrial Relations</td>
<td>2</td>
<td>P) 36 credit points of senior units of study.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 4700 Robotic Systems</td>
<td>4</td>
<td>P) MECH 3500 Engineering Dynamics 2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 4900 Orthopaedic Engineering</td>
<td>4</td>
<td>P) MECH 3300 Materials 2 and MECH 3310 Mechanics of Solids 2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>MECH 4910 Biomechanics and Biomaterials</td>
<td>4</td>
<td>P) 36 credit points of third year units of study.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4303 Aerospace Structures 3</td>
<td>6</td>
<td>P) AERO 3350 Aircraft Structures 2 or AERO 3351 Aerospace Structures 2.</td>
<td></td>
<td></td>
<td></td>
<td>AERO4301 Applied Numerical Stress Analysis.</td>
<td>February</td>
</tr>
</tbody>
</table>

#### Other electives

<table>
<thead>
<tr>
<th>Uni of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying Knowledge</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASNS 2601 Asian Studies 1A</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ASNS 2602 Asian Studies 1B</td>
<td>4</td>
<td>P) ASNS 2601.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ASNS 2603 Asian Studies 2A</td>
<td>4</td>
<td>P) ASNS2602.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ASNS 2604 Asian Studies 2B</td>
<td>4</td>
<td>P) ASNS2603.</td>
<td></td>
<td></td>
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<td>CIVL 3701 Transportation Engineering and Planning</td>
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<tr>
<td>ELEC 3801 Fundamentals of Biomedical Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2401 Introductory Electronics or ELEC2001 Electrical and Electronic Engineering or ELEC2003 Electrical and Electronic Engineering A.</td>
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<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A) Assumed Knowledge</td>
<td>C) Corequisite</td>
<td>N) Prohibition</td>
<td>P) Prerequisite</td>
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<td>IREL 1001</td>
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</tbody>
</table>
Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Mechatronics) are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional credit points of elective units of study as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points. See note (1) relating to core units of study offered by faculties other than Engineering.

### Core units of study

#### First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
</table>
| MATH 1001 Differential Calculus              | 3             | A) HSC 3-unit Mathematics.  
 N) May not be counted with MATH 1901 or 1011. |               |                | February, January (short) |
| MATH 1002 Linear Algebra                     | 3             | A) HSC 3-unit Mathematics.  
 N) May not be counted with MATH 1902 or 1012. |               |                | February, January (short) |
| MATH 1003 Integral Calculus and Modelling    | 3             | A) HSC 4-unit Mathematics or MATH 1001.  
 N) May not be counted with MATH 1903 or 1013. |               |                | July, January (short) |
| MATH 1005 Statistics                          | 3             | A) HSC 2-unit Mathematics.  
 N) May not be counted with MATH 1905 or 1015. |               |                | July, January (short) |
| MECH 1530 Engineering Mechanics              | 8             | N) CIVL1052 Statics MECH1501 Engineering Statics MECH1511 Introductory Dynamics MECH1510 Kinematics and Dynamics MECH1500 Mechanical Engineering 1. |               |                | July |
| MECH 1540 Introductory Mechanical Engineering | 5             | N) AERO 1 6.0 1 Aerospace Manufacturing, MECH1500 Mechanical Engineering 1, MECH1800 Computational Engineering 1A. |               |                | February |
| MECH 1600 Manufacturing Technology            | 4             | N) AERO 1600 Workshop Technology. |               |                | July |
| MECH 1820 Introduction to Computing           | 6             | N) MECH1800 Computational Engineering 1A MECH1501 Computational Engineering 1C INFO 1000 Information Technology Tools. |               |                | February |
| CHEM 14013 Chemistry IE                       | 6             | P) Mathematics 2-unit course and a satisfactory knowledge of 2-unit Chemistry or the Chemistry component of the 3 or 4-unit Science HSC course.  
 N) CHEM 1101, CHEM 1102. |               |                | February, January (short) |
| ELEC 1001 Introductory Electrical Engineering | 4             | P) Advisory Prerequisite: MATH1001 Differential Calculus.  
 N) ELEC1102 Foundations of Electronic Circuits. |               |                | July |

#### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
</table>
| MATH 2001 Vector Calculus and Complex Variables | 4             | P) MATH (1001 or 1901or 1906) and (1002 or 1902) and (1003 or 1903 or 1907).  
 N) May not be counted with MATH 2901. |               |                | February, January (short) |
| MATH 2002_1 Matrix Applications              | 4             | P) MATH 1002 or 1902 or Distinction in MATH 1012.  
 N) May not be counted with MATH 2902. |               |                | February, January (short) |
| MATH 2005 Fourier Series & Differential Equations | 4             | P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907).  
 N) May not be counted with MATH 2905. |               |                | July, January (short) |
| MATH 2052_1 Numerical Methods                 | 2             | C) MATH 2001 or 2901.  
 N) MATH 2952. |               |                | July |
| MECH 2201 Thermodynamics 1                    | 4             | N) MECH 2200 Thermofluids. |               |                | February |
| MECH 2400 Mechanical Design 1                 | 6             |                     |               |                | July |
| MECH 2500 Engineering Dynamics 1              | 4             | P) MATH 1001 MATH 1002 and MECH 1530 Engineering Mechanics or MECH 1510 Kinematics and Dynamics. |               |                | July |
| MECH 2700 Mechatronics 1                      | 6             |                     |               |                | July |
### Table 7: Mechanical Engineering (Mechatronics) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AERO 2300 Mechanics of Solids 1</strong></td>
<td>4</td>
<td>P) 12 credit points of first year Maths (i.e Maths 1001,1002,1003,1005).</td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>

#### Third Year

| MECH 3400 A Mechanical Design 2A                  | 4             | P) MECH 2400 Mechanical Design 1. |               |                 | February |
| MECH 34102 Mechanical Design 2B                   | 4             | P) MECH 2400 Mechanical Design 1. |               |                 | July     |
| MECH 3500 Engineering Dynamics 2                  | 4             | P) MECH 2500 Engineering Dynamics 1 and (MATH 2001 & MATH 2005). |               |                 | February |
| MECH 36004 Manufacturing Engineering              | 6             | P) MECH 1600 Manufacturing Technology. |               |                 | February |
| MECH 3610 A Team Project                          | 2             | P) 30 credit points of second year units of study. |               |                 | July     |
| MECH 36202 Industrial Management                  | 5             |                                  |               |                 | July     |
| MECH 3700 A Mechatronics 2                        | 5             | P) MECH 2700 Mechatronics 1. |               |                 | February |
| ELEC 3202 Power Electronics and Drives            | 4             | P) Advisory Prerequisites: ELEC2101 Circuit Analysis, andELEC2401 Introductory Electronics. |               |                 | July     |
| ELEC 3401 Electronic Devices and Circuits         | 4             | P) Advisory Prerequisites: ELEC2401 Introductory Electronics andELEC2101 Circuit Analysis. |               |                 | February |

#### Fourth Year

| MECH 4101 A Thesis A                              | 0             | P) 36 credit points of Third Year units of study. |               |                 | February, July |
| MECH 41027 Thesis B                              | 12            | P) MECH 4101 Thesis A (the Head of Department may allow Thesis A as corequisite in exceptional circumstances). |               |                 | February, July |
| MECH 4110 Professional Engineering                | 4             | P) 3 6 credit points of Senior units of study. |               |                 | February |
| MECH 4120 Professional Communication              | 4             | P) 32 credit points of third year units of study. |               |                 | July     |
| MECH 4130 Practical Experience                   | 0             | P) 28 credit points of second year units of study. |               |                 | February, July |

**Notes to Table 7**

1. For core units offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite requirements, will be as prescribed by that Faculty.
2. These units of study are core for candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Mechatronics) and the combined degree BE/BSc, but not for candidates for the combined degrees of BE/BCom, BE/LLB and BE/BA.
3. For CHEM 1401, note (2) above also applies. Candidates for the combined degree BE/BSc may take as an alternative to CHEM 1401 other units of study from the Faculties of Science or Health Services, up to 12 credit Points and subject to timetabling constraints. Candidates for the combined degree BE/BMedSci should enrol in CHEM 1102 (instead of CHEM 1401) as well as BIOL 1003.
4. for the combined degrees BE/BCom, BE/LLB and BE/BA should enrol in MECH 3601 Manufacturing Systems (2 cp).
5. These units of study are core for candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Mechatronics) and the combined degree BE/BSc, but not for candidates for the combined degrees of BE/BMedSci.
6. Candidates for the combined degree BE/BSc should enrol in MECH 2202 (2cp) instead of AERO 2201 (4cp) and should take an additional unit of study in mathematics, MATH 2051 (2cp).
7. Candidates for the combined degree BE/BmedSci should enrol in MECH 4103 and MECH 4104 (instead of MECH 4101 and MECH 4102)
Chapter 3 - Tables of undergraduate courses

Table 7: Mechanical Engineering (Mechatronics) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
</table>

Resolutions of the Faculty of Engineering relating to Table 7

Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Mechatronics) and candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Mechatronics) combined with Bachelor of Science are required to gain credit for all core units of study set out in Table 7. Additional credit necessary to satisfy Section 9 shall be gained by completing at least 30 credit points of elective units of study. At least 24 of these credit points must be chosen from mainstream electives.

Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Mechatronics) combined with Bachelor of Arts or Bachelor of Law or Bachelor of Commerce are required to gain credit for all core units of study set out in Table 7 except those marked as (2). Additional credit necessary to satisfy Section 9 shall be gained by completing at least 13 credit points of elective units of study which must be chosen from mainstream electives.

Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Mechatronics) combined with Bachelor of Medical Science required to gain credit for all core units of study set out in Table 6 except those marked as (5). Additional credit necessary to satisfy Section 9 shall be gained by completing at least 20 credit points of elective units of study which must be chosen from mainstream electives.

Acceptable alternative units of study

Pursuant to Resolution 3, the Faculty has prescribed the following acceptable alternatives to core units of study listed in Table 7:

<table>
<thead>
<tr>
<th>Acceptable alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1401 Chemistry IE</td>
</tr>
<tr>
<td>MECH 1530 Engineering Mechanics</td>
</tr>
<tr>
<td>MECH 1802 C Programming</td>
</tr>
<tr>
<td>MECH 1820 Introduction to Computing</td>
</tr>
</tbody>
</table>

Note

Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced Level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced Levels should seek advice from their Department before enrolling.

Resolutions of the Department of Mechanical and Mechatronic Engineering relating to Table 7

Note

Units of study not included in this table may also be selected subject to the approval of the Head of Department, Mechanical and Mechatronic Engineering.

Recommended elective units of study

Mainstream electives

<table>
<thead>
<tr>
<th>MECH Advanced Design and Analysis 1</th>
<th>3</th>
<th>P) MECH 3400 Mechanical Design 2A and MECH 3410 Mechanical Design 2B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH Advanced Design and Analysis 2</td>
<td>3</td>
<td>P) MECH 3400 Mechanical Design 2A and MECH 3410 Mechanical Design 2B.</td>
</tr>
<tr>
<td>MECH Machine Vibration and Monitoring</td>
<td>3</td>
<td>P) MECH 3500 Engineering Dynamics 2.</td>
</tr>
<tr>
<td>MECH Product Life Cycle Design</td>
<td>2</td>
<td>P) MECH3600 Manufacturing Engineering.</td>
</tr>
<tr>
<td>MECH Workplace Industrial Relations</td>
<td>2</td>
<td>P) 36 credit points of senior units of study.</td>
</tr>
<tr>
<td>MECH Robotic Systems</td>
<td>4</td>
<td>P) MECH 3500 Engineering Dynamics 2.</td>
</tr>
<tr>
<td>MECH Microprocessors in Engineered Products</td>
<td>6</td>
<td>P) ELEC 3601 Digital Systems Design and ELEC 3401 Electronics Devices &amp; Circuits.</td>
</tr>
</tbody>
</table>
# Table 7: Mechanical Engineering (Mechatronics) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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</thead>
<tbody>
<tr>
<td><strong>Other electives</strong></td>
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<tr>
<td>ASNS 2601 Asian Studies 1A</td>
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<tr>
<td>ASNS 2602 Asian Studies 1B</td>
<td>4</td>
<td>P) ASNS 2601.</td>
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<tr>
<td>ASNS 2603 Asian Studies 2A</td>
<td>4</td>
<td>P) ASNS2602.</td>
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<tr>
<td>ASNS 2604 Asian Studies 2B</td>
<td>4</td>
<td>P) ASNS2603.</td>
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</tr>
<tr>
<td>BIOL 1001 Concepts in Biology</td>
<td>6</td>
<td>A) HSC 2-unit Biology course. N) May not be counted with BIOL 1901.</td>
<td></td>
<td></td>
<td>February, July</td>
</tr>
<tr>
<td>CIVL 3701 Transportation Engineering and Planning</td>
<td>2</td>
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<td>July</td>
</tr>
<tr>
<td>ELEC 3801 Fundamentals of Biomedical Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2401 Introductory Electronics or ELEC2001 Electrical and Electronic Engineering or ELEC2003 Electrical and Electronic Engineering A.</td>
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<tr>
<td>ENGG 4001 Innovation/International Competitiveness</td>
<td>4</td>
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<tr>
<td>ENGG 4002 New Business Creation</td>
<td>4</td>
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<tr>
<td>CHNG 4300 Environmental Decision Making</td>
<td>4</td>
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<tr>
<td>REL 1001 Macro Industrial Relations</td>
<td>6</td>
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<tr>
<td>MECH 4230 Environmental Engineering</td>
<td>6</td>
<td>P) 24 credit points of third year units of study. N) MECH4240 Energy and the Environment and MECH4230 Environmental Acoustics and Noise Control.</td>
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<tr>
<td>MECH 4910 Biomechanics and Biomaterials</td>
<td>4</td>
<td>P) 36 credit points of third year units of study.</td>
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</tbody>
</table>
Candidates for the degree of Bachelor of Engineering in Project Engineering and Management (Civil) are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study, as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points.

### Core units of study

#### First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>Assumed Knowledge</th>
<th>Qualifying</th>
<th>Prerequisite</th>
<th>Corequisite</th>
<th>Prohibition</th>
<th>Offered</th>
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</thead>
<tbody>
<tr>
<td>MATH 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics. N) May not be counted with MATH 1901 or 1011.</td>
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<tr>
<td>MATH 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics. N) May not be counted with MATH 1902 or 1012.</td>
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<td>February, January (short)</td>
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<tr>
<td>MATH 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001. N) May not be counted with MATH 1903 or 1013.</td>
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<tr>
<td>MATH 1005 Statistics</td>
<td>3</td>
<td>A) HSC 2-unit Mathematics. N) May not be counted with MATH 1905 or 1015.</td>
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<tr>
<td>CIVL 1051 Dynamics</td>
<td>5</td>
<td>A) Mathematics 3 unit course and Science 4 unit course (or the Physics core of 3-4 unit Science) at the HSC. N) MECH1510.</td>
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<tr>
<td>CHEM 1401 Chemistry IE</td>
<td>6</td>
<td>P) Mathematics 2-unit course and a satisfactory knowledge of 2-unit Chemistry or the Chemistry component of the 3 or 4-unit Science HSC course. N) CHEM 1101, CHEM 1102.</td>
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<td>February, January (short)</td>
</tr>
<tr>
<td>CIVL 1001 Civil Engineering 1</td>
<td>4</td>
<td>A) Mathematics 3 unit course and a satisfactory knowledge of 2 unit Chemistry or the Chemistry component of the 3 or 4 unit Science HSC course and of the 2 unit Physics course or the Physics component of the 3 or 4 unit Science HSC course.</td>
<td></td>
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<td>February</td>
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<tr>
<td>CIVL 1052 Statics</td>
<td>5</td>
<td>A) Mathematics 3 unit course at the HSC. N) MECH1500 Mechanical Engineering 1, MECH1501 Engineering Statics.</td>
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<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 1004 Computational Engineering</td>
<td>4</td>
<td>N) COMP 1001 Introductory Programming or COMP 1002 Introductory Computer Science.</td>
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<td>July</td>
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<tr>
<td>ACCT 1003 Financial Accounting Concepts</td>
<td>6</td>
<td>N) Terminating unit. Cannot be counted with ACCT1001 and ACCT1002.</td>
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<td>February</td>
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<tr>
<td>ACCT 1004 Management Accounting Concepts</td>
<td>6</td>
<td>N) Terminating unit. Cannot be counted with ACCT1001 and ACCT1002.</td>
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</table>

#### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>Assumed Knowledge</th>
<th>Qualifying</th>
<th>Prerequisite</th>
<th>Corequisite</th>
<th>Prohibition</th>
<th>Offered</th>
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<tbody>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907). N) May not be counted with MATH 2901.</td>
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<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2002 Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902.</td>
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<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907). N) May not be counted with MATH 2905.</td>
<td></td>
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<td>July, January (short)</td>
</tr>
<tr>
<td>MATH 2051 Linear Programming</td>
<td>2</td>
<td>C) MATH 2001 or 2901, and MATH 2002 or 2902. N) MATH 2955.</td>
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<td>July</td>
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<tr>
<td>MATH 2052 Numerical Methods</td>
<td>2</td>
<td>C) MATH 2001 or 2901. N) MATH 2955.</td>
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<td>July</td>
</tr>
<tr>
<td>GEOL 1501 Engineering Geology 1</td>
<td>6</td>
<td>N) GEOL 1002.</td>
<td></td>
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<td>February</td>
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<tr>
<td>CIVL 2201 Structural Mechanics</td>
<td>6</td>
<td>A) CIVL 1051 Dynamics and CIVL 1052 Statics.</td>
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<td>February</td>
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</table>
**Table 8: Project Engineering and Management (Civil) — continued**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
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<tbody>
<tr>
<td>CIVL 2004 Engineering Communications 1</td>
<td>2</td>
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<td>February</td>
</tr>
<tr>
<td>CIVL 2205 Introduction to Structural Design</td>
<td>4</td>
<td>A) CIVL1051 Dynamics and CIVL1052 Statics.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 2801 Engineering Construction 1</td>
<td>4</td>
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</tr>
<tr>
<td>IREL 1002 Micro Industrial Relations</td>
<td>6</td>
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<td>July</td>
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</table>

**Third Year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 3401 Soil Mechanics A</td>
<td>4</td>
<td>A) CIVL 2201 Structural Mechanics.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3501 Surveying 1</td>
<td>4</td>
<td>A) MATH 1001, MATH 1002, MATH 1003, MATH 1005.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3701 Transportation Engineering and Planning</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3005 Engineering Communications 2</td>
<td>2</td>
<td>A) CIVL 2004 Engineering Communications 1.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3802 Engineering Construction 2</td>
<td>4</td>
<td>A) Completion of CIVL 2801 Engineering Construction 1 or equivalent knowledge.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 2610 Fluids 1</td>
<td>6</td>
<td>A) MATH 1001, MATH 1002, MATH 1003, MATH 1005.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3805 Project Scope, Time and Cost Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3804 Contracts, Formulation and Management</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3803 Project Appraisal</td>
<td>4</td>
<td>N) CIVL 4803 Engineering Management.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>

**Fourth Year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 4014 Thesis/Design/Project</td>
<td>5</td>
<td>P) 40 credit points of Senior Subjects.</td>
<td>N) CIVL 4013 Honours Thesis/Design/Project or CIVL4015.</td>
<td></td>
<td>February, Full Year (starts Feb)</td>
</tr>
<tr>
<td>CIVL 4008 Practical Experience</td>
<td>0</td>
<td>P) 28 credit points of Senior courses.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4016 Professional Practice- Civil Engineering</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 4807 Project Formulation</td>
<td>5</td>
<td>A) Completion of CIVL 3803 Project Appraisal or equivalent knowledge.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 4810 Project Quality Risk and Procurement Mgt</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 4808 Project Management &amp; Information Technol</td>
<td>4</td>
<td>A) Sufficient knowledge of information technology systems &amp; communications capabilities.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 4809 Project Planning and Tendering</td>
<td>4</td>
<td>A) Completion of CIVL2801 Engineering Construction 1 and CIVL3802 Engineering Construction 2 or the equivalent knowledge.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Note to Table 8**
1. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite and corequisite requirements will be as prescribed by the Faculty.
Resolutions of the Faculty of Engineering relating to Table 8

Degree Eligibility

Candidates for the degree of Bachelor of Engineering in Project Engineering and Management (Civil) are expected to complete all the core units for study in Table 8 (162 credit points). They are also required to gain at least 30 credit points from the third and fourth year table of electives listed below.

Candidates commencing a combined degree program (that is a Bachelor of Engineering in Project Engineering and Management (Civil) with a Bachelor of Commerce) are required to complete all of the core units of study in Table 8 except for ACCT 1003, ACCT 1004 and IREL 1002, which are not required, therefore only 144 credit points are needed. However, a minimum of 8cp from the 3rd and 4th year tables of electives listed below must be taken. This total of 152 credit points is only sufficient to be awarded a Bachelor of Engineering in Project Engineering and Management (Civil) as part of an approved combined degree program. The remaining 88 credit points for the combined degree will be taken in the Faculty of Economics and candidates should refer to the Joint Resolutions of the Faculty of Engineering and the Faculty of Economics.

Note

Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level units of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced options should seek advice from their Department before enrolling.

Acceptable alternative units of study

Pursuant to Resolution 3, the Faculty has prescribed the following acceptable alternatives to core units of study listed in Table 8.

<table>
<thead>
<tr>
<th>Acceptable alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1401 Chemistry 1E CHEM 1101 and CHEM 1102</td>
</tr>
<tr>
<td>GEOL 1501 Engineering Geology 1 GEOL 1001 and GEOL 1002</td>
</tr>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables STAT 2002 (For BE/BCom degrees only)</td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations STAT 2004 (For BE/BCom degrees only)</td>
</tr>
<tr>
<td>CIVL 1004 Computational Engineering COMP 1001 and COMP 1002 or MECH 1800 or MECH 1810 or MECH 1801</td>
</tr>
<tr>
<td>CIVL 1052 Statics MECH 1500 or MECH 1501</td>
</tr>
<tr>
<td>CIVL 1051 Dynamics MECH 1500 or MECH 1501</td>
</tr>
<tr>
<td>CIVL 4014 Thesis/Design/Project CIVL 4013</td>
</tr>
</tbody>
</table>

Recommended elective units of study

Third Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 3204 Structural Analysis</td>
<td>6</td>
<td>A) CIVL 2201 Structural Mechanics and MATH 2002 Matrix Applications plus MATH 2005 Fourier Series and Differential Equations.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3102 Materials Aspects in Design</td>
<td>4</td>
<td>A) CIVL 2101 Properties of Materials.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3207 Risk and Reliability Analysis</td>
<td>2</td>
<td>A) MATH 1001, MATH 1002, MATH 1003, MATH 1005, CIVL 2201 Structural Mechanics, CIVL 2204 Introduction to Structural Concepts, CVTL2205 Introduction to Structural Design.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3206 Steel Structures 1</td>
<td>6</td>
<td>A) CIVL 2201 Structural Mechanics.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3223 Concrete Structures: Behaviour</td>
<td>3</td>
<td>A) CIVL 2201 Structural Mechanics and CIVL 2203 Structural Design. N) CIVL 3205 Concrete Structures 1.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>CIVL 3224 Concrete Structures: Design</td>
<td>3</td>
<td>A) CIVL 2201 Structural Mechanics and CIVL 2203 Structural Design. N) CIVL 3205 Concrete Structures 1.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3402 Soil Mechanics B</td>
<td>4</td>
<td>A) CIVL 3401 Soil Mechanics A.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>CIVL 3602 Fluids 2</td>
<td>4</td>
<td>A) CIVL 2610 Fluids 1.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>
### Table 8: Project Engineering and Management (Civil) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>B) Qualifying</th>
<th>C) Corequisite</th>
<th>D) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fourth Year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ECON 1001</strong></td>
<td>6</td>
<td>A) HSC 2 unit Mathematics.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Finite Element Methods</td>
<td>5</td>
<td>A) CIVL 3204 Structural Analysis.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Bridge Engineering</td>
<td>5</td>
<td>A) CIVL 3225 or CIVL3223 Concrete Structures - Behaviour, CIVL 3226 or CIVL3224 Concrete Structures - Design and CIVL 3227 or CIVL3206 Steel Structures 1.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Concrete Structures 2</td>
<td>5</td>
<td>A) CIVL 3223 or CIVL 3225 Concrete Structures - Behaviour, CIVL 3224 or CIVL 3226 Concrete Structures - Design.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Structural Dynamics</td>
<td>5</td>
<td>A) CIVL 3204 Structural Analysis.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Steel Structures 2</td>
<td>5</td>
<td>A) CIVL3206 or CIVL 3227 Steel Structures 1.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Environmental Geotechnics</td>
<td>5</td>
<td>A) CIVL 3401 Soil Mechanics A, CIVL 3402 Soil Mechanics B.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Geotechnical Engineering</td>
<td>.</td>
<td>A) CIVL 3401 Soil Mechanics A, CIVL 3402 Soil Mechanics B.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Environmental Fluids 1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Environmental Fluids 2</td>
<td>5</td>
<td>A) Material covered in Environmental Fluids 1.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Water Resources Engineering</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Civil Engineering Design</td>
<td>6</td>
<td>A) CIVL 3225 or CIVL3223 Concrete Structures - Behaviour, CIVL 3226 or CIVL3224 Concrete Structures - Design and CIVL 3227 or CIVL3206 Steel Structures 1.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>

**Notes**

1. Choice of electives as shown in the above table will depend upon subject availability, timetabling and prerequisite conditions.
2. For the BE Project Engineering and Management (Civil) degree, students must take at least 22 elective units of study at third and fourth year level, however, 2 x 4 credit points of study may be replaced by at least 8 credit points available elsewhere in the Faculty of Engineering and subject to the approval of the Head of Civil Engineering.
3. Honours candidates replace the core unit of study CIVL 4014 Thesis by CIVL 4013 Thesis Honours.
4. CIVL 4014 may be replaced with CIVL 4015 with written approval from the Head of Civil Engineering.
### Table 9: Telecommunications Engineering

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Core units of study</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candidates for the degree of Bachelor of Engineering in Telecommunications Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study recommended or approved by the Faculty.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ First year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP 1001 Introductory Programming</td>
<td>6</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1005 or 1903 and 1904 or 1905 in their first year.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with COMP 1901.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP 1002 Introductory Computer Science</td>
<td>6</td>
<td>P) COMP 1001 or 1901.</td>
<td></td>
<td></td>
<td>February, July, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with COMP 1902.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 1101 Foundations of Computer Systems</td>
<td>6</td>
<td>A) HSC Maths 3 unit.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 1102 Foundations of Electronic Circuits</td>
<td>6</td>
<td>A) HSC Physics 2 unit.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P) Advisory Prerequisite: MATH1001 Differential Calculus.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with MATH 1901 or 1011.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with MATH 1902 or 1012.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001.</td>
<td></td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with MATH 1903 or 1013.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1004 Discrete Mathematics</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with MATH 1904.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A) HSC Physics or HSC 4-unit Science.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C) Recommended concurrent units of study: MATH 1001 and 1002 or 1901 and 1902.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with PHYS 1002 or 1901.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 10032 Physics 1 (Technological)</td>
<td>6</td>
<td>A) HSC 2-unit Physics or HSC 4-unit Science or PHYS 1001 or 1002 or 1901 or equivalent.</td>
<td></td>
<td></td>
<td>February, July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C) For Science students: Recommended concurrent units MATH 1003 and 1005 or 1903 and 1905.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) For Science students: May not be counted with PHYS 1004 or 1902.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Second year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP 2002 Design and Data Structures</td>
<td>4</td>
<td>Q) COMP 1002 or 1902.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with COMP 2902.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP 2004 Programming Practice</td>
<td>4</td>
<td>Q) COMP 1002 or 1902.</td>
<td></td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) May not be counted with COMP 2904.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 2101 Circuit Analysis</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC1102 Foundations of Electronic Circuits.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) ELEC2001 Electrical and Electronic Engineering, and ELEC2002 Electrical Technology, and ELEC2003 Electrical and Electronic Engineering A.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 2301 Signals and Systems</td>
<td>4</td>
<td>P) Advisory Prerequisite: MATH1001 Differential Calculus, andMATH1002 Linear Algebra, and MATH 1003 Integral Calculus and Modelling, and MATH1004 Discrete Mathematics.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A) Assumed Knowledge</td>
<td>Q) Qualifying</td>
<td>P) Prerequisite</td>
<td>Offered</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>---------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907). N) May not be counted with MATH 2901.</td>
<td></td>
<td>February (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 2002 Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902.</td>
<td></td>
<td>February (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907). N) May not be counted with MATH 2905.</td>
<td></td>
<td>July (short)</td>
<td></td>
</tr>
<tr>
<td>PHYS 2203 Physics 2EE</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Third year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 3102 Engineering Electromagnetics</td>
<td>4</td>
<td>P) Advisory Prerequisites: PHYS2203 Physics2EE and ELEC2101 Circuit Analysis.</td>
<td></td>
<td>February</td>
<td></td>
</tr>
<tr>
<td>ELEC 3401 Electronic Devices and Circuits</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC2401 Introductory Electronics and ELEC2101 Circuit Analysis.</td>
<td></td>
<td>February</td>
<td></td>
</tr>
<tr>
<td>ELEC 3402 Communications Electronics</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits.</td>
<td></td>
<td>July</td>
<td></td>
</tr>
<tr>
<td>ELEC 3502 Random Signals and Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite:ELEC2301 Signals and Systems.</td>
<td></td>
<td>February</td>
<td></td>
</tr>
<tr>
<td>ELEC 3503 Introduction to Digital Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td>July</td>
<td></td>
</tr>
<tr>
<td>Fourth year</td>
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<td>ELEC 4501 Data Communication Networks</td>
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<td>P) Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
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<td>ELEC 4502 Digital Communication Systems</td>
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<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
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<td>ELEC 4702 Practical Experience</td>
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<td>ELEC 4703 Thesis</td>
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<td>P) A minimum of 36 credit points from third and fourth year units of study.</td>
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Notes to Table 9
1. For units of study offered by other than the Faculty of Engineering, any assumed knowledge, prerequisites and corequisites will be as prescribed by that Faculty.
2. PHYS 1203 Physics IEE is an acceptable alternative to PHYS 1003 (Technological).

Resolutions of the Faculty of Engineering relating to Table 9
BE(Telecommunications Engineering)
In addition to gaining credit for the 140 credit points of core units of study set out in Table 9, candidates are required to complete at least 40 credit points of units of study (at least 20 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Telecommunications Engineering). Further credit for a total of not less than 192 credit points shall be gained by completing additional elective units of study approved by the Faculty.
Chapter 3 - Tables of undergraduate courses

Table 9: Telecommunications Engineering - continued

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<th>Unit of study</th>
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<th>P) Prerequisite</th>
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</table>
Table 9: Telecommunications Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 5503 Optical Communication Systems</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3402 Communications Electronics, ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>July</td>
<td></td>
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</tr>
<tr>
<td>ELEC 5504 Cellular Radio Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>February</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 5505 Advanced Digital Transmissions</td>
<td>4</td>
<td>A) ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>July</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 5506 Optical Networks</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td>July</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 5610 Computer and Network Security</td>
<td>4</td>
<td>A) ELEC4601 Computer Design and ELEC4501 Data Communication Networks.</td>
<td>July</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes
1. For units of study offered by a Faculty other than the Faculty of Engineering, any assumed knowledge, prerequisites and corequisites will be as prescribed by that Faculty.
2. The units of study in this table may not all be available every year.
### Core units of study

Candidates for the degree of Bachelor of Engineering in Software Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study recommended or approved by the Faculty.

#### First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 1001</td>
<td>6</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introductory Programming</td>
<td>C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1005 or 1903 and 1904 and 1905 in their first year.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>N) May not be counted with COMP 1901.</td>
<td></td>
<td>February, July, January (short)</td>
<td></td>
</tr>
<tr>
<td>COMP 1002</td>
<td>6</td>
<td>P) COMP 1001 or 1901.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introductory Computer Science</td>
<td>N) May not be counted with COMP 1902.</td>
<td></td>
<td></td>
<td>February, July, January (short)</td>
<td></td>
</tr>
<tr>
<td>ELEC 1101</td>
<td>6</td>
<td>A) HSC Maths 3 unit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations of Computer Systems</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
<td></td>
</tr>
<tr>
<td>ELEC 1102</td>
<td>6</td>
<td>A) HSC Physics 2 unit.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Foundations of Electronic Circuits</td>
<td>P) Advisory Prerequisite: MATH1001 Differential Calculus.</td>
<td></td>
<td></td>
<td>July</td>
<td></td>
</tr>
<tr>
<td>MATH 1001</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Differential Calculus</td>
<td>N) May not be counted with MATH 1901 or 1011.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
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</tr>
<tr>
<td>MATH 1002</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Linear Algebra</td>
<td>N) May not be counted with MATH 1902 or 1012.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
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</tr>
<tr>
<td>MATH 1003</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001.</td>
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<tr>
<td>Integral Calculus and Modelling</td>
<td>N) May not be counted with MATH 1903 or 1013.</td>
<td></td>
<td></td>
<td>July, January (short)</td>
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</tr>
<tr>
<td>MATH 1004</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td></td>
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<tr>
<td>Discrete Mathematics</td>
<td>N) May not be counted with MATH 1904.</td>
<td></td>
<td></td>
<td>July, January (short)</td>
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</tr>
<tr>
<td>PHYS 10032</td>
<td>6</td>
<td>A) HSC 2-unit Physics or HSC 4-unit Science or PHYS 1001 or 1002 or 1901 or equivalent.</td>
<td></td>
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<tr>
<td>Physics 1 (Technological)</td>
<td>C) For Science students: Recommended concurrent units MATH 1003 and 1005 or 1903 and 1905.</td>
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<td></td>
<td></td>
<td>N) For Science students: May not be counted with PHYS 1004 or 1902.</td>
<td></td>
<td>February, July</td>
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</table>

#### Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 2000</td>
<td>4</td>
<td>Q) INFO 1000 or COMP 1000 or 1001 or 1901 or COMP 1002 or 1902.</td>
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<tr>
<td>System Analysis and Design</td>
<td>N) May not be counted with COMP 2000.</td>
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<td></td>
<td>February</td>
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<tr>
<td>COMP 2002</td>
<td>4</td>
<td>Q) COMP 1002 or 1902.</td>
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<tr>
<td>Design and Data Structures</td>
<td>N) May not be counted with COMP 2902.</td>
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<td></td>
<td></td>
<td>NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook.</td>
<td></td>
<td>February</td>
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<tr>
<td>COMP 2004</td>
<td>4</td>
<td>Q) COMP 1002 or 1902.</td>
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<tr>
<td>Programming Practice</td>
<td>N) May not be counted with COMP 2904.</td>
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<tr>
<td>ELEC 2301</td>
<td>4</td>
<td>P) Advisory Prerequisite: MATH1001 Differential Calculus, and MATH1002 Linear Algebra, and MATH 1003 Integral Calculus and Modelling, and MATH1004 Discrete Mathematics.</td>
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<tr>
<td>ELEC 2401</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC1102 Foundations of Electronic Circuits.</td>
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<tr>
<td>Introductory Electronics</td>
<td>N) ELEC2001 Electrical and Electronic Engineering, and ELEC2002 Electrical Technology, and ELEC2003 Electrical and Electronic Engineering A.</td>
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<td>July</td>
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<tr>
<td>ELEC 2601</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC1101 Foundations of Computer Systems.</td>
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<tr>
<td>Microcomputer Systems</td>
<td>N) ELEC2001 Electrical and Electronic Engineering and ELEC2003 Electrical Electronic Engineering A.</td>
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<td></td>
<td>February</td>
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</table>
### Table 10: Software Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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</thead>
</table>
| MATH 2001 Vector Calculus and Complex Variables   | 4             | P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907).  
N) May not be counted with MATH 2901.            |               |                    |                | February, January (short) |
| MATH 2002 Matrix Applications                     | 4             | P) MATH 1002 or 1902 or Distinction in MATH 1012.  
N) May not be counted with MATH 2902.             |               |                    |                | February, January (short) |
| MATH 2005 Fourier Series & Differential Equations | 4             | P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907).  
N) May not be counted with MATH 2905.             |               |                    |                | July, January (short) |
| COMP 3001 Algorithms                              | 4             | Q) COMP 2002 or 1902.  
P) MATH 1004 or 1904 and 8 credit points in Intermediate Mathematics and/or Statistics and/or Econometrics.  
N) May not be counted with COMP 3901.              |               |                    |                | July             |
| COMP 3008 Object-Oriented Systems                 | 4             | Q) COMP 2004 or 1904.  
N) May not be counted with COMP3908.               |               |                    |                | February        |
| COMP 3009 Operating Systems                       | 4             | Q) COMP 2004 or 1904.  
P) COMP 2001 or 1901 or ELEC 2601.  
N) May not be counted with COMP 3909.              |               |                    |                | February        |
| COMP 3100 Software Engineering                    | 4             | P) COMP 2004 or 1904.  
N) May not be counted with COMP 3800.              |               |                    |                | July             |
| COMP 3205 Product Development Project             | 4             | P) COMP 3008 or 3908.  
NB: Students intending to major in Computer Science are advised to enrol in one of COMP 3201, 3202, 3203, 3204 or 3205 or 3809.  
N) May not be counted with COMP 3800.              |               |                    |                | February, July   |
| ELEC 3604 Internet Engineering                    | 4             | P) Advisory prerequisites: ELEC 1101 Foundations of Computer systems,  
COMP2002 Design and Data Structures and COMP2004 Programming Practice.  
N) ELEC5609 Internet Engineering, COMP3007 Networked systems. |               |                 | July             |
| ELEC 4602 Real Time Computing                     | 4             | P) Advisory Prerequisites: ELEC3601 Digital Systems Design and COMP3100 Software Engineering. |               |                 | February        |
| ELEC 4702 Practical Experience                    | 0             |                      |               |                 | February        |
| ELEC 4704 Software Project Management             | 4             | P) Advisory Prerequisites: COMP3100 Algorithms, COMP3205 Product Development Project and ELEC3701 Management for Engineers. |               |                 | February        |
| ELEC 4705 Thesis                                  | 12            | P) A minimum of 36 credit points from third and fourth year units of study. |               |                 | July             |

**Notes to Table 10**

1. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite and corequisite requirements will be as prescribed by that Faculty.
2. PHYS 1203 Physics 1EE is an acceptable alternative to PHYS 1003 (Technological).

**Resolutions of the Faculty of Engineering relating to Table 10**

BE(Software Engineering)

In addition to gaining credit for the 134 credit points of core units of study set out in Table 10, candidates are required to complete at least 46 credit points of units of study (at least 20 of which are at the 4 or 5 level) from the table of recommended elective units of study for BE (Software Engineering). Further credit for a total of not less than 192 credit points shall be gained by completing additional elective units of study approved by the Faculty.
### Chapter 3 - Tables of undergraduate courses

**Table 10: Software Engineering - continued**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
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<tbody>
<tr>
<td>BE(Software Engineering)/BSc or BA</td>
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<tr>
<td>In addition to gaining credit for the 134 credit points of core units of study set out in Table 10, candidates must complete at least 26 credit points of units of study (at least 12 of which are at the 4 or 5 level) from the table of recommended elective units of study for BE (Software Engineering). Candidates should refer to the joint resolutions of the Faculties of Engineering and Science or of the Faculties of Engineering and Arts.</td>
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</table>

**BE(Software Engineering)/BMedSc**

Candidates are required to gain credit for the 122 credit points of core units of study in Table 10 excluding ELEC 4703 Thesis. They are also required to complete the 12 credit point unit of study ELEC 4705 Interdisciplinary Thesis and at least 26 credit points of units of study (at least 12 of which must be at the 4 or 5 level) from the table of recommended elective units of study for BE (Software Engineering). Candidates should refer to the joint resolutions of the Faculties of Engineering and Science.

**BE(Software Engineering)/BCom**

In addition to gaining credit for the 134 credit points of core units of study set out in Table 10, candidates must complete at least 26 credit points of units of study (at least 12 of which are at the 4 or 5 level) from the table of recommended elective units of study for BE (Software Engineering). Candidates are also required to complete at least 100 credit points of units of study in the Faculty of Economics (listed in Table A for the Bachelor of Commerce degree). The Computer Science units of study in Table 10 may be counted, to a maximum of 20 credit points, in the 100 credit points. They may also be used to satisfy the requirement for a minor (or second major) for the Bachelor of Commerce. No other units of study in Table 10 or the table of recommended electives may be counted in the 100 credit points or used to satisfy a minor or major. Candidates should refer to the joint resolutions of the Faculty of Engineering and the Faculty of Economics and Business for additional information.

### Acceptable alternative units of study

Most Mathematics, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met.

### Recommended elective units of study for BE(Software Engineering)

#### First year

| PHYS Physics 1 (Regular) 1001 | 6 | A) HSC Physics or HSC 4-unit Science. C) Recommended concurrent units of study: MATH 1001, and 1002 or 1901 and 1902. N) May not be counted with PHYS 1002 or 1901. | February |
|-----------------------------|---|--------------------------------------------------------------------------------اور|---------|

#### Second year

|-----------------------------|---|--------------------------------------------------------------------------------اور|---------|

#### Third year

| I SYS Information Systems Management 3000 | 4 | Q) INFO 2000 or COMP 2000 or ISYS 2006. | July |
| COMP Computer Graphics 3004 | 4 | Q) COMP 2004 or 2904. P) COMP 2002 or 2902 and MATH 1002 or 1902 and 8 credit points in Intermediate Mathematics and/or Statistics and/or Econometrics. N) May not be counted with COMP 3904. | July |
| COMP User Interfaces 3102 | 4 | Q) COMP 2004 or 2904. N) May not be counted with COMP 3802. | July |
| COMP Software Engineering Project 3204 | 4 | C) COMP 3100 or 3800. N) COMP 3201, 3202, 3203, 3204, 3205, 3206 or 3809. | July |
| ELEC Electronic Devices and Circuits 3401 | 4 | P) Advisory Prerequisites: ELEC2401 Introductory Electronics and ELEC2101 Circuit Analysis. | February |
| ELEC Random Signals and Communications 3502 | 4 | P) Advisory Prerequisite: ELEC2301 Signals and Systems. | February |
### Table 10: Software Engineering - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 3503 Introduction to Digital Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 3701 Management for Engineers</td>
<td>4</td>
<td>P) Advisory Prerequisite: Nil.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>

**Fourth year**

| INFO 4300 Information Systems (Advanced Topic)    | 4             | P) Credit in ISYS 3000. |               |                 | February, July |
| COMP 4305 Networked Systems (Advanced Topic)      | 4             | P) Credit in COMP 3007. |               |                 | February, July |
| COMP 4307 Distributed Systems (Advanced Topic)    | 4             | P) Credit in COMP 3007 or Credit in COMP 3009. |               |                 | February, July |
| COMP 4309 Object-Oriented Systems (Advanced Topic)| 4             | P) Credit in COMP 3008. |               |                 | February, July |
| COMP 4400 Operating Systems (Advanced Topic)      | 4             | P) Credit in COMP 3009. |               |                 | February, July |
| COMP 4401 Software Engineering (Advanced Topic)   | 4             | P) Credit in COMP 3100. |               |                 | February, July |
| ELEC 4302 Image Processing and Computer Vision    | 4             | P) Advisory Prerequisites: ELEC2301 Signals and Systems, and ELEC4303 Digital Signal Processing. |               |                 | July |
| ELEC 4501 Data Communication Networks             | 4             | P) Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications. |               |                 | February |
| ELEC 4601 Computer Design                         | 4             | P) Advisory Prerequisites: ELEC 3403 Switching Devices and High Speed Electronics, and ELEC 3601 Digital Systems Design. |               |                 | February |
| ELEC 5610 Computer and Network Security           | 4             | A) ELEC4601 Computer Design and ELEC4501 Data Communication Networks. |               |                 | July |
| ELEC 5611 Advanced Computer Engineering           | 4             | P) Advisory Prerequisite: ELEC4601 Computer Design. Offered. |               |                 | July |

**Notes**

1. For units of study offered by a Faculty other than the Faculty of Engineering, any assumed knowledge, prerequisites and corequisites will be as prescribed by that Faculty.
2. The units of study in this table may not all be available every year.
Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Biomedical) are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional credit points of elective units of study, as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points. See note (1) relating to core units of study offered by faculties other than Engineering.

### Core units of study

#### First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1001 Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td>N) May not be counted with MATH 1901 or 1011.</td>
<td>February, January (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 1002 Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td>N) May not be counted with MATH 1002 or 1012.</td>
<td>February, January (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001.</td>
<td>N) May not be counted with MATH 1003 or 1013.</td>
<td>July, January (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 1005 Statistics</td>
<td>3</td>
<td>A) HSC 2-unit Mathematics.</td>
<td>N) May not be counted with MATH 1905 or 1015.</td>
<td>July, January (short)</td>
<td></td>
</tr>
<tr>
<td>MECH 1350 Engineering Mechanics</td>
<td>8</td>
<td>N) CIVL1052 Statics MECH1501 Engineering Statics MECH1511 Introductory Dynamics MECH1510 Kinematics and Dynamics MECH1500 Mechanical Engineering 1.</td>
<td>July</td>
<td></td>
<td></td>
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<tr>
<td>MECH 1545 Introductory Professional Engineering</td>
<td>3</td>
<td>N) AERO 16 01 1 Aerospace Manufacturing MECH1500 Mechanical Engineering 1.</td>
<td>February</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECH 1820 Introduction to Computing Applications</td>
<td>6</td>
<td>N) MECH1800 Computational Engineering 1A MECH1801 Computational Engineering 1C INFO 1000 Information Technology Tools.</td>
<td>February</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 1401 Chemistry IE</td>
<td>6</td>
<td>P) Mathematics 2-unit course and a satisfactory knowledge of 2-unit Chemistry or the Chemistry component of the 3 or 4-unit Science HSC course.</td>
<td>N) CHEM 1101, CHEM 1102.</td>
<td>February, January (short)</td>
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</tr>
</tbody>
</table>

#### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2001 Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907).</td>
<td>N) May not be counted with MATH 2901.</td>
<td>February, January (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 2002 Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012.</td>
<td>N) May not be counted with MATH 2902.</td>
<td>February, January (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 2005 Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907).</td>
<td>N) May not be counted with MATH 2905.</td>
<td>July, January (short)</td>
<td></td>
</tr>
<tr>
<td>MATH 2052 Numerical Methods</td>
<td>2</td>
<td>C) MATH 2001 or 2901.</td>
<td>N) MATH 2952.</td>
<td>July</td>
<td></td>
</tr>
<tr>
<td>MECH 1600 Manufacturing Technology</td>
<td>4</td>
<td>N) AERO 1600 Workshop Technology.</td>
<td>July</td>
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</tr>
<tr>
<td>MECH 2201 Thermodynamics 1</td>
<td>4</td>
<td>N) MECH 2200 Thermofluids.</td>
<td>February</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECH 2300 Materials 1</td>
<td>4</td>
<td>N) CIVL 2101 Properties of Materials.</td>
<td>July</td>
<td></td>
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</tr>
<tr>
<td>MECH 2400 Mechanical Design 1</td>
<td>6</td>
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<td></td>
<td>July</td>
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</table>
### Table 11: Mechanical Engineering (Biomedical) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MECH 2500</strong> Engineering Dynamics 1</td>
<td>4</td>
<td>P) MATH 1001, MATH 1002 and MECH 1530 Engineering Mechanics or MECH 1510 Kinematics and Dynamics.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>MECH 2900</strong> Anatomy and Physiology for Engineers</td>
<td>4</td>
<td>P) Biology BIOL 1001 or some previous biology experience.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>

#### Third Year

| **AERO 2300** Mechanics of Solids 1 | 4             | P) 12 credit points of first year Maths (i.e Maths 1001,1002,1003,1005). |               |                                                                                | February|
| **MECH 3211** Fluid Mechanics 2    | 4             | P) AERO 2201 Fluid Mechanics 1 or MECH 2202 Fluids 1.             | N) AERO3250 Aerodynamics 2. |                                                                                | July    |
| **MECH 3300** Materials 2          | 4             | P) MECH 2300 Materials 1 and AERO 2300 Mechanics of Solids 1.     |               |                                                                                | July    |
| **MECH 3400** Mechanical Design 2A | 4             | P) MECH 2400 Mechanical Design 1.                                |               |                                                                                | February|
| **MECH 3410** Mechanical Design 2B | 4             | P) MECH 2400 Mechanical Design 1.                                |               |                                                                                | July    |
| **MECH 3500** Engineering Dynamics 2| 4             | P) MECH 2500 Engineering Dynamics 1 and (MATH 2001 & MATH 2005). |               |                                                                                | February|
| **MECH 3600** Manufacturing Engineering | 6             | P) MECH 1600 Manufacturing Technology.                           |               |                                                                                | February|
| **MECH 3620** Industrial Management | 5             |                                                                  |               |                                                                                | July    |
| **MECH 3800** Systems Control      | 4             | P) MATH 2001 and MATH 2005.                                      |               |                                                                                | July    |
| **MECH 3910** Biomedical Technology | 3             |                                                                  |               |                                                                                | February|
| **MECH 3920** Biomedical Design Project | 2             | N) MECH 3610 Team Project.                                       |               |                                                                                | July    |
| **ELEC 3801** Fundamentals of Biomedical Engineering | 4             | P) Advisory Prerequisite: ELEC2401 Introductory Electronics or ELEC2001 Electrical and Electronic Engineering or ELEC2003 Electrical and Electronic Engineering A. |               |                                                                                | February|

#### Fourth Year

| **MECH 4101** Thesis A              | 0             | P) 36 credit points of Third Year units of study.               |               |                                                                                | February, July|
| **MECH 4102** Thesis B              | 12            | P) MECH 4101 Thesis A (the Head of Department may allow Thesis A as corequisite in exceptional circumstances). |               |                                                                                | February, July|
| **MECH 4110** Professional Engineering | 4             | P) 36 credit points of Senior units of study.                  |               |                                                                                | February|
| **MECH 4112** Professional Communication | 4             | P) 32 credit points of third year units of study.              |               |                                                                                | July    |
| **MECH 4130** Practical Experience | 0             | P) 28 credit points of second year units of study.             |               |                                                                                | February, July|
| **MECH 4900** Orthopaedic Engineering | 4             | P) MECH 3300 Materials 2 and MECH 3310 Mechanics of Solids 2. |               |                                                                                | February|
| **MECH 4910** Biomechanics and Biomaterials | 4             | P) 36 credit points of third year units of study.              |               |                                                                                | July    |
### Table 11: Mechanical Engineering (Biomedical) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC Biomedical Engineering</td>
<td>4</td>
<td>A) ELEC3801</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>4801 Systems</td>
<td></td>
<td>Fundamentals of Biomedical Engineering.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes to Table 11**

1. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite and corequisite requirements will be as prescribed by that Faculty.
2. Candidates for the combined degree BE/BSc should enrol in MECH 2202 (2cp) instead of AERO 2201 (4cp) and should take an additional unit of study in mathematics MATH 2051 (2cp).

### Resolutions of the Faculty of Engineering relating to Table 11

Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Biomedical) and candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Biomedical) combined with Bachelor of Science are required to gain credit for all core units of study set out in Table 11. Additional credit necessary to satisfy Section 9 shall be gained by completing at least 12 credit points of elective units of study.

### Acceptable alternative units of study

Pursuant to Resolution 3, the Faculty has prescribed the following acceptable alternatives to core units of study listed in Table 11.

<table>
<thead>
<tr>
<th>Acceptable alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 1530 Engineering Mechanics</td>
</tr>
<tr>
<td>MECH 1820 Introduction to Computing</td>
</tr>
<tr>
<td>AERO 1801 Computer Engineering Applications</td>
</tr>
</tbody>
</table>

**Note**

Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced Level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced Levels should seek advice from their Department before enrolling.

### Resolutions of the Department of Mechanical and Mechatronic Engineering relating to Table 11

Note

Units of study not included in this table may also be selected subject to the approval of the Head of Department, Mechanical and Mechatronic Engineering.

### Recommended elective units of study

<p>| ENGG 4001 Innovation/International Competitiveness | 4 | February |
| MECH 4210 Computational Fluid Dynamics | 4 | P) MECH 3210 Fluid Mechanic. | July |
| MECH 4230 Environmental Acoustics &amp; Noise Control | 2 | P) 24 credit points of third year units of study. | February |
| MECH 4240 Energy and the Environment | 4 | P) 24 credit points of Senior units of study. | February |
| MECH 4610 Industrial Engineering and Management | 2 | P) MECH 3620 Industrial Management. | February |
| MECH 4620 Industrial Ergonomics | 2 | N) MECH 4605 Industrial Engineering. | February |
| AERO 4303 Aerospace Structures 3 | 6 | P) AERO 3350 Aircraft Structures 2 or AERO 3351 Aerospace Structures 2. | February |
| N) AERO 4301 Applied Numerical Stress Analysis. | | | |</p>
<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>C) Corequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCHM 2001 Genes and Proteins</td>
<td>8 Q) 6 credit points of Junior Chemistry which must include one of CHEM 1101, 1102, January 1901, 1902, 1903, 1904 or, with the permission of the Head of Department, exceptional performance in CHEM 1001 or 1002. N) May not be counted with AGCH 2001 or BCHM 2101 or 2901.</td>
<td></td>
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<tr>
<td>MICR 2001 Introductory Microbiology</td>
<td>8 Q) Pass average in 12 credit points of first year Biology. P) 6 credit points of first year Chemistry. N) May not be counted with MICR 2003 or 2901.</td>
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</tbody>
</table>
Table 12: Aeronautical Engineering (Space Engineering)

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Workshop Technology AERO 1600</td>
<td>4</td>
<td>N) MECH 1600</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Introduction to Aerospace Engineering AERO 1701</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Foundations of Electronic Circuits ELEC 1102</td>
<td>6</td>
<td>A) HSC Physics 2 unit.</td>
<td></td>
<td></td>
<td>P) Advisory Prerequisite: MATH1001</td>
<td>July</td>
</tr>
<tr>
<td>Differential Calculus MATH 1001</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td>N) May not be counted with MATH 1901 or 1011.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>Linear Algebra MATH 1002</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics.</td>
<td>N) May not be counted with MATH 1902 or 1012.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>Integral Calculus and Modelling MATH 1003</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001.</td>
<td>N) May not be counted with MATH 1903 or 1013.</td>
<td></td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td>Engineering Mechanics MECH 1530</td>
<td>8</td>
<td>N) CIVL1052 Statics MECH1501 Engineering Statics MECH1511 Introductory Dynamics MECH1510 Kinematics and Dynamics MECH1500 Mechanical Engineering 1.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Introduction to Computing MECH 1520</td>
<td>6</td>
<td>N) MECH1800 Computational Engineering 1A MECH1801 Computational Engineering 1C INFO 1000 Information Technology Tools.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>Second Year</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanics of Solids 1 AERO 2300</td>
<td>4</td>
<td>P) 12 credit points of first year Maths (i.e Maths 1001,1002,1003,1005).</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Space Engineering 1 AERO 2701</td>
<td>8</td>
<td>N) AERO2201 Fluid Mechanics 1 AERO2500 Introductory Flight Mechanics and Performance.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Vector Calculus and Complex Variables MATH 2001</td>
<td>4</td>
<td>P) MATH (1001 or 1901or 1906) and (1002 or 1902) and (1003 or 1903 or 1907).</td>
<td>N) May not be counted with MATH 2901.</td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>Fourier Series &amp; Differential Equations MATH 2005</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907).</td>
<td>N) May not be counted with MATH 2905.</td>
<td></td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td>Thermodynamics 1 MECH 2201</td>
<td>4</td>
<td>N) MECH 2200 Thermofluids.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>Materials 1 MECH 2300</td>
<td>_</td>
<td>N) CIVL 2101 Properties of Materials.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Mechanical Design 1 MECH 2400</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>Engineering Dynamics 1 MECH 2500</td>
<td>4</td>
<td>P) MATH 1001 MATH 1002 and MECH 1530 Engineering Mechanics or MECH 1510 Kinematics and Dynamics.</td>
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<td>July</td>
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<tr>
<td><strong>Third Year</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Aerospace Structures 1 AERO 3301</td>
<td>4</td>
<td>P) AERO 2300 Mechanics of Solids 1.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
</tbody>
</table>
Table 12: Aeronautical Engineering (Space Engineering) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>Q) Qualifying</th>
<th>N) Prohibition</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 3401 Aerospace Design</td>
<td>4</td>
<td>P) MECH 2400 Mechanical Design 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
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<tr>
<td></td>
<td></td>
<td>N) AERO 3400 Aircraft Design 1.</td>
<td></td>
<td></td>
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<tr>
<td>AERO 3700 Space Engineering 2</td>
<td>8</td>
<td>P) AERO 2701 Space Engineering 1.</td>
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<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>MECH 3201 Thermodynamics 2</td>
<td>4</td>
<td>P) MECH 2200 Thermofluids or MECH 2201 Thermodynamics 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
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<tr>
<td></td>
<td></td>
<td>N) MECH 3200 Thermal Engineering 1.</td>
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<tr>
<td>MECH 3500 Engineering Dynamics 2</td>
<td>4</td>
<td>P) MECH 2500 Engineering Dynamics 1 and (MATH 2001 &amp; MATH 2005).</td>
<td></td>
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<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3102 Engineering Electromagnetics</td>
<td>4</td>
<td>P) Advisory Prerequisites: PHYS2203 Physics2EE and ELEC2101 Circuit Analysis.</td>
<td></td>
<td></td>
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<td></td>
<td>February</td>
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<tr>
<td>ELEC 3401 Electronic Devices and Circuits</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC2401 Introductory Electronics and ELEC2101 Circuit Analysis.</td>
<td></td>
<td></td>
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<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 3402 Communications Electronics</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC 3401 Electronic Devices and Circuits.</td>
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■ Fourth Year

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<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>Q) Qualifying</th>
<th>N) Prohibition</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 4201 Propulsion</td>
<td>4</td>
<td>P) MECH 3201 Thermodynamics 2.</td>
<td></td>
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<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4303 Aerospace Structures 3</td>
<td>6</td>
<td>P) AERO 3350 Aircraft Structures 2 or AERO 3351 Aerospace Structures 2.</td>
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<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N) AERO 4301 Applied Numerical Stress Analysis.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AERO 4400 Aircraft Design 3</td>
<td>6</td>
<td>P) AERO 3450 Aircraft Design 2 AERO 3401 Aerospace Design.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 4500 Flight Mechanics 2</td>
<td>6</td>
<td>P) AERO 3500 Flight Mechanics 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 4600 Practical Experience</td>
<td>0</td>
<td>P) 40 credit points of 3rd year UOS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4700 Space Engineering 3</td>
<td>4</td>
<td>P) AERO 3700 Space Engineering 2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 4950 Thesis Preparation</td>
<td>2</td>
<td>P) 40 credit points of 3rd year UOS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>February, July</td>
</tr>
<tr>
<td>AERO 4900 Thesis or Design Project</td>
<td>10</td>
<td>P) 40 Credit Points of 3rd Year UOS AERO 4950 Thesis Preparation.</td>
<td></td>
<td></td>
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<td></td>
<td>February, July</td>
</tr>
<tr>
<td>AERO 4920 Seminar</td>
<td>2</td>
<td>P) 40 credit points of 3rd Year UOS.</td>
<td></td>
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<td></td>
<td>July</td>
</tr>
</tbody>
</table>

Notes
1. MATH 1005 Statistics is an acceptable alternative to MATH 1004.

Resolutions of the Faculty of Engineering relating to Table 12

■ Degree eligibility
BE(Aeronautical)(Space Engineering)
In addition to gaining credit for the 160 credit points of core units of study set out in Table 3, candidates are required to complete at least 32 credit points of elective units of study from Table 2, recommended elective units of study for BE (Aeronautical) (Space Engineering). A minimum of 192 credit points is required to be eligible for the award of the degree of BE (Aeronautical) (Space Engineering).

Acceptable alternative units of study
Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent Advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced options should seek advice from their Department before enrolling.

Students undertaking Study Abroad in their final year of the degree must enrol in the AERO 4620 Aeronautical International Exchange Program unit of study as an alternative to a semester's standard units.
### Table 12: Aeronautical Engineering (Space Engineering) - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>C) Corequisite</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>PHYS 1500</td>
<td>6</td>
<td>A) No assumed knowledge of Physics.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>Second Year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 2002</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012. N) May not be counted with MATH 2902.</td>
<td></td>
<td></td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>MATH 2052</td>
<td>2</td>
<td>C) MATH 2001 or 2901. N) MATH 2952.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>Third Year</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>AERO 3200</td>
<td>4</td>
<td>P) AERO 2201 Fluid Mechanics 1.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 3501</td>
<td>2</td>
<td>P) AERO 2500 Introductory Flight Mechanics and Performance; AERO 2201 Fluid Mechanics 1.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 3602</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>Fourth Year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO 4250</td>
<td>3</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4390</td>
<td>4</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>AERO 4391</td>
<td>3</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4292</td>
<td>3</td>
<td>P) AERO 3250 Aerodynamics 2.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4351</td>
<td>3</td>
<td>P) AERO 3351 Aerospace Structures 2, AERO 3350 Aircraft Structures 2.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4390</td>
<td>3</td>
<td>P) AERO 3351 Aerospace Structures 2, AERO 3350 Aircraft Structures 2.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4490</td>
<td>4</td>
<td>P) AERO 3450 Aircraft Design 2, AERO 3401 Aerospace Design.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>AERO 4590</td>
<td>3</td>
<td>P) AERO 3500 Flight Mechanics 1.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td>ELEC 4502</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC 3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td>ELEC 5502</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC 3502 Random Signals and Communications, ELEC 3503 Introduction to Digital Communications and ELEC 4502 Digital Communication Systems.</td>
<td></td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Notes**

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Approved elective units of study given by Departments other than the School of Aerospace, Mechanical and Mechatronic Engineering may be taken as alternatives, subject to the approval of the head of school.
Table 13: Advanced Engineering and Faculty-wide elective subjects

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>N) Prohibition</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG 1001</td>
<td>12</td>
<td>P) UAI score of at least 98. Students considering this option are advised to see their Head of Department. N) Mutually exclusive with a number of other first year units of study. As these will vary depending on the branch of Engineering, students considering this option are advised to see their Head of Department prior to enrolment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 1002</td>
<td>2</td>
<td>P) Only students who have been named on the Dean's list at the end of Year 1 will be eligible.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 2002</td>
<td>2</td>
<td>P) Only students who have been named on the Dean's list at the end of Year 1 will be eligible.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 2003</td>
<td>4</td>
<td>N) ELEC3701, MECH3620.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 2006</td>
<td>2</td>
<td>P) ENGG 1002.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 3001</td>
<td>2</td>
<td>P) Only students who have been named on the Dean's list at the end of Year 2 will be eligible.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 3002</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 4002</td>
<td>4</td>
<td></td>
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</tr>
<tr>
<td>ENGG 4003</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG 4004</td>
<td>12</td>
<td>P) Only students on the Dean's List at the end of Year 3 will be invited to join this interdisciplinary group. N) AERO4900, AERO4950, CHNG4201, CHNG4202, CIVL4013, CIVL4014, ELEC4703,MECH4102.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note

These units of study are elective units of study available in any discipline of engineering.
### Core units of study

Candidates for the degree of Bachelor of Engineering in Electronic Commerce are required to gain credit for the core units of study set out below. Any additional credit necessary to satisfy Section 9 shall be gained by completing additional elective units of study recommended or approved by the Faculty.

#### First year

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACCT 1003</strong> Financial Accounting Concepts</td>
<td>6</td>
<td>N) Terminating unit. Cannot be counted with ACCT1001 and ACCT1002.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>ACCT 1004</strong> Management Accounting Concepts</td>
<td>6</td>
<td>N) Terminating unit. Cannot be counted with ACCT1001 and ACCT1002.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>COMP 1001</strong> Introductory Programming</td>
<td>6</td>
<td>A) HSC 3-unit Mathematics. C) Students intending to major in Computer Science are advised to enrol in MATH 1003 and 1004 or 1005 or 1903 and 1904 or 1905 in their first year. N) May not be counted with COMP 1901.</td>
<td></td>
<td></td>
<td>February, January</td>
</tr>
<tr>
<td><strong>COMP 1002</strong> Introductory Computer Science</td>
<td>6</td>
<td>P) COMP 1001 or 1901. N) May not be counted with COMP 1902.</td>
<td></td>
<td></td>
<td>February, July, January</td>
</tr>
<tr>
<td><strong>ELEC 1101</strong> Foundations of Computer Systems</td>
<td>6</td>
<td>A) HSC Maths 3 unit.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>MATH 1001</strong> Differential Calculus</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics. N) May not be counted with MATH 1901 or 1011.</td>
<td></td>
<td></td>
<td>February, January</td>
</tr>
<tr>
<td><strong>MATH 1002</strong> Linear Algebra</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics. N) May not be counted with MATH 1902 or 1012.</td>
<td></td>
<td></td>
<td>February, January</td>
</tr>
<tr>
<td><strong>MATH 1003</strong> Integral Calculus and Modelling</td>
<td>3</td>
<td>A) HSC 4-unit Mathematics or MATH 1001. N) May not be counted with MATH 1903 or 1913.</td>
<td></td>
<td></td>
<td>July, January</td>
</tr>
<tr>
<td><strong>MATH 1004</strong> Discrete Mathematics</td>
<td>3</td>
<td>A) HSC 3-unit Mathematics. N) May not be counted with MATH 1904.</td>
<td></td>
<td></td>
<td>July, January</td>
</tr>
</tbody>
</table>

#### Second year

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLAW 2006</strong> Legal Issues for eCommerce</td>
<td>8</td>
<td>P) 48 credit points at level 1000.</td>
<td></td>
<td></td>
<td>February, July</td>
</tr>
<tr>
<td><strong>COMP 2002</strong> Design and Data Structures</td>
<td>4</td>
<td>Q) COMP 1002 or 1902. N) May not be counted with COMP 2902. NB: See prerequisites for Senior Computer Science units of study. Consult Departmental Handbook.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>ELEC 2301</strong> Signals and Systems</td>
<td>4</td>
<td>P) Advisory Prerequisite: MATH1001 Differential Calculus, and MATH1002 Linear Algebra, and MATH1003 Integral Calculus and Modelling, and MATH1004 Discrete Mathematics, N) MATH3019 Signal Processing and MATH3909 Signal Processing (Adv).</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>ELEC 2601</strong> Microcomputer Systems</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC1101 Foundations of Computer Systems, N) ELEC2001 Electrical and Electronic Engineering and ELEC2003 Electrical Electronic Engineering A.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>INFO 2000</strong> System Analysis and Design</td>
<td>4</td>
<td>Q) INFO 1000 or COMP 1003 or 1001 or 1901 or COMP 1002 or 1902. N) May not be counted with COMP 2000.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>MATH 2001</strong> Vector Calculus and Complex Variables</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and (1002 or 1902) and (1003 or 1903 or 1907). N) May not be counted with MATH 2901.</td>
<td></td>
<td></td>
<td>February, January</td>
</tr>
</tbody>
</table>
### Table 14: Electronic Commerce - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATH 2002</strong> Matrix Applications</td>
<td>4</td>
<td>P) MATH 1002 or 1902 or Distinction in MATH 1012.</td>
<td>N) May not be counted with MATH 2902.</td>
<td>February, January (short)</td>
<td></td>
</tr>
<tr>
<td><strong>MATH 2005</strong> Fourier Series &amp; Differential Equations</td>
<td>4</td>
<td>P) MATH (1001 or 1901 or 1906) and MATH (1002 or 1902) and MATH (1003 or 1903 or 1907).</td>
<td>N) May not be counted with MATH 2905.</td>
<td>July, January (short)</td>
<td></td>
</tr>
<tr>
<td><strong>MKTG 2001</strong> Marketing Principles</td>
<td>8</td>
<td>P) ECON1001, ECON1002, ECMT1010 and ECMT1020.</td>
<td>C) ACCT1001 or ACCT1003.</td>
<td>February, January (short)</td>
<td></td>
</tr>
<tr>
<td>■ Third year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACCT 3006</strong> eCommerce Business Models</td>
<td>8</td>
<td>A) INFO1010.</td>
<td>Q) COMP 2004 or 2904.</td>
<td>July</td>
<td></td>
</tr>
<tr>
<td><strong>COMP 3009</strong> Operating Systems</td>
<td>4</td>
<td>P) COMP 2001 or 2901 or ELEC 2601.</td>
<td>N) May not be counted with COMP 3909.</td>
<td>February</td>
<td></td>
</tr>
<tr>
<td><strong>EBUS 3001</strong> Introduction to Electronic Commerce Systems</td>
<td></td>
<td></td>
<td></td>
<td>Not offered in 2001.</td>
<td></td>
</tr>
<tr>
<td><strong>EBUS 3002</strong> Introduction to Electronic Commerce Technology</td>
<td></td>
<td></td>
<td></td>
<td>Not offered in 2001.</td>
<td></td>
</tr>
<tr>
<td><strong>ELEC 3502</strong> Random Signals and Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td>February</td>
<td></td>
</tr>
<tr>
<td><strong>ELEC 3503</strong> Introduction to Digital Communications</td>
<td>4</td>
<td>P) Advisory Prerequisite: ELEC2301 Signals and Systems.</td>
<td></td>
<td>July</td>
<td></td>
</tr>
<tr>
<td>■ Fourth year</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>ELEC 4501</strong> Data Communication Networks</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC 3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td>February</td>
<td></td>
</tr>
<tr>
<td><strong>ELEC 4702</strong> Practical Experience</td>
<td>0</td>
<td></td>
<td></td>
<td>February</td>
<td></td>
</tr>
<tr>
<td><strong>ELEC 4703</strong> Thesis</td>
<td>12</td>
<td>P) A minimum of 3 6 credit points from third and fourth year units of study.</td>
<td></td>
<td>July</td>
<td></td>
</tr>
</tbody>
</table>

### Notes to Table 14
1. For units of study offered by a faculty other than the Faculty of Engineering, any assumed knowledge and prerequisites will be as prescribed by that faculty.
2. Some of the units of study shown will not be available until after 2001 and are not listed in the Engineering handbook. For a description of these units of study, see the web pages of the School of Electrical and Information Engineering.

### Resolutions of the Faculty of Engineering relating to Table 14

**BE(Electronic Commerce)**

In addition to gaining credit for the 162 credit points of core units of study set out in Table 14, candidates are required to complete at least 18 credit points of units of study from the table of recommended elective units of study for BE (Electronic Commerce), of which at least 6 credit points are to be from Group A and at least 12 credit points from Group B. Further credit for a total of not less than 192 credit points shall be gained by completing additional elective units of study approved by the Faculty.
### Table 14: Electronic Commerce - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BE(Electronic Commerce)/BCom</strong></td>
<td></td>
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</tr>
<tr>
<td>Candidates are required to gain credit for the</td>
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<tr>
<td>150 credit points comprising all of the units of</td>
<td></td>
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</tr>
<tr>
<td>study in Table 14 except for ACCT 1003 and</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ACCT 1004. Candidates must also complete at least</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10 credit points of units of study from Group B</td>
<td></td>
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</tr>
<tr>
<td>of the table of recommended elective units of</td>
<td></td>
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</tr>
<tr>
<td>study for BE (Electronic Commerce). Candidates</td>
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<tr>
<td>are also required to complete at least 100</td>
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<tr>
<td>credit points of units of study in the Faculty of</td>
<td></td>
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</tr>
<tr>
<td>Economics and Business (listed in Table A for</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>the Bachelor of Commerce degree). The Computer</td>
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</tr>
<tr>
<td>Science units of study in Table 14 may be counted,</td>
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<tr>
<td>to a maximum of 20 credit points, in the</td>
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<tr>
<td>100 credit points. They may also be used to</td>
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<tr>
<td>satisfy the requirement for a minor (or second</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>major) for the Bachelor of Commerce. No</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>other unit of study used to satisfy the</td>
<td></td>
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</tr>
<tr>
<td>requirements described in the previous paragraph</td>
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<tr>
<td>may be counted in the 100 credit points or used</td>
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<tr>
<td>to satisfy a minor or major. Candidates</td>
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<tr>
<td>should refer to the Joint Resolutions of the</td>
<td></td>
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</tr>
<tr>
<td>Faculty of Engineering and the Faculty of</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Economics and Business for additional information.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Acceptable alternative units of study

Most Mathematics, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met.

### Recommended elective units of study

#### Group A

<table>
<thead>
<tr>
<th>ECMT 1011</th>
<th>Econometrics 1A Stream 1</th>
<th>6</th>
<th>A) 4 unit Maths.</th>
<th>N) MATH 1005, MATH 1905.</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECMT 1021</td>
<td>Econometrics 1B Stream 1</td>
<td>6</td>
<td>A) 4 unit Maths.</td>
<td>C) ECMT 1011.</td>
<td>N) MATH 1005, MATH 1905.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N) Other than in exceptional circumstances, it is strongly recommended that students do not undertake Econometrics 1B before attempting 1A.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECON 1001</td>
<td>Introductory Microeconomics</td>
<td>6</td>
<td>A) HSC 2 unit Mathematics.</td>
<td></td>
<td>February, January (short)</td>
</tr>
<tr>
<td>ECON 1002</td>
<td>Introductory Macroeconomics</td>
<td>6</td>
<td>A) HSC 2 unit Mathematics.</td>
<td></td>
<td>July, January (short)</td>
</tr>
<tr>
<td>ACCT 3005</td>
<td>IT Assurance and Control</td>
<td>8</td>
<td>A) INFO 1000.</td>
<td>P) ACCT2003.</td>
<td>February</td>
</tr>
</tbody>
</table>

#### Group B

| PHYS 1001  | Physics 1 (Regular) | 6 | A) HSC Physics or HSC 4-unit Science. | C) Recommended concurrent units of study: MATH 1001 and 1002 or 1901 and 1902. | N) May not be counted with PHYS 1002 or 1901. | February |
| PHYS 1003  | Physics 1 (Technological) | 6 | A) HSC 2-unit Physics or HSC 4-unit Science or PHYS 1001 or 1002 or 1901 or 1902 or equivalent. | C) For Science students: Recommended concurrent units MATH 1003 and 1005 or 1903 and 1905. | N) For Science students: May not be counted with PHYS 1004 or 1902. | February, July |
| COMP 3001  | Algorithms | 4 | Q) COMP 2002 or 2902. | P) MATH 1004 or 1904 and 8 credit points in Intermediate Mathematics and/or Statistics and/or Econometrics. | N) May not be counted with COMP 3901. | July |
| ELEC 3701  | Management for Engineers | 4 | P) Advisory Prerequisite: Nil. |               |               | February |
| MATH 3024  | Elementary Cryptography and Protocols | 4 | P) 12 credit points of Intermediate Mathematics. Strongly advise MATH 2008 or 2908. |               |               | February |
| MATH 3925  | Public Key Cryptography (Advanced) | 4 | P) 12 credit points from Intermediate or senior mathematics. Strongly recommend MATH 3902. |               |               | July |
# Table 14: Electronic Commerce - continued

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A) Assumed Knowledge</th>
<th>Q) Qualifying</th>
<th>P) Prerequisite</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEC 4502</strong> Digital Communication Systems</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>ELEC 4604</strong> Engineering Software Requirements</td>
<td>4</td>
<td>P) Advisory Prerequisite: COMP3100 Algorithms, COMP3205 Product Development Project, ELEC3601 Digital Systems Design and ELEC3701 Management for Engineers.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>ELEC 4704</strong> Software Project Management</td>
<td>4</td>
<td>P) Advisory Prerequisites: COMP3100 Algorithms, COMP3205 Product Development Project and ELEC3701 Management for Engineers.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>EBUS 5004</strong> The Impacts and Challenges of Electronic Commerce</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not offered in 2001.</td>
</tr>
<tr>
<td><strong>ELEC 5501</strong> Communication Networks (Advanced)</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, ELEC3503 Introduction to Digital Communications and ELEC 4501 Data Communication Networks.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td><strong>ELEC 5504</strong> Cellular Radio Engineering</td>
<td>4</td>
<td>P) Advisory Prerequisites: ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>February</td>
</tr>
<tr>
<td><strong>ELEC 5505</strong> Advanced Digital Transmissions</td>
<td>4</td>
<td>A) ELEC3502 Random Signals and Communications, and ELEC3503 Introduction to Digital Communications.</td>
<td></td>
<td></td>
<td>July</td>
</tr>
</tbody>
</table>

**Notes**

1. For units of study offered by a faculty other than the Faculty of Engineering, any assumed knowledge and prerequisites will be as prescribed by that faculty.
2. The units of study in this table may not all be available every year.
3. Some of the units of study shown will not be available until after 2001 and are not listed in the Engineering handbook. For a description of these units of study, see the web pages of the School of Electrical and Information Engineering.
CHAPTER 4

Regulations

Undergraduate degree requirements

Bachelor of Engineering:
Resolutions of the Senate

1. Specialisations
(1) The degree of Bachelor of Engineering shall be awarded in the following specialisations:
(i) Aeronautical Engineering (including Space and Management)
(ii) Chemical Engineering (including Bio Process, Environmental and Energy, Process and Computer Systems and Management)
(iii) Civil Engineering (including Environmental, Geotechnical, Structural engineering; Construction Management)
(iv) Computer Engineering
(v) Electrical Engineering (including Management)
(vi) Mechanical Engineering (including Management)
(vii) Mechanical Engineering (Mechatronics) (including Management)
(viii) Mechanical (Biomedical) Engineering
(ix) Project Engineering and Management (Civil)
(x) Software Engineering
(xi) Telecommunications Engineering
(xii) Commerce
(2) (i) Each specialisation may, with the permission of the Faculty, be undertaken as part of a combined degree program with the Bachelor of Commerce (BCom), Bachelor of Arts (BA), Bachelor of Science (BSc) Bachelor of Medical Science (B MedSc)
(ii) Resolutions governing the combined degree programs are set out in the Joint Resolutions of the Faculty of Engineering and the Faculties of Science, Economics and Arts.
(3) The testamur for the degree of Bachelor of Engineering shall specify the specialisation for which it is awarded.
(4) (i) Graduates in Engineering in any specialisation may be admitted to the program for another specialisation on conditions to be determined by the Faculty.
(ii) Upon satisfactory completion of the program, the candidate shall receive a certificate relating to the additional specialisation.
(5) A candidate for the BE degree in any specialisation may apply to the Faculty for permission to transfer candidature to any other specialisation.

2. Definitions
For the purposes of these resolutions:
(1) A ‘unit of study’ shall comprise such lectures, tutorial instruction, essays, exercises and practical work as the Faculty may prescribe.
(2) To complete a unit of study means:
(i) to attend the lectures and any tutorials; and
(ii) to complete satisfactorily any essays, exercises and practical work and to pass any final examination; prescribed for that unit of study.
(3) ‘Core’ unit of study means a unit of study which must be completed in order to qualify for the award of the degree, unless exemption is granted by the Faculty.
(4) ‘Elective’ unit of study means a unit of study other than a core unit of study.
(5) ‘Prerequisite’ means a unit of study which must be completed before enrolment in any unit of study for which that unit of study has been prescribed as a prerequisite.
(6) ‘Corequisite’ means a unit of study in which, unless previously completed, a candidate must enrol concurrently with any unit of study for which that unit of study has been prescribed as a corequisite.

3. Units of Study
(1) The units of study for the degree shall each have a credit point value.
(2) The units of study which may be taken for the degree are:
(i) the units of study set out in the tables appended to these resolutions; and
(ii) such other units of study as are approved by the Faculty.
(3) The Faculty may prescribe units of study as acceptable alternatives to one or more of the units of study set out in the tables appended to these resolutions.
(4) The head of the department concerned may accept other work completed by a candidate as the equivalent of a corequisite or prerequisite for any unit of study provided by that Department.
(5) A candidate may only enrol in units of study in accordance with these resolutions and subject to the constraints of the timetable, unless approval is given by the head of department.

4. Credit
A candidate who has completed a unit of study shall be credited with the credit point value of that unit of study except that:
(a) a candidate may not receive credit for more than one of such units of study as the Faculty may deem to be mutually exclusive; and
(b) a candidate may not receive credit for units of study which are deemed to be mutually exclusive with units of study credited toward the Bachelor of Science degree when enrolled in the Faculty of Science under Section 14 of the Resolutions of the Senate relating to the degree of Bachelor of Science.

5. Final Examination
(1) A final examination shall be prescribed for each unit of study.
(2) The final examination may consist of such written and/or oral examination(s), exercises, essays or practical work or any combination of these as the Faculty may determine.
(3) A candidate who has been prevented by duly certified illness or misadventure from sitting for the whole or part of the final examination may be tested at such times and in such a way as the Faculty shall determine. This shall not be regarded as a re-examination.

6. Conditions of Enrolment
(1) Except with the permission of the Faculty, a candidate in the first year of attendance shall enrol in First Year units of study with a total of not less than 48 credit points and not more than 54 credit points.
(2) In each subsequent year of attendance after the first, a candidate may enrol in any of the units of study for which there is no prerequisite or for which the candidate has completed the prerequisites provided that:
(i) in the second year of attendance the candidate may enrol in First Year and/or Second Year units of study only;
(ii) the candidate shall enrol in any core units of study for which he/she was qualified to enrol in the previous year of attendance and for which credit has not yet been gained, and for which the candidate has not been granted exemption under subsection 7(2);
(iii) except with Faculty approval, the candidate shall not enrol for units of study totalling more than 60 credit points, nor enrol for units of study totalling less than 36 credit points, unless the candidate already has credit for 156 or more credit points.
7. Conditions for Advanced Standing and Credit

(1) Graduates of other faculties of the University of Sydney, or graduates of other universities, who desire to proceed to the degree of Bachelor of Engineering may apply for permission to enrol as candidates for the degree of Bachelor of Engineering. If granted such permission, they may be given credit for any of the units of study set out in the appended tables as the Faculty may determine, up to a maximum of 96 credit points, provided they have completed as part of their previous degree units of study considered by the Faculty to be equivalent.

(2) Students who have completed units of study in other faculties of the University of Sydney may apply for permission to enrol as candidates for the degree of Bachelor of Engineering. If granted such permission, they may be given credit for any of the units of study set out in the appended tables which have been completed in the other faculties, or for any units of study considered by the Faculty to be equivalent, provided they have abandoned the credit for such units of study in the other faculties.

(3) Students who have completed units of study in another university or institution may apply for permission to enrol as candidates for the degree of Bachelor of Engineering. If granted such permission, they may be given credit for, or exempted from, such of the units of study set out in the appended tables as the Faculty may determine.

(4) With regard to each of the previous subsections, where an applicant for candidature has completed units of study which are not comparable with any of the units of study set out in the tables appended to these resolutions, the Faculty may grant non-specific credit points. Such credit points will be designated by the Faculty as First Year, Second Year, Third Year or Fourth Year.

8. Levels of Award

(1) The degree of Bachelor of Engineering shall be awarded in two grades, namely, the Pass degree and the Honours degree.

(2) (i) There shall be three classes of Honours, namely, Class I, Class II and Class III.
(ii) Second Class Honours may be awarded in two divisions, namely Division I and Division II.

(3) If a candidate qualifies for the award of the degree with First Class Honours and the Faculty is of the opinion that the candidate's work is of outstanding merit, that candidate shall receive a University Medal.

9. Requirements for the Pass Degree

(1) To qualify for the award of a Pass degree a candidate shall, unless granted exemption by the Faculty under subsection (2) of this resolution:
(i) satisfy the requirements prescribed in those tables appended to these resolutions pertaining to the specialisation which the candidate is pursuing, and
(ii) complete additional elective units of study as may be necessary to gain credit for a total of not less than 192 credit points.

(2) In special circumstances, the Faculty may exempt a candidate from completion of any core unit of study. No credit shall be granted for any such exempted unit of study.

(3) A candidate who, with the prior permission of the Faculty, completes units of study at another university or appropriate institution may be given credit for such of the units of study set out in the tables attached to these resolutions as the Faculty may determine.

10. Honours and Prizes

(1) To qualify for the award of an Honours BE degree a candidate shall:
(i) complete the Pass degree requirements;
(ii) complete such Honours units of study as may be determined by the head of the department in which the candidate is pursuing the degree; and
(iii) attain a level of performance acceptable to the head of department.

(2) The Faculty may prescribe any Third Year or Fourth Year of study as being an Honours unit of study.

(3) Where an Honours unit of study and a core unit of study are deemed by the Faculty to be mutually exclusive, completion of the Honours unit of study will be taken as satisfying the core unit of study.

(4) Except with the permission of the Faculty, a candidate shall not be eligible for the award of an Honours degree unless the candidate has completed all the requirements in minimum time, namely, four years for the BE degree and five years for the combined BE/BSc, BE/Bcom, BE/BA or BE/BMedSc degrees.

(5) A candidate for an Honours degree who has failed to be placed in any Honours classification may be awarded a Pass degree.

(6) A candidate who has previously failed any unit of study shall not be eligible for any prize or scholarship awarded in connection with that unit of study.

11. Transitional Arrangements

The provisions of these resolutions came into force on 1 January 1998. All candidates who commenced candidature prior to this date shall complete the degree requirements under such conditions as the Faculty may determine.

Combined degrees of Bachelor of Engineering with Bachelor of Science, Commerce or Arts:

Resolutions of the Faculty

Minimum and maximum completion times
1. That the minimum time for completion of the BE degree shall be two years and the maximum shall be eight years.

Joint resolutions of the Faculties of Engineering and Arts (BE/BA)
1. Candidature for this combined degree program is a minimum of 5 years of full-time study.
2. Candidates qualify for the award of the two degrees of the combined program (a separate testamur being awarded for both the BE and the BA) by completing the following:
   (a) The units of study prescribed for the BE specialisation undertaken (totalling 160-162 credit points, depending on the specialisation). These units of study are set out in the tables appended to the Senate Resolutions relating to the BE degree.
   (b) BA units of study totalling at least 80 credit points, of which at least 56 must be Second or Third Year credit points from Part A of the Table of Units of Study for the BA degree, including a major as defined in the resolutions relating to the BA degree.
3. Candidates may not enrol in any unit of study which is substantially the same as one they have already passed (or in which they are currently enrolled).
4. Candidates will be under the general supervision of the Faculty of Engineering. General supervision covers all
areas of policy and procedures affecting candidates, such as combined degree program rules and enrolment procedures. Candidates will be under the supervision of the Faculty of Arts regarding enrolment and progression within the BA component of the combined degree program, as defined in subsection 2(b).
5. Candidates may qualify for the award of the BE degree with Honours.
6. Candidates who complete the combined degree program may qualify for admission to an honours year in the Faculty of Arts.
7. Candidates who abandon the combined degree program may elect to complete the BE degree or BA degree in accordance with the appropriate Senate Resolutions.
8. The Deans of the Faculties of Engineering and Arts shall jointly exercise authority in any matter concerning this combined degree program not otherwise dealt with in the Senate Resolutions or these joint resolutions.

Joint Resolutions of the Faculties of Engineering and Economics and Business (BE/BCom)
1. Candidate for this combined degree program is a minimum of 5 years of full-time study.
2. Candidates qualify for the two degrees of the combined program (a separate testamur being awarded for both the BE and BCom) by completing the following:
   (a) The units of study prescribed for the BE specialization. These units of study are set out in the tables appended to the Senate Resolutions relating to the BE degree.
   (b) Units of study in the Faculty of Economics and Business (listed in Table A for the Bachelor of Commerce degree) worth at least 100 credit points including:
      (i) 12 credit points in Accounting;
      (ii) 12 credit points in Economics or Political Economy;
      (iii) 12 credit points in Econometrics;
      (iv) no more than 48 credit points at first-year level; and
      (v) a major in each of two subject areas as given in Table A, or one major and one minor from subjects listed in Table A.

Note that a major is a sequence of 44 credit points as described for each subject in Table A; a minor in a subject comprises a sequence of not less than 28 credit points, including 12 credit points in the subject at first-year level and 16 credit points from later year units of study required to complete a major in that subject.
(c) No unit of study taken to satisfy the requirements for the BE degree may be counted in the 100 credit points in the Faculty of Economics nor be used to satisfy a minor or major except that:
   (i) Computer Science units of study may be counted, to a maximum of 20 credit points, in the 100 credit points. They may also be used to satisfy the requirement for a minor (or second major) for the Bachelor of Commerce.
   (ii) Eight credit points of second year Statistics units of study, as prescribed by the Faculty of Economics, may be counted in the 100 credit points and may be used in place of first-year level Econometrics to satisfy the requirements for a major or minor.
3. Candidates may not enrol in any unit of study which is substantially the same as one they have already passed (or in which they are currently enrolled).
4. Candidates will be under the general supervision of the Faculty of Engineering. General supervision covers all areas of policy and procedures affecting candidates, such as combined degree program rules and enrolment procedures. Candidates will be under the supervision of the Faculty of Economics regarding enrolment and progression within the BCom component of the combined degree program, as defined in subsection 2(b).
5. Candidates may qualify for the award of the BE degree with Honours.
6. Candidates who complete the combined degree program may qualify for admission to an honours year in the Faculty of Economics and Business.
7. Candidates who abandon the combined degree program may elect to complete the BE degree or the BCom degree in accordance with the appropriate Senate Resolutions.
8. The Deans of the Faculties of Engineering and Economics shall jointly exercise authority in any matter concerning this combined degree program not otherwise dealt with in the Senate Resolutions or these joint resolutions.

Previous joint resolution
The previous joint resolutions, which apply to those entering the combined degree as second year students up to and including 1998, appear in Volume 1 of the 1996 Calendar.

Joint resolutions of the Faculties of Engineering and Science (BE/BSc)
1. Candidature for this combined degree program is a minimum of 5 years of full-time study.
2. Candidates qualify for the two degrees of the combined program (a separate testamur being awarded for both the BE and the BSc) by completing at least 240 credit points which must include the following:
   (a) At least 160 credit points from the units of study prescribed for the BE specialisation undertaken. These units of study are set out in the tables appended to the Senate Resolutions relating to the BE degree.
   (b) At least 80 credit points from units of study listed in Table 1 for the BSc degree other than those in the Science discipline area of Engineering Science, 32 of which must be from Second Year units of study and 24 of which must be from Third Year units of study in one Science discipline area.
   (c) The same unit of study cannot be used to satisfy the requirements of (a) and (b) above.
3. (a) Candidates may not enrol in any unit of study which is substantially the same as one they have already passed (or in which they are currently enrolled).
   (b) The choice of units of study made by a candidate shall be limited by the exigencies of the timetable except that, where two units of study are given wholly or partly at the same time, the heads of the departments concerned may give permission for the candidate to attend equivalent units of study (or parts of units of study) at another time.
4. Candidates will be under the general supervision of the Faculty of Engineering. General supervision covers all areas of policy and procedures affecting candidates, such as combined degree program rules and enrolment procedures. Candidates will be under the supervision of the Faculty of Science regarding enrolment and progression within the BSc component of the combined degree program, as defined in subsection 2(b).
5. Candidates may qualify for the award of BE degree with Honours.
6. Candidates who complete the combined degree program may qualify for admission to an honours year in the Faculty of Science.
7. Candidates who abandon the combined degree program may elect to complete the BE degree in accordance with the appropriate Senate Resolutions.
8. Candidates in the combined degree program may apply for admission to the BSc degree and enrol in such units of study as are required to complete the requirements for the degree. Such candidates shall be deemed to have abandoned the BE/BSc combined degree program.
9. The Deans of the Faculties of Engineering and Science shall jointly exercise authority in any matter concerning this combined degree program not otherwise dealt with in the Senate Resolutions or these joint resolutions.

Joint Resolutions of the Faculties of Engineering and Science (BE/BMedSc)
1. A student may proceed concurrently to the degrees of Bachelor of Medical Science and any stream of the Bachelor of Engineering (except Civil Engineering or Electronic Commerce).
2. To qualify for the award of the pass degrees, a student shall complete units of study totalling at least 240 credit points including:
(a) at least 160 credit points from prescribed Engineering units of study, including an interdisciplinary thesis (see note 2(e) below);
(b) at least 24 credit points from Junior Science units of study (which may be common with those of 2(a)), but including CHEM 1102 Chemistry 1B, BIOL1003 Human Biology and 12 credit points of Mathematics;
(c) 40 credit points of Intermediate core units of study as listed in Table IV of units of study for the BMedSc;
(d) at least 24 credit points of Senior units of study taken from the subject areas of Anatomy/Histology, Biology (Genetics), Biochemistry, Cell Pathology, Immunology, Infectious Diseases, Microbiology, Pharmacology and Physiology as listed in Table IV;
(e) a 12 credit point interdisciplinary thesis jointly supervised by departments from Engineering and Science.

3. Students who are so qualified may be awarded honours in the BE degree or undertake an honours course in the BMedSc degree.

4. Students may abandon the combined degree course and elect to complete either a BMedSc or a BE in accordance with the resolutions governing those degrees.

5. Students will be under the general supervision of the Faculty of Engineering.

6. The Deans of the Faculties of Engineering and Science shall jointly exercise authority in any matter concerning the combined degrees not otherwise dealt with in these resolutions.

**Student guide to regulations**

A summary of many of the rules and regulations governing the undergraduate degrees in Engineering is set out below. This is intended to assist students in understanding the rules but is not intended to replace them in any way.

**Summary of degree requirements**

To become eligible for the award of the degree of Bachelor of Engineering, you must:

- complete the core units of study (and satisfy any requirements on recommended electives) of your chosen branch of engineering,
- gain credit for a minimum of 192 credit points,
- complete a period of practical experience in engineering and
- be a candidate for a minimum of two years and a maximum of eight years.

**Core and elective units of study**

For each of the branches of engineering in which a degree is awarded there is a list of prescribed core and recommended elective units of study.

A core unit of study is one that must be passed to fulfil the requirements for the degree. An elective unit of study is one that is acceptable as part of the requirements but is not a compulsory unit of study.

The core and recommended elective units of study for each branch of engineering are listed in tables. Descriptions of each unit of study, in numerical order, are also provided in this document.

**Credit point value of units of study**

Each unit of study has a credit point value, which is an approximate measure of the time required for lectures, tutorials and practical classes.

When you pass a unit of study you are credited with its credit point value, except where it is mutually exclusive with a unit of study you have already passed.

**Completion of units of study**

In order to complete a unit of study you must: attend the lectures, tutorials and laboratory and practical classes prescribed for the unit of study; complete the exercises, practical work and assignments prescribed; and pass the examination(s) set for the unit of study.

If you have been absent without leave from more than ten percent of the classes in any one semester in a particular unit of study, you may be asked to show cause why you should not be deemed to have failed to complete that unit of study. Should you fail to show cause, you shall be deemed not to have completed that unit of study.

**Absence from lectures and other classes**

If you are unable to attend lectures and/or practical classes because of illness, accident or for any other reason, you must submit an ‘Application for Special Consideration’ form. When applicable, a medical certificate or other supporting evidence should be attached. Notification forms for this purpose are available at the Engineering Faculty Office. The forms must be submitted to the Student Centre (Carslaw) within 7 days of the incident, and a copy given to the Department. The Faculty’s policy on its handling of Special Consideration applications is available from the Student Enquiry Office.

**Minimum number of credit points and rates of progress**

To satisfy the requirements for a pass degree you must gain not less than 192 credit points, and satisfy all requirements on core and recommended elective units of study.

The minimum time in which you can qualify for the degree is four years. Some candidates, however, plan to progress at a slower rate, sometimes so that they can take a number of elective units of study.

At present, the BE degree is available on a full-time basis only and students cannot complete the degree requirements on a part-time basis or externally.

**Classification into years**

Students are classified as being in First Year, Second Year, Third Year or Fourth Year according to the year from which the majority of their credit points are being taken.

**Changing your specialisation**

Students who wish to change their specialisation (eg, from Chemical to Mechanical) must obtain written Faculty approval. Such a change may entail an extra year (or more) of study.

**First year enrolment**

In your first year of attendance you must enrol in at least 48, and no more than 54, credit points.

**Second and later year enrolments**

The minimum enrolment for re-enrolling students is normally 36 credit points and the maximum is normally 60 credit points (unless the Faculty has imposed any special conditions on your re-enrolment because of unsatisfactory progress in the previous year).

Enrolments outside the 36 to 60 credit points limit require written Faculty permission.

Second Year students must include in their enrolment any outstanding First year core units of study for their chosen branch of engineering. (Outstanding core units of study are units of study which a student either did not attempt in the previous year, or attempted but did not complete satisfactorily.) Similarly, Third Year students must include in their enrolment any outstanding First Year and Second Year core units of study, etc.

Your enrolment in any outstanding core units of study must generally take priority over your enrolment in higher year units of study and you must not enrol in units of study with timetable clashes.

If you wish to take the opportunity of transferring to the Faculty of Science at the end of your Second (or Third) BE year, you should consult the appropriate Faculty of Science resolutions relating to this double degree.
Advice for students

An academic Year Adviser is appointed for each year in each branch of Engineering. You should consult the noticeboards in your Department and the Student Enquiry Office to find the name and location of your Year Adviser.

Result grades

The Board of Examiners of the Faculty of Engineering is the body which determines BE students’ examination results. The Board meets after each semester when it considers the results recommended by the examiners of each unit of study for each student. Official examination result notices are then sent to students.

Satisfactory performance in a unit of study is recognised by the award of a grade of Pass (P). Performance at levels higher than this is recognised by the award of a Credit (Crt), Distinction (D) or High Distinction (HD). If the requirements for a unit of study are not completed then a grade of Fail (XX) may be awarded.

Grade %
Pass 50-64
Credit 65-74
Distinction 75-84
High Distinction 85-100
Fail below 50

If a student failed a unit of study but the failure was borderline, then the Board of Examiners may award a concessional pass (PCON) instead of a Fail. A PCON is treated as a full pass for progression purposes.

Students awarded supplementary examinations should consult the department that teaches the unit of study for information about the form and content of the supplementary examination.

A grade of R denotes that a unit of study has been satisfactorily completed.

Exemption from attendance at classes

If you enrol in a unit of study which you have previously attempted you may be granted exemption by the Department from attendance at laboratory or practical classes.

Deferment of enrolment

Deferment of enrolment is only possible from Second Year onwards. To ensure your place is kept open, you must apply in writing to the Faculty stating the reasons for your requested deferment. Deferment is normally granted for only one year, although this may be extended in exceptional circumstances which must be detailed in your letter of application.

Practical experience

At an appropriate stage of your training you are required to work as an employee of an approved engineering-related organisation and submit a satisfactory written report of your work. This period of experience, usually about 10 weeks, is normally undertaken after you complete some or all of the prescribed Third Year units of study and before you enrol for your final year of study. It is possible to undertake all of the work experience at the end of Third Year, or undertake a part at the end of Second Year and complete the work experience at the end of Third Year. There is a core unit of study prescribed for each of the branches of engineering which comprises this practical experience requirement. Please refer to the unit of study descriptions later in this Handbook for specific conditions applying in each department in relation to when the work experience can be undertaken and what type of experience is suitable.

If you are not committed to employment as a cadet or scholarship holder the Careers and Appointments Service of the University is available to help you obtain suitable employment.

Honours degree

Conditions for the award of Honours are described elsewhere. Note that there is no special admission procedure to an Honours program.

An alternative to the combined BE/BSc degree program

Many Engineering students take the opportunity of gaining the BE and BSc degrees over five years. As well as the combined BE/BSc degree (described previously), there is a second option (henceforth referred to as the double degree BSc/BE program).

If you satisfy certain requirements you may be permitted to transfer to the Faculty of Science for one year in order to complete the requirements for the BSc degree. This one year is additional to the four years required to complete the BE degree. Students who proceed towards the ‘double degree’ usually transfer to the Faculty of Science after they have completed two years of Engineering, but there is provision for students to do so after they have completed the Third Year of the BE degree. There is also provision for students to remain in the Faculty of Science for an extra year in order to complete an Honours BSc degree.

After completion of the Science year(s), students men transfer back to the Faculty of Engineering in order to complete their BE degrees.

If you wish to take the opportunity of transferring to the Faculty of Science at the end of your Second Year (or Third Year) BE year, you should consult the appropriate Faculty of Science resolutions relating to this double degree.

If you are interested in proceeding towards the ‘double degree’ it is essential that you plan your units of study carefully in your First Year, so that you fulfil prerequisite requirements for the Second Year Science units of study which you must take in your Second Year.

Application to transfer to the Faculty of Science should be made at the end of your second (or third) year of studies.

Applications for transfer to the Faculty of Science are available at the Student Centre and the Faculty of Science and Faculty of Engineering Offices.

Admission of BSc graduates

If you are enrolled in the Bachelor of Science degree unit of study at this University and wish to transfer to the Bachelor of Engineering degree unit of study, you must make application through the Universities Admissions Centre by the advertised closing date.

Your application will be considered on the basis of academic merit. Consideration will be given to your HSC examination results and to your examination results in the Faculty of Science (and to your results in any other tertiary units of study you may have completed). The offer of a place in the Faculty of Engineering is NOT automatic and the competition for entry is keen.

If you are a graduand/graduate in the Faculty of Science and if you are offered a place in the Faculty of Engineering, you may be able to complete the BE degree requirements in two further years of full-time study. You would need to have completed appropriate units of study in the Faculty of Science so that you could be given credit for/exemption from all or most of the First Year and Second Year core units of study prescribed for that branch of Engineering in which you wish to proceed.

You should seek advice from the Engineering Department in which you wish to study regarding their requirements in order that you might complete the BE degree requirements in two years.

Advanced Engineering Program

The Faculty makes special provision for First Year students who have achieved outstanding academic results before coming to the Faculty. For students who achieve a UAI of 98+ with 4 Unit Mathematics and Science (4 Units from Physics, Chemistry, Engineering Science or Science), HSC students in this category will be granted exemption for half of their
Semester 1 material, and may choose to commence study in the July Semester or undertake a special interdisciplinary engineering project in a group with other Advanced Students. Students can apply to enter this arrangement on enrolment in their first year by discussing their options with the Dean or Head of Department.

The optional Advanced Engineering Program continues through years 2 and 3 with special subjects available only to those students named on the Dean's List for Excellence in the previous year.

Discontinuation and variation of enrolment
Please note that your enrolment is your responsibility. It is in your best interests to ensure that the formal record of your unit of study enrolment is correct.

If you wish to cease attending a unit of study (or all your units of study), you are discontinuing your enrolment in those units of study. You must notify the University of your intention to discontinue by submitting the appropriate form to the Engineering Faculty Office.

There are three categories of discontinuation results used to record discontinuations: 'Withdrawn', 'Discontinued - Not to count as failure', and 'Discontinued - Fail'. These results are dependent upon the time of year you choose to discontinue (see below).

If your enrolment is Withdrawn (W), then your enrolment is cancelled as though you had never enrolled. This enrolment does not appear on an official transcript of your academic record.

If your enrolment is Discontinued - Not to count as failure (DNF), it means that you commenced the unit(s) of study and were given permission to discontinue without any academic penalty or implication of failure whatsoever. However, HECS or fees are still liable for these subjects. The enrolment and the result of 'Discontinued - Not to count as failure' appear on an official transcript of your academic record.

If your enrolment is Discontinued - Fail (DF), then it means that the discontinuation counts as a failure. HECS or fees are still liable for these subjects. On an official transcript of your academic record, your enrolment appears with the result of 'Discontinued - Fail'. As this result implies failure, you will be allocated a 0% unit value for this subject in the calculation of your weighted average mark. The Faculty takes student WAMs into consideration when determining whether or not students have made satisfactory progress.

Total discontinuation
If you wish to discontinue all your units of study, then you must notify the University of this intention by submitting a 'Variation of Enrolment' form to the Engineering Faculty Office. You should note your reasons for discontinuing on this form.

Variation of enrolment
Any change to your enrolment, including total withdrawal from the degree, can only be done through the Engineering Faculty Office. This includes units of study taken outside this Faculty. Collect a 'Variation of Enrolment' form from the Faculty Office, have the changes approved by your Year Adviser/Supervisor and hand the completed form back to the Faculty Office.

You may enrol in a unit of study given in first semester (or full-year) prior to 31 March. You may enrol in a unit of study given in second semester prior to 31 August.

Discontinuations from units of study are described below. Before 31 March (First Semester HECS deadline) You may withdraw from any unit of study without academic or financial penalty. Your discontinuation result will be 'Withdrawn'.

After 31 March
• You may withdraw from Second Semester units of study without academic or financial penalty.
• If you drop a First Semester (or full-year) unit of study between 31 March and the seventh teaching week of First Semester, you will automatically receive a 'Discontinue with Permission' result;
• If you drop any unit of study after the seventh teaching week, you will receive a result of 'Discontinued - Fail'. If, however, you believe you have good reason for discontinuing at this late stage, discuss this with your Year Adviser, who may recommend a result of 'Discontinue with Permission';
• You remain liable for the HECS payment for these units of study.

After August 31 (Second Semester HECS deadline)
• You cannot drop any unit of study without penalty;
• If you drop a Second Semester unit of study between 31 August and the seventh week of teaching of Second Semester, you will automatically receive a 'Discontinued with Permission' result;
• If you drop any unit of study after the seventh teaching week, you will receive a result of 'Discontinued - Fail'. If, however, you believe you have good reason for discontinuing at this late stage, discuss this with your Year Adviser, who may recommend a result of 'Discontinue - Not to count as failure';
• You remain liable for the HECS payment for these units of study.

There is no way these rules can be varied, so it is in your best interests to ensure that your enrolment is correct.

You should note that variations of enrolment are subject to all the other rules relating to enrolment in the BE degree unit of study.

Weighted average mark
The Faculty uses students' weighted average marks ('WAM') when considering a number of aspects of students' candidatures: Engineering departments use WAM calculations when determining students' eligibility for the award of Honours degrees. The Faculty uses WAM calculations when ranking applicants for scholarships for postgraduate study and for undergraduate prizes and scholarships. The Faculty also takes account of students' WAMs when determining whether or not students have made satisfactory progress with their studies. A WAM is calculated for every student for every year of enrolment by adding together the products of the marks achieved with the unit value of each unit of study attempted (including units of study which have been failed or 'Discontinued - Fail') and dividing by the total number of credit points attempted.

Units of study which have been 'Withdrawn' or 'Discontinued - Not to count as failure' are not included in the WAM calculation.

Application procedure to re-enrol in the BE degree after total discontinuation
New first year students If you are a new First Year student who totally discontinues his/her enrolment and you now wish to re-enrol in the BE degree unit of study, then generally speaking you will need to apply for re-enrolment through the Universities Admissions Centre (unless you were recorded as 'Discontinued - Not to count as failure' and were given 'Repeat status'). ('Repeat status' means that you may enrol in the BE degree unit of study in the next calendar year by completing an internal University 'General application for enrolment' form and that you will not need to compete for a place through UAC for that one calendar year only. If you do not take up that option and then wish to re-enrol in the BE degree unit of study in a future year, you will need to apply for re-admission through UAC.)

UAC applications must be lodged by the closing date late in September/early in October in the year prior to that in which you wish to re-enrol.

Re-enrolling students If you are a re-enrolling student in the BE degree unit of study who totally discontinues his/her enrolment and wish to re-
enrol in the BE degree unit of study, then generally speaking you should apply for re-enrolment by completing an internal University 'General application for enrolment' form by 1 October in the year prior to that in which you wish to re-enrol.

**Failure to make satisfactory progress and exclusion**

If the Faculty considers that you have failed to make satisfactory progress with your studies, the Faculty may exclude you from re-enrolment in the Faculty of Engineering. This process of excluding students is designed to ensure that the resources available in the Faculty are used to teach those students who make the best use of them. Failure to make satisfactory progress cannot be defined precisely in all cases in advance, but generally you will be considered not to have made satisfactory progress if:

- your weighted average mark (WAM) for the year is poor; and/or
- you do not gain at least half of the credit points for which you are enrolled; and/or
- you fail a major unit of study more than once; and/or
- you had special conditions imposed on your re-enrolment (usually because of lack of satisfactory progress in the previous year of enrolment) and you fail to meet these conditions.

If the Faculty considers that your annual progress has not been satisfactory, it may decide that you should be sent a 'Warning Letter', in which you are advised of this and also of certain conditions that you would need to meet in your next year of enrolment in the Faculty. These conditions would normally specify the number of credit points and particular credit points of study that you would need to pass in the next year of enrolment in the Faculty. Failure to meet such conditions would normally result in you being asked to show cause as to why you should be allowed to re-enrol in the Faculty of Engineering.

If the Faculty considers that your progress has been particularly unsatisfactory, then it may decide that you should be asked to show cause as to why you should be allowed to re-enrol in the Faculty of Engineering. This means that you are being asked for an explanation for your failure to make satisfactory progress in your studies. When the Faculty considers students' statements purporting to show good cause, it takes account of illness, accident and/or personal problems.

If the Faculty accepts your explanation, then it will allow you to re-enrol. In doing so, the Faculty will probably impose certain conditions on your re-enrolment (such as specifying the number of credit points and particular credit points of study that you must pass in your next year of enrolment). Should you fail to meet these conditions you may be called upon again to show cause as to why you should be allowed to re-enrol in the Faculty of Engineering.

If the Faculty considers that you have failed to show good cause on this occasion (or if no statement is received from you), then the Faculty may exclude you from enrolment. If you are excluded, you have the right of appeal to the Senate. The Senate may either uphold your appeal and allow you to re-enrol in the Faculty of Engineering or it may disallow your appeal and confirm your exclusion.

A student who is excluded from re-enrolment in the Faculty may apply for re-admission to the Faculty after two academic years have elapsed. When considering an application for re-admission, the Faculty takes account of the following: the circumstances that led to the student's failure to make satisfactory progress; how these circumstances have changed; and the student's activities since being excluded. The Faculty would normally expect a student to have undertaken relevant tertiary studies successfully during this period.
CHAPTER 5

Postgraduate study

The Faculty of Engineering offers a wide range of postgraduate research and coursework programs within the Departments of Aeronautical, Chemical, Electrical and Mechanical and Mechatronic Engineering and the specialisation, Environmental Engineering.

Full details of the postgraduate degrees and diplomas are contained in a graduate brochure which is updated annually and is available from the Faculty Office.

Doctor of Engineering

The senior of the higher degrees in the field of engineering is the DEng degree. Originally called Doctor of Science in Engineering, DEng, the name was changed to Doctor of Engineering in 1981. The degree is awarded for distinguished published work. The first doctorate in engineering was conferred in 1924.

DEng

John Job Crew Bradfield, 1924
William George Baker, 1932
David Milton Myers, 1938
David Lipscombe Holl way, 1954
Bernard Yarnton Mills, 1959
Robert Thomas Fowler, 1960
James Brydon Rudd, 1962
John Ernest Benson, 1975
Harry George Poulos, 1976
George Kossoff, 1981
Robert Henry Frater, 1982

Doctor of Philosophy

The degree of Doctor of Philosophy is a research degree awarded for a disser considered to be a substantially original contribution to the subject concerned. This degree is becoming a prerequisite for research appointments in government and industrial research and development laboratories.

Applicants should normally hold a master’s degree or a bachelor’s degree with first or second class honours of the University of Sydney, or an equivalent qualification from another university or institution.

The degree may be taken on either a full-time or part-time basis.

In the case of full-time candidates, the minimum period of candidature is six semesters (3 years). The maximum period of candidature is normally ten semesters.

Part-time candidature may be approved for applicants who can demonstrate that they are engaged in an occupation or other activity which leaves them substantially free to pursue their candidature for the degree. Normally the minimum period of candidature will be determined on the recommendation of the Faculty but in any case will not be less than six semesters; the maximum period of candidature is normally 14 semesters.

The Faculty may admit some applicants on a probationary basis for a period not exceeding twelve months.

Master of Engineering

Graduates in engineering of the University of Sydney who have had at least three years’ experience after graduation may be admitted as candidates for the ME degree. The award is made for a thesis or a design of special merit, and may be looked upon as an external degree reserved by the Faculty for its own graduates.

Master of Engineering (Research)

The Master of Engineering (Research) degree provides candidates with opportunities to develop specialist interests through a program of supervised research (theoretical or applied), shorter than the three years usually required for the PhD degree. Candidature is normally on a full-time basis but may also be undertaken part-time. The ME(Res) degree may be undertaken in the Departments of Aeronautical, Chemical, Electrical and Information Engineering, Mechanical and Mechatronic Engineering and Civil Engineering.

The minimum academic entry requirement is normally the 4-year Bachelor of Engineering degree from the University of Sydney with first or second class honours in the same branch of engineering as that in which the ME(Res) degree is to be undertaken, or an equivalent qualification from another university or tertiary institution. In exceptional circumstances a candidate in engineering with a pass degree or a graduate with an honours degree in a different branch of engineering from another Faculty may be admitted to candidature but such an applicant may be required to undergo a preliminary examination.

The Faculty may admit some applicants on a probationary basis for a period not exceeding twelve months.

The minimum period of candidature is one year full-time and two years part-time and the maximum period of candidature is two years full-time and three years part-time. If a candidate is required to undertake a preliminary examination then the candidature commences after the completion of the preliminary examination.

Special attention is drawn to the need for applicants to provide concise details of their proposed research program including aims and methodology and evidence of their ability to carry out intensive research and advanced study. Candidates who enrol for this degree with the object of later transferring to candidature for the PhD degree should select a research project that is suitable for this purpose.

Applicants admitted to candidature for the ME(Res) degree are expected to work individually on advanced study and research under the direction of a supervisor, with whom regular consultation about their work and the general planning of their thesis is required. On completion of their candidature a thesis must be submitted embodying the results of their work.

Master of Engineering Studies

The MES degree provides candidates with programs of formal coursework alone or coursework and applied research aimed at meeting the professional development needs of engineers and scientists in the private and public sectors of industry and in private practice. The degree is offered on a full-fee paying basis.

The minimum academic entry requirement is the 4-year Bachelor of Engineering degree from the University of Sydney, or an equivalent qualification from another university or tertiary institution.

The minimum period of candidature is one year full-time and two years part-time and the maximum period of candidature for all candidates is two years full-time and three years part-time.

Candidates for the MES have two alternative methods of candidature, by coursework alone or by coursework and project. They are required to complete either 48 credit points of coursework or at least 36 credit points of coursework and a design or research project valued at 12 credit points.

Candidates may choose to complete the units of coursework from the same subject area or from related subject areas, in the same department or school, or they may choose to complete...
all subjects from departments other than the one in which they are primarily studying. Candidates may also be given permission to take subjects from another Faculty at this University or from another tertiary institution such as the University of New South Wales or the University of Technology, Sydney. If you wish to apply to count subjects from another tertiary institution, you would of course need approval from that institution to enrol there and the permission of the University of Sydney.

For their projects, candidates are encouraged to select problems based on their professional experience or their research interests. Many projects will be closely related to the research activity within the Faculty, and in some cases it may be possible for original work to be reported in the project report. A design study or a critical examination of a professional problem may also be acceptable as a project. The work on the project is expected to occupy about one-third of a candidate's total program, i.e., a maximum of 12 credit points.

Aeronautical Engineering
There is no coursework program currently available.

Chemical Engineering
The Department of Chemical Engineering offers the MES course and the MEEP (Master of Environmental Engineering Practice).

Civil Engineering
The Department of Civil Engineering offers the MES coursework program in the areas of Geotechnical Engineering, Structural Engineering and Structural and Foundation Engineering.

You should note, however, that the Department of Civil Engineering may not be able to offer all its courses each year, so that even a full-time candidate may take 18 months or two years to complete the degree requirements in that School.

Electrical and Information Engineering
The Department of Electrical and Information Engineering offers an MES drawing its coursework from each of the Graduate Diploma areas and permits a flexible program of study to suit the individual needs. All areas of specialisation apply to both Master's and Graduate Diploma programs. If you are completing the MES it is 48 credit points whereas a Graduate Diploma is 36 credit points. Engineers planning to increase their management component of their work can take up to 24 credit points of business subjects within their MES.

Mechanical and Mechatronic Engineering
The coursework program is available on both a full- and part-time basis in Mechanical Engineering There is no Masters program in Mechatronic Engineering available at present.

In order to complete the degree, requirements in one year, however, a candidate would need to take subjects from those offered by other departments or by another tertiary institution.

Environmental Engineering
The Faculty of Engineering offers a coursework program in Environmental Engineering for the MES degree and DipEnvironEng. While the program is managed by the Department of Chemical Engineering, teaching is by Chemical, Civil and Mechanical Engineering, as well as by other departments in the University.

Master of Project Management
The Master of Project Management is awarded after completing 8 course modules (48 credit points), of which 3 (18 credit points) are core subjects. The remainder are selected from a range of elective modules. This course is available through PM Outreach a global Internet based program in project management and is available to both Australian and international students through the Internet. Students wishing to obtain a qualification in project management have the option to take individual modules or add modules together to complete a graduate certificate in project management, graduate diploma of project management or the Masters of Project Management.

The management of this program is through the Department of Civil Engineering.

Diplomas and certificates

Diplomas
Graduate Diplomas are offered on a full fee-paying basis. Courses leading to the award of a diploma are currently available in the following specialist areas:
- Geotechnical Engineering - DipGeotEng
- Structural Engineering - DipStructEng
- Structural and Foundation Engineering - DipStructFoundEng
- Project Management - GradDipPM
- Power Engineering - DipPowEng
- Computer Systems Engineering - DipCompSystEng
- Technology Venture Creation
- Telecommunications - DipTelecomm
- Environmental Engineering - DipEnvironEng

Graduate Certificates are offered on a full fee paying basis. Courses leading to the award of a graduate certificate are available in the following specialist areas:
- Electrical Energy Systems
- Integrated Systems
- Photonics
- Project Management
- Signal Processing
- Technology Commercialisation
- Wireless Communications

The minimum academic entry requirement is the 4-year Bachelor of Engineering degree from the University of Sydney, or an equivalent qualification from another university or tertiary institution.

The minimum period of candidature is one year full-time and two years part-time and the maximum period of candidature for all candidates is two years full-time and three years part-time.

Further information
To obtain further postgraduate information contact:
Postgraduate Advisor
Graduate School of Engineering
Faculty of Engineering, J13
The University of Sydney NSW 2006
Phone: (02) 9351 7084
Fax: (02) 9351 7082
Email: j.harty@eng.usyd.edu.au
The brochure Graduate Programs Engineering 2001 is available from the postgraduate advisor.
CHAPTER 6

Other Faculty information

The Faculty

Faculty adviser
You are most welcome to discuss with the undergraduate or postgraduate advisers any questions about your studies, difficulties in maintaining your studies for financial or personal reasons, or any other questions or problems that may arise. As difficulties can usually be handled more easily in the early stages, you should seek help without delay. Discussions are held in strict confidence - simply come to the Faculty Office, in Room 226, Engineering Faculty Building and make an appointment.

Special enrolment instructions
These are the special requirements for Engineering students.

To complete your enrolment in Engineering you proceed to the PNR Enrolment Centre in the Drawing Office, where you will:

• collect your enrolment form,
• complete a registration form,
• consult an adviser about your plan of courses and
• record your courses on the computer and receive your timetable.

Examinations

Freedom of Information Act
Examination scripts, or copies of same, are available for viewing or collection from Departmental Offices for three months after final examinations each year, after which they will be shredded.

Enquiries
All examination result enquiries must be made with your Department. The Engineering Faculty Office is not equipped to handle examination enquiries.

Supplementary examinations
A supplementary examination may be granted by the Faculty:
(a) to candidates whose performance in an examination has been significantly affected by duly certified illness or misadventure;
(b) to candidates who have failed an examination but whose overall level of performance in the year’s work is deemed sufficient to warrant the concession of a further test.

Supplementary examinations under category (b) are normally granted only to those candidates who are in their first year of attendance.

The award of supplementary examinations is a privilege and not a right.

Illness or misadventure
The Faculty of Engineering recognises that the performance of students may be adversely affected by illness or other misadventure, and makes provision for special consideration of such disabilities when examination results are considered.

Any student who believes that his/her performance has been or may be adversely affected by an occurrence of illness or misadventure may request the Faculty to make special consideration of same. All such requests must include a special consideration application on the form provided by the Faculty, supplied within one week of the occurrence and accompanied by an appropriate medical certificate or other relevant documentary evidence apart from the student’s own submission. Such certificates or documentary evidence should state not only the nature of the illness or misadventure but also (where relevant) the opinion of the issuer as to the extent of the disability involved.

If the student has completed the assessment for which special consideration is requested, then further documentary evidence of the extent of the disability from a specialist medical practitioner/counsellor etc. must also be supplied. For example, if a student completes an examination but still wishes to request special consideration for it, this additional specialist evidence is required.

Finally, the Faculty intends only to compensate for substandard performance in assessments which do not reflect a student’s true competence in a subject, and such provisions must not act to the disadvantage of other students. The Faculty will only compensate students when there is clear evidence that results have been adversely affected by the disability for which special consideration is requested.

Financial assistance

Special assistance
In certain circumstances assistance is available to students who encounter some unforeseen financial difficulty during their studies. The assistance is usually in the form of bursaries or interest free loans.

Students wishing to apply for financial assistance should make enquiries from either of the following:

Financial Assistance Office, Student Services, (02) 9351 2416.

President of the Students’ Representative Council, (02) 9660 5222

J.N. Ellis Memorial Fund
The J.N. Ellis Memorial Fund was established in 1969 following an appeal made to all graduates in engineering to honour the memory of Neil Ellis, who as Sub-Dean and later as Administrative Assistant to the Dean over a considerable period of years was able, by sympathetic counselling, to help many students who were having difficulties in completing their studies.

The object of the fund is to provide financial assistance to students in the Faculty of Engineering who are in such a position that without assistance they would not be able to continue their studies. Students seeking such assistance should apply to Financial Assistance, Student Services, phone (02) 9351 2416. Awards are made on the recommendation of the Dean. Value: $500. Applications may be made at any time.

Those who receive assistance from the fund are asked to make a contribution to it when they are financially able to do so. In this way the fund will be able to continue and grow in the extent to which it can help deserving students in future years.

Learning assistance

The University’s Learning Assistance Centre offers a wide range of workshops and other activities to assist students develop the learning and language skills needed for academic study. The workshops are available free to all enrolled students of the University. Workshop topics include essay and assignment writing, oral communication skills, studying at university, conducting research.

The Learning Assistance Centre is located on Level 7 of the new Education Building next to Manning House, phone (02) 93513853.

List of staff by departments

Faculty staff

Dean
Professor Judy A Raper, BE PhD U.N.S. W. CEng, FIChemE FTEAust

Pro Dean
Professor Yiu-Wing Mai BSc (Eng) PhD H.K., DEng, FTSE FASME FHKTE FIE Aust

Associate Dean (Postgraduate and Research)
Associate Professor John C Small, BSc(Eng) Lond. PhD, MTEAustMASCE

Associate Professor John C Small, BSc(Eng) Lond. PhD, MTEAustMASCE

Associate Professor John C Small, BSc(Eng) Lond. PhD, MTEAustMASCE
Associate Dean (Undergraduate)
Associate Professor Geoffrey W. Barton, BE PhD

Executive Officer
Eric van Wijk BSc ANU GradDipEd GradDipAppEcon UCan

Secretary to the Faculty and Finance Officer
Michael Whitley, BA(Hons) EastAnglia MCom U.N.S.W.
ASA CIA FCIS FCID Dip

Executive Officer Scholarships and External Relations
Lee Glasson BA DipEd Flinders Student Administration Staff
Postgraduate Adviser
Josephine Harty, BA Macq. Undergraduate Adviser
Annamaria Brancato

Executive Assistant to the Dean
Kay Fielding
Administrative Assistant
vacant

Faculty Librarian
Irene Rossendell BA Qld, Dip Lib UNSW, ALIA

Advisers to undergraduate students
Aerospace, Mechanical and Mechatronic Engineering
To be advised
Chemical Engineering
Director of Undergraduate Studies - A/Prof G W Barton
Director of Teaching and Learning - Dr C A Mitchell
First Year—Marjorie Valix
Second Year—Dr V Gomes
Third Year - Dr C A Mitchell
Fourth Year - Dr I A Furzer

Civil Engineering
First Year—Associate Professor R. J. Wheen
Second Year—Mr N. L. Engs
Third Year—Dr D. W. Airey
Fourth Year—Associate Professor K. J. R. Rasmussen
Electrical and Information Engineering
First Yr - Dr Jamie Evans
Second Yr - Dr Swamidoss. Sathia Kumar
Third Yr-Dr Jim Rathmell
Fourth Yr—Dr Yash Shrivastava

Aerospace, Mechanical and Mechatronic Engineering

Head of Department
Assaad R. Masri, BE PhD

P. N. Russell Professor
Roger L. Tanner, BSc Brist. MS Calif. PhD Man. FAAFTS FIEAust MASME MAIChemE. Appointed 1975

Lawrence Hargrove Professor
To be advised

Professors
Robert W. Bilger, BSc BE NZDPhil Oxf. FTS FIEAust. Appointed 1976
Hugh F. Durrant-Whyte, BSc(Eng) Lond. MIEAust. Appointed 1995
John H. Kent, BE MEngSc PhD FIEAust. Appointed 2000
Yiu-Wing Mai, BSc (Eng) PhD t/I/DEng Syd. FTSE FASME FHKIE FIE Aust. Appointed 1987
Nhan Phan-Thien, BE PhD FAA FIEAust. Appointed 1991
Michael V Swain, BSc, PhD UNSW. Appointed 1997

Associate Professors
Assaad R. Masri, BE PhD
Liangchi Zhang, BSc MEng Zhejiang PhD Peking MASME MASPE MJSPE MJSME
Liyong Tong, BSc MEngSc Dalian PhD B.U.A.A., MIEAust MAIAAA
Eduardo M. Nebot, BS Bahia Blanca MS PhD Colorado State

Reader
Lin Ye, BS Harbin MS PhD BeijinglAA

Senior Lecturers
Steven W Armfield, BSc Flinders PhD
Douglas J. Auld, BSc BE MEngSc PhD
Lynne E. Bilston, MSc PhD Penn. BE
MWMG Dissanayake, BSc(Eng) Peradeniya MSc PhD Birm.
Andrei Lozzi, BSc UNSW MEngSc PhD
Paul J. McHugh, BSc BE
David C. Rye, BE Adel. PhD
Karkenahalli Srinivas, ME PhD LL.Sc.
Kee Choon Wong, BE PhD, MAIAA

Lecturers
Peter W Gibbens, BE PhD, MAIAA
David P. Boyle, BE, MAIAA

Professional Officer
Jehangir Madhani, MSc Strath. BSc ScotlandUK

Research Associates
Dr Ping Tan, MEngSc Melb
Hugh Stone, BE BSc PhD

Visiting Professor
J. Dennis Boby, BSc MSc McGill PhD Montreal Toronto

Adjunct Associate Professor
Robin J. Higgs, MBBS Lond FRCS Edin FRACS FA Orth A

Adjunct Lecturer
Captain Peter L. Bates, BE

Chemical Engineering

Head of Department
James G Petrie BSc PhD Capetown. Appointed 1997

Professors
Brian S Haynes, BE PhD U.N.S.W, FICChemE FIEAust
CPEng. Appointed 1997
Emeritus Professor Kolf G.H. Prince, AO, BE BSc NZ. PhD, FChemE HonFIEAust FTSE FPREng. Appointed 1969

Shell Professor of Environmental Engineering
James G Petrie BSc PhD Capetown. Appointed 1997

Associate Professors
Geoffrey W. B arton, BE PhD
Timothy A. G Langrish, BEV.Z. DPhil Oxf., MIChemE

Senior Lecturers
Ian A. Furzer, DSc(Eng) PhD Lond., MIChemE CEng

MAIChemE
Vincent G. Gomes, BTech MEng PhD Montr.
Cynthia A Mitchell, BE Qld PhD UNSW
Kelly Thambimuthu, PhD McGill

Lecturers
Marjorie Valix, BSc, PhD UNSW

Dennis McNevin, BE UNSW, PhD, GradDipEd UWS

Honorary Appointments
Honorary Research Associates
David F Bagster, BScApp BSc BE Qld PhD Camb, FIChemE FIEAust CEng

G. DeLeon, PhD Belgrade, MAIMM GSA
P Dun. BE PhD, MIChe

Peter B. Linkson, BE PhD, FIChemE F AusIMM FGAA CEng

Barry W Walsh, BE PhD, MIChemE CEng SPE

Wayne A. Davies, BSc PhD, MIEAust

Don White, BE Liverpool

Research & Development Manager
Dr Maurice Barton, BSc Hons Brighton C.O.T. MSc Oxon PhD Aston, FAM

Civil Engineering

Head of Department
Robert J. Wheen, BSc BE MEngSc, FIEAust, MASCE

Challis Professor of Civil Engineering
John P. Carter, BE PhD, MASCE FIEAust. Appointed Professor 1990. Appointed Challis Professor 1999

Professors
Ali Fadafar, BSc ME Tehran MSc PhD Sur. Appointed 2000
Kenny C.S. Kwok, BE PhD Monash, FIEAust. Appointed Professor 1999
Harry G. Poulos, AM, BE PhD DScEng, FIEAust, FASCE, FAAA. Appointed Professor 1982
BHP Steel Professor of Steel Structures
Gregory J. Hancock, BE BSc PhD, FIEAust. Appointed Professor 1990

Associate Professors
Peter Ansourian, BSc BE PhD, FIEAust
Kim JR Rasmussen, MEngSc TU Denmark, PhD
Stuart G Reid, ME Cant PhD MG
John C Small, BSc Lond PhD, FIEAust MASCE
Robert J Wheen, BSc BE MEngSc, FIEAust MASCE

Adjunct Associate Professor
Ian SF Jones, BE UNSW PhD Wat MTEAust

Honorary Associate Professor
Andrew Abel, Dipling TUBad MSc MsM PhD UNSW, CEng, FIM

Senior Lecturers
David W Airey, BA MPhil PhD Camb
Lecturers
Abbas ElZein, BE AmerUniLeb MSc PhD Southampton MS ENPC Paris, MIEAust
Noel L. Ings, BE MEngSc U.N.S.W., MASCE MIEAust
Tim Wilkinson, BSc BE MA PhD
Graeme Wood, BEng(Hons) PhD Edin.

Professional Officers
Nigel P. Balaam, BE PhD
Timothy S. Hull, BE PhD
John P. Papangelis, BE PhD, MIEAust
Craig M. Polley, BSc MSc Wisconsin

Emeritus Professor
Nicholas S. Trahair, BSc BE MEngSc PhD DEng, FIEAust

Honorary Research Associates
Russell Q. Bridge, BE (Hons) U.N.S.W., PhD, FIEAust
Howard B. Harrison, BE PhD, MIEAust
Harold Rooper, BSc PhD Wince, MEngSc, MATMM
Richard D. Watkins, BE Qld PhD Aberd., MIEAust

Honorary Teaching Associate
Ian G. Bowie, MSc Mane, MCSCE MTEAust

Electrical and Information Engineering

Head of School
Stephen W. Simpson, BSc PhD, FIEAust

Manager, Resources
Paul Beed, BBus UWS ASA

Manager, Academic Support Services
Peter Finneran, BA

Executive Officer, Electrical Engineering Foundation
Stuart Glanfield, BA DipEd MA

Administrative Assistants
Maree Belloli
Colleen Moore
Sylvia Pyman
Inge Rogers
Katherine Smith
Jenny Wong
Rita Wong
Ping Zhang, BA Fadan

PN Russell Professor

Professors
David Hill, BE BSc QldPhD N’cle(N.S.W), FIEAust FIEEE. Appointed 1994
Marwan A. Jabri, Maitrise de physique Paris PhD. Personal Chair 1996
Branka S. Vucetic, MSc PhD Belgrade. Personal Chair 1999
Hong Yan, BS Banking I.P.T. MSEE Mich PhD Yale. Personal Chair 1997

Associate Professors
Robert A. Minasian, BE PhD Melb. MSc(Dist) DipMicrowave Eng(Dist) Lond., MTEE SMIEEE FIEAust
Stephen W. Simpson, BSc PhD, FIEAust
Anthony D. Stokes, BSc BE PhD, FIEAust
Hanssen Yee, BSc BE PhD, MTEE

Senior Lecturers
Richard Coggins, BE, BSc, PhD
Iain Collings, BE Melb. PhD ANU
Ling Guan, BSc Tianjin MASc PhD Waterloo, SMIEEE
Xibeng Hu, DipElecEng Chongqing Indast. Uni.

Honorary Professor
FAA. Appointed Professor 1982

Honorary Appointments
Peter M. Nickolls, MB BS BSc BE PhD

Professional Officers
William Fong, BE WA, MEngSci
Ebrahim Gogani, ME Tehran, Polytechnic PhD Brunei
Ross Hutton, BE Q. I. T.

Honorary Appointments
S.Y.R. Hui, BSc Birmingham PhD London

Adjunct Associate Professor
Peter M. Nickolls, MB BS BSc BE PhD

Senior Lecturer
Brian Campbell, ME

Research Associate
Julie Vonwiller, B A(Hons) PhD Macquarie

Research Affiliate
J.J. Lowke, BSc PhD DipEd Adel.

Chapter 6 - Other Faculty information

Scholarships and prizes

Many students enrolling in the Faculty of Engineering obtain financial assistance by way of a cadetship or scholarship, either at the time of enrolment, or at a later stage in their studies.

Information about the Australian government Austudy Scheme is available from the State Director, Department of Employment, Education and Training, 477 Pitt Street, Sydney 2000.

Scholarships are also awarded by a number of industrial organisations. Many of these do not require the student to enter into a financial bond.

Some government departments and public authorities provide cadetships or traineeships which require the student to enter into an agreement to work for the employer for a specified number of years after graduation.

Before accepting a bonded cadetship or traineeship students should give careful consideration to the conditions of the
award and in particular the obligations which they will incur should they decide to relinquish the award for any reason. A list of currently available prizes and scholarships is available from the University’s Scholarships Office in the Main Quadrangle, phone (02) 9351 3250.

Engineering scholarships
UNISEN Scholarships represent an expanded choice of scholarships offering a wide range of cooperative education choices. UNISEN comprises the Chancellor’s Industry Scholarship (CISE, ordinary degree only, $11000 pa), the Dean’s Industry Scholarship (DISE, ordinary and combined degrees, $4000 pa + $3500 for 10 weeks paid work experience) and the Industrial Experience Placement Scholarship (IEPS, ordinary and combined degrees, $1000 pa + $3500 for 10 weeks paid work experience).

The scholarships web site is at www.eng.usyd.edu.au/scholarships.

WAIMeArisious Scholarship
For women enrolling in structural (civil) engineering, valued at $3000 pa for 4 years.

EnergyAustralia Scholarship in Engineering
For school leavers undertaking a standard electrical engineering program, with a complete year in industry, valued at $44,500 for 3 years.

Contact: Faculty Scholarships Office
Lee Glasson, Executive Officer
Phone: (02) 9351 2834/2131
Fax: (02) 9351 3885
Email: l.glasson@eng.usyd.edu.au

Student facilities and societies
Notice boards
Faculty notice boards, one for First year courses and one for Second year courses, located outside the Student Enquiry Office, second level, Faculty Building. Each of the Engineering departments has a notice board for Third and Fourth year students.

Notice boards are also in the various Science departments, and information concerning the courses given by those departments will be posted on these boards.

Details of class lists, timetable variations, examination times and other information relating to courses of study will be posted on the relevant notice boards. Students are expected to inspect the notice boards at frequent intervals.

Notices referring to cadetships, scholarships, vacation employment and career opportunities and other matters of this nature are also displayed on the notice boards in and around the Student Enquiry Office, 2nd level, Engineering Faculty Building.

The Engineering Library
The Engineering Library is part of the University of Sydney Library and supports the Engineering Faculty. It is located on the ground floor of the PNR Building. The Library has a large collection of Engineering serials (many of which are available electronically), research material such as books, conferences and microfiche collections and multiple copies of Undergraduate Engineering material. The library’s catalogues, databases, internet resource guides and electronic collections are available via the web at www.library.usyd.edu.au.

The library offers electronic database classes and personal assistance with research needs. The librarians are involved in an extensive Information skills program within the Faculty undertaking classes for all Engineering courses during the semester.

Books may be borrowed by Undergraduate students for two weeks with renewals available if the item is not placed on hold for another borrower. Postgraduates and academics are entitled to a two month loan period with renewals available if the item is not required by another borrower. Journals are not borrowable but photocopying facilities are available for print journals and many journals are available in electronic format. Printing facilities are available in the library and remote access is available via the internet. High demand material is also put into a Reserve collection for two hour loan during the day and overnight loan.

The Engineering Library opens from 8.30 am to 7 pm on Monday and Thursday and 8.30 am to 6 pm Tuesday, Wednesday and Friday during semester. Vacation hours are 9 am to 5 pm Monday to Friday.

Engineering associations
SUCEA
The Sydney University Chemical Engineering Association (SUCEA) is a body representing the graduates of the Department of Chemical Engineering. Established in the 1950s, it is one of the oldest alumni associations at the University of Sydney. With 1326 members living in over 20 countries around the world, it is also one of the largest.

SUCEA holds a number of social events and a technical symposium each year with the aim of maintaining strong contact between the Department and its graduates (some of whom are well into their sixties). So, via SUCEA, you will still be part of the ‘Chem Eng’ family even after you graduate.

SUEUA
The objects of SUEUA, the Sydney University Engineering Undergraduates’ Association, are;
(a) to perform such actions and to organise such functions as the committee may deem necessary and desirable in the interests of the Faculty of Engineering, University of Sydney, and the students thereof;
(b) to act as an intermediary body between the teaching staff on the one hand and the members of the Association on the other;
(c) to organise Engineering teams for inter-faculty sport.

The office of the SUEUA is on the ground floor of the PNR Building close to the Faculty library.

In this office the association conducts a bookshop where many items of stationery, and some textbooks and codes of practice, are available at competitive prices.

The SUEUA normally holds an election for the president and other office bearers in March each year and all financial members of the association are eligible to vote. The president becomes a member of the Faculty by virtue of this office. The by-laws of the University provide for the undergraduates in Engineering to elect two others of their number to be members of Faculty and an election for this purpose is conducted in October each year. All Engineering undergraduates, including those enrolled in the Faculty of Science as candidates for the double degree, are eligible to vote.

Institution of Engineers, Australia
The professional body for Engineering in Australia is the Institution of Engineers, Australia, whose first objective is to promote the science and practice of engineering in all its branches.

The institution functions through a series of divisions, the local one being the Sydney Division. Within each division are branches representing the main interests within the profession - eg, civil, electrical, mechanical, chemical and transportation to name a few.

Any student of an approved School of Engineering can join the Institution as a student member (StudlE Aust). As a student member you will receive the fortnightly magazine Engineers Australia, containing articles of general engineering interest and advising you of site tours, conferences, technical meetings of all branches, harbour cruises, film nights, and so on.

Student members may freely use the comprehensive library and reference facilities maintained by the Institution - a handy place to obtain a hard-to-get book or periodical.

Within most divisions is a Graduates and Students Section, known as GAS, and all graduates of, or students at, approved engineering schools are eligible for membership.

The Graduates and Students Sections organise film nights, site tours and other activities of general interest. The Malcolm Stanley Speakers’ Competition for public speaking is held.
each year, usually in September, and prizes are awarded for the best speeches.

For membership information and application forms enquire at the Faculty Office or at the Sydney Division Office: 118 Alfred Street, Milsons Point 2061 (PO Box 138) Phone (02) 9929 8544.

The Institution of Chemical Engineers

An alternative organisation for Chemical Engineering students is the Institution of Chemical Engineers. The Institution welcomes and values student members, offering special rates for technical meetings, together with Institution literature and guides to gaining employment. For further information contact the General Office in Chemical Engineering, phone (02) 9329 3046.

The Association of Professional Engineers, Scientists and Managers, Australia

APESMA is a professional organisation that represents the industrial interests of its members. Its major focus is on providing advice and assistance on employment-related matters, including individual representation and improving salaries and conditions for professional engineers, scientists and managers. The Association also provides members with legal, financial and insurance services and runs an extensive management education program.

APESMA has some 19,000 members in all areas of public and private sectors in Australia. In addition, 6500 university students in engineering and science-related disciplines are student members.

The Association invites students to become affiliate members for no charge while they are studying. This membership gives students access to information and advice on industrial experience, salary rates for graduates and contracts of employment. Student members receive The Student Update, a publication designed specifically for students, three times a year. This gives students some practical insight into aspects of the workplace to which they may not have given much thought, in particular the employment issues that affect them as professional engineers.

For more information and student membership application forms, contact Felicity Ryan, Membership Liaison Officer, phone (02) 9264 9300.

A short history of the Faculty

A hundred and seventeen years of engineering education

In 1883 the Faculty of Engineering celebrated one hundred years of engineering education at the University of Sydney.

At the beginning of March 1883 the first classes in engineering were held in the Main Building. Engineering then formed part of the newly created Faculty of Science (1882). The classes were attended by three matriculated students who were candidates for the engineering certificate and by seven non-matriculated students.

The lecturer in engineering was Mr W.H. Warren, who had been appointed in December 1882 following a decision by the University Senate to carry out significant revisions to the teaching of the University. These revisions, which provided for the establishment of Schools of Medicine, Science and Engineering, were unable to be implemented in 1881 for lack of staff, accommodation, and facilities.

In 1883, when the new engineering curriculum was introduced, the Senate reported that ‘great inconvenience [had] been felt during the year, both by the lecturers and the students, through the deficiency in accommodation for lecturing purpose … the room occupied by the Lecturer in Engineering [was] much too small to contain the apparatus required for the illustration of his lectures …’. A temporary structure was erected at the rear of the Main Building, and in 1885 classes moved to a fairly commodious low white building with a verandah facing Parramatta Road, on a site now partly occupied by the Holme Building.

In 1909 the new building for the P.N. Russell School of Engineering was sufficiently completed early in the year for the work of the school to be conducted within its walls. This building - an outcome of the extraordinary benefaction of Peter Nicol Russell - was formally opened by the Governor on 20 September 1909 at the same time as he opened the new Fisher Library building (now MacLaurin Hall). During the course of the next few decades extensions were made to the PNR Building until, with the expansion in student numbers in the 1950s and early 1960s, new facilities were constructed in the Darlington extension area across City Road. Since the mid seventies all departments have been accommodated in this area, although a wind tunnel in the Woolley Building is still in use by Aeronautical Engineering.

Foundations

Chemical Engineering Foundation

The Chemical Engineering Foundation within the University of Sydney was established in 1981 with the following objectives:

- to foster good communications between industry and commerce and the Department of Chemical Engineering,
- to advise on courses of instruction in Chemical Engineering,
- to encourage students of high calibre to work in the Department,
- to assist graduates in Chemical Engineering to make appropriate contributions to industry,
- to facilitate and develop research in Chemical Engineering with particular reference to industry oriented projects.

The Chemical Engineering Foundation provides an opportunity for executives in Australian industry to assess and discuss what is taught in the undergraduate course in chemical engineering.

Activities include financial support to the undergraduate program and to research by both postgraduates and staff. Continuing education courses for practising engineers are regularly arranged, publication of updates on the Department's research activities is undertaken twice yearly, and emphasis is placed on expanding industry-university collaboration.

Executive Officer Ms Trish Powers, phone (02) 9351 6743, fax (02) 9351 7180, email t.powers@chem.eng.usyd.edu.au.

The Civil Engineering Foundation

The Civil Engineering Foundation exists to assist postgraduate and undergraduate students to achieve their goals in the civil engineering industry. The Foundation acts in all areas non-academic and is a conduit between academic staff, parents and industry. In addition, the Foundation supports department activities and is an integral part of the department's function.

The Foundation is the arm of the civil engineering industry within the University receives all it's funding from the industry. The Foundation has gained a reputation for holding unusual fund raising activities being widely supported by industry.

This funding is used to foster education and research and to ensure the department is fully equipped to engage in such civil engineering research and development. Many civil engineering consultants, contractors and architects use the department's research capabilities before any major works are commenced.

The Foundation also promotes Lectures, Seminars, Short Courses, Masters programs and technical notes to ensure the Australian civil engineering industry is kept at the forefront of world practice.

Management of the Foundation is through a council of civil engineering industry representatives and department staff who meet regularly to monitor the progress of the department and its students.

The Foundation can be contacted through the Executive Officer:
Phone: (02) 9351 2127
Fax: (02) 9351 6284
Email: foundation@civil.usyd.edu.au

The Electrical Engineering Foundation

The Electrical and Information Engineering Foundation provides an opportunity for executives in Australian industry to assess and discuss what is taught in the undergraduate course in electrical engineering.

Activities include financial support to the undergraduate program and to research by both postgraduates and staff. Continuing education courses for practising engineers are regularly arranged, publication of updates on the Department's research activities is undertaken twice yearly, and emphasis is placed on expanding industry-university collaboration.

Executive Officer Mr John Taylor, phone (02) 9351 6743, fax (02) 9351 7180, email j.taylor@elec.eng.usyd.edu.au.

The Foundation can be contacted through the Executive Officer:
Phone: (02) 9351 2127
Fax: (02) 9351 6284
Email: foundation@elec.usyd.edu.au

The Information Engineering Foundation

The Information Engineering Foundation is to build a successful partnership between the
School of Electrical and Information Engineering, industry and the profession which facilitates, in Australia, the achievement of world-class performance through education, research and development.

The Foundation is managed by a Board made up of representatives from industry, university staff, students and graduates.

The Foundation's activities include:
- Networking
- Presenting University Research
- Industry Participation in University Research
- Business Development Facilitation
- Industry Participation in Curriculum Development
- Performance Benchmarking
- Bringing Industry and Students Together
- Encouraging Student and Teaching Excellence
- Entrepreneurship Training
- Sophia Technica Project
- Alumni Relations

President: Mr Allan Gillespie.
Director: Professor Trevor Cole.
Executive Officer: Mr Stuart Glanfield.
Phone: (02) 9351 7171
Fax: (02) 9351 7172
Email: eef@ee.usyd.edu.au
Web: www.ee.usyd.edu.au/eef/
General University Information

See also the Glossary for administrative information relating to particular terms.

Accommodation Service
The Accommodation Service assists students to find off-campus accommodation by maintaining an extensive database of suitable accommodation in various areas but primarily close to University or within easy access via public transport.
Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 3312
Fax: (02) 9351 8262
TTY: (02) 9351 3412
Email: accomm@stuserv.usyd.edu.au
Web: www.usyd.edu.au/su/accom

Admissions Office
The Admissions Office is responsible for overseeing the distribution of offers of admission to undergraduate students through the Universities Admissions Centre (UAC) and can advise prospective local undergraduate students on admission requirements. Postgraduate students should contact the appropriate faculty. Applicants without Australian citizenship or permanent residency should contact the International Office.
Student Centre
Ground Floor, Carslaw Building, F07
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 4117 or (02) 9351 4118
Fax: (02) 9351 4869
Email: admissions@records.usyd.edu.au

Applying for a course
Prospective (intending) undergraduate students must lodge an application form with the Universities Admissions Centre (UAC) by the last working day of September of the year before enrolment for all courses except the graduate dental and medical programs, which require direct application to the faculties of Dentistry and Medicine. Note that some faculties may have additional application procedures.

Assessment
For matters regarding assessment, refer to the relevant Department or School.

Casual Employment Service
The Casual Employment Service helps students find casual and part-time work during their studies and in University vacations.
Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia
Phone: (02) 9352 2589
Fax: (02) 9352 4713
Email: ces@stuserv.usyd.edu.au
Web: www.usyd.edu.au/su/cas_emp

Centre for English Teaching
The Centre for English Teaching provides a variety of full-time English language courses for adult students at all levels of proficiency, including General English from Beginner to Advanced, IELTS preparation, and a range of specific programs in English for Academic Purposes designed to bring international students up to the required English language entry levels for degree programs at the University.
Level 2, Building F, 88 Mallett St
Camperdown NSW 2006
Phone: (02) 9351 0706
Fax: (02) 9351 0701
Email: info@cet.usyd.edu.au
Web: www.usyd.edu.au/cet

Child Care
Contact the Child Care Coordinator for information about Children’s Services for students and staff of the University who are parents.
Child Care Coordinator
Level 7, Education Building, A35
Phone: (02) 9351 5667
Fax: (02) 9351 7055
TTY: (02) 9351 3412
Email: childc@stuserv.usyd.edu.au
Web: www.usyd.edu.au/su/childcare

Co-op Bookshop
Sells textbooks, reference books, general books and software. Special order services available. The Co-op Bookshop is located at:
Sydney University Sports and Aquatic Centre, G09
Car Codrington St and Darlington Rd
Phone: (02) 9351 3705 or (02) 9351 2807
Fax: (02) 9660 5256
Email: syedu@mail.coop-bookshop.com.au
Web: www.coop-bookshop.com.au

Counselling Service
The Counselling Service aims to help students fulfil their academic, individual and social goals through professional counselling which is free and confidential.
Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 2228
Fax: (02) 9351 7055
TTY: (02) 9351 3412
Email: counsell@mail.usyd.edu.au
Web: www.usyd.edu.au/su/counsel

Disability Services
Disability Services is the principal point of contact and advice on assistance available for students with disabilities. The Service works closely with academic and administrative staff to ensure that students receive reasonable accommodations in all areas of their study. Assistance available includes the provision of notetaking, interpreters, and advocacy with academic staff to negotiate assessment and course requirement modifications where appropriate.
Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 4554
Fax: (02) 9351 7055
Email: disserv@stuserv.usyd.edu.au
Web: www.usyd.edu.au/su/disability

Enrolment and pre-enrolment
Students entering first year
Details of the enrolment procedures will be sent to new undergraduate students with their UAC Offer of Enrolment. Enrolment takes place at a specific time and date, depending on your surname and the faculty in which you are enrolling, but is usually within the last week of January. You must attend the University in person or else nominate, in writing, somebody to act on your behalf. On your enrolment day, you pay the compulsory fees for joining the Student Union, the Students’ Representative Council and the student sporting...
bodies. Fees for certain courses are also payable at enrolment as is upfront HECS if you decide to pay with this option. You also choose your first-year units of study, so it's important to consult the faculty handbook before enrolling. Faculty handbooks can be purchased at the Student Centre, or found on the web at www.usyd.edu.au/studentcentre/enrolments.

Re-enrolling students

For re-enrolling students, enrolment is accomplished via pre-enrolment which is compulsory. A pre-enrolment package is sent to all enrolled students in early October which contains instructions on pre-enrolment procedures.

Examinations

The Examinations and Exclusions Office is usually responsible for examination seat numbers, examination timetabling and examination arrangements. This information is available to students via the web (MyUni). Examinations and Exclusions Office

Student Centre
Level 1, Carslaw Building, F07
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 4005 or (02) 9351 5054
Fax: (02) 9351 7330
Email: exams.office@exams.usyd.edu.au

Note that some faculties, such as the Sydney Conservatorium of Music, make all examination arrangements for the units of study that they offer.

Fees

The Fees Office provides advice to students on how to pay fees, where to pay, and if payments have been received. Margaret Tefler Building, K07
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 5222
Fax: (02) 9351 4202

Financial Assistance Office

The University has a number of loan funds and bursaries to assist students who experience financial difficulties. Assistance is not intended to provide the principal means of support but to help in emergencies and to supplement other income.

Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 2416
Fax: (02) 9351 7055
TTY: (02) 9351 3412
Email: fao@stuserv.usyd.edu.au
Web: www.usyd.edu.au/su/fin_assist

Freedom of Information

The University of Sydney falls within the jurisdiction of the NSW Freedom of Information Act, 1989. The Act requires information concerning documents held by the University to be made available to the public, to enable a member of the public to obtain access to documents held by the University and to enable a member of the public to ensure that records held by the University concerning his or her personal affairs are not incomplete, incorrect or out of date. By definition, a 'member of the public' includes staff or students of the University.

• Application may be made for access to access University documents, however the Act provides some exemptions to particular documents. The Act contains review and appeal mechanisms which are required to be explained to applicants where applicable. The University is required to report to the public on its FOI activities on a regular basis. The two reports provided are the Statement of Affairs and the Summary of Affairs. The Statement of Affairs contains information about the University, its structure and function and the kinds of documents held. The Summary of Affairs identifies each of the University's policy documents and provides a contact list for those wishing to access these documents. Further information, and copies of the current reports may be found at www.usyd.edu.au/arms/foi/.

• It is a requirement of the Act that applications be processed and a determination be made generally within 21 days. Determinations are made by the University's Registrar.

Graduations Office

The Graduations Office is responsible for organising graduation ceremonies and informing students of their graduation arrangements.

Ground Floor, Carslaw Building, F07
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 3199, (02) 9351 4009
Protocol: (02) 9351 4612
Fax: (02) 9351 5072
Email: d.obrien@exams.usyd.edu.au

(Grievances) appeals

Many decisions about academic and non-academic matters are made each year and you may consider that a particular decision affecting your candidature for a degree or other activities at the University may not have taken into account all the relevant matters.

• In some cases the by-laws or resolutions of the Senate (see University Calendar) specifically provide for a right of appeal against particular decisions; for example, there is provision for appeal against academic decisions, disciplinary decisions and exclusion after failure.

• A document outlining the current procedures for appeals against academic decisions is available at the Student Centre, at the SRC, and on the University's web site at www.usyd.edu.au/su/planning/policy/

• If you wish to seek assistance or advice regarding an appeal, contact:

Students' Representative Council
Level 1, Wentworth Building, G01
The University of Sydney
NSW 2006 Australia
Phone: (02) 9660 5222

HECS and fees

The HECS and Fees Office in the Student Centre can provide advice on your HECS or fee liability at any time.

Student Centre
Ground Floor, Carslaw Building, F07
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 2086, (02) 9351 5659, (02) 9351 5062
Fax: (02) 9351 5081

International Student Centre

The International Student Centre consists of the International Office (IO), the International Student Services Unit (ISSU) and the Study Abroad and Exchange Office. The International Office provides assistance with application, admission and enrolment procedures and administers scholarships for international students. The ISSU provides a wide range of international student support services including arranging arrival accommodation and offering advice and professional counselling. The Study Abroad and Exchange Unit assists both domestic and international students who wish to enrol for Study Abroad or Exchange programs.

International Student Centre
Services Building, G12
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 4079
Fax: (02) 9351 4013
Email: info@io.usyd.edu.au
Web: www.usyd.edu.au/international/index.html
Intranet

USYDnet is the University of Sydney's intranet. It provides easy access to staff and student directories, maps, software and useful resources for both staff and students. As well as delivering information, the intranet provides interactive services such as the Calendar of Events, where staff and students can enter events and publish them university-wide.

MyUni is the personalised section of USYDnet. All staff and students are provided with access to MyUni through a login name and password. This enables them to customise the information they see and also receive delivery of personal information such as exam results and seat numbers. MyUni is a portal from which students and staff can complete tasks that were previously only possible offline. Web enrolment variation is one of the first of many facilities that are helping to move the everyday tasks of all members of the university online.

Learning Centre

The Learning Centre assists students to develop the generic skills which are necessary for learning and communicating knowledge and ideas at university. The Centre is committed to helping students to achieve their academic potential throughout their undergraduate and postgraduate studies.

Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 3853
Fax: (02) 9351 4865
Email: lc@stuserv.usyd.edu.au
Web: www.usyd.edu.au/su/lc

Library

Students are welcome to use any of the 23 libraries in the University. The student card is also the library borrower's card. Further details of the libraries, including services provided, locations and opening hours are available on the Library's homepage www.library.usyd.edu.au as well as in the printed Library Guide, available at any library. Consult the Library staff for assistance.

The libraries listed below are located on the Camperdown/Darlington campus unless otherwise specified.

Alexander Mackie Curriculum Resources Library
Old Teachers College, A22
Phone: (02) 9351 6254
Fax: (02) 9351 7766
Email: curriculum@library.usyd.edu.au

Architecture Library
Wilkinson Building, G04
Phone: (02) 9351 2775
Fax: (02) 9351 4782
Email: architecture@library.usyd.edu.au

Badham Library
Badham Building, A16
Phone: (02) 9351 2728
Fax: (02) 9351 3852
Email: badham@library.usyd.edu.au

Biochemistry Library
Biochemistry Building, (308
Phone: (02) 9351 2231
Fax: (02) 93517699
Email: biochemistry@library.usyd.edu.au

Burkitt-Ford Library
Sir Edward Ford Building, A27
Phone: (02) 9351 4364
Fax: (02) 9351 7125
Email: burkittford@library.usyd.edu.au

Camden Library
University Farms, Camden, C15
Phone: (02) 9551 1627
Fax: (02) 4655 6719
Email: camden@library.usyd.edu.au

Chemistry Library
Chemistry Building, FI 1
Phone: (02) 9351 3609
Fax: (02) 9351 3329
Email: chemistry@library.usyd.edu.au

Dentistry Library
United Dental Hospital, 2 Chalmers St, Surry Hills, C12
Phone: (02) 9351 8331
Fax: (02) 9212 5149
Email: dentistry@library.usyd.edu.au

Engineering Library
P N Russell Building, J02
Phone: (02) 9351 2138
Fax: (02) 9351 7466
Email: engineering@library.usyd.edu.au

Fisher Library
Eastern Ave, F03
Phone: (02) 9351 2393
Fax: (02) 9351 2830
Email: fishinf@library.usyd.edu.au

Geosciences Library
Madsen Building, F09
Phone: (02) 9351 6456
Fax: (02) 9351 6459
Email: geosciences@library.usyd.edu.au

Health Sciences Library
East St, Lidcombe, C42
Phone: (02) 9351 9423
Fax: (02) 9351 9421
Email: h.knight@cchs.usyd.edu.au

Law Library
Law School, 173-175 Phillip St, Sydney, C13
Phone: (02) 9351 0216
Fax: (02) 9351 0301
Email: library@law.usyd.edu.au

Mathematics Library
Carslaw Building, F07
Phone: (02) 9351 2974
Fax: (02) 9351 5766
Email: madmathematics@library.usyd.edu.au

Medical Library
Bosch Building, D05
Phone: (02) 9351 2413
Fax: (02) 9351 2427
Email: medical@library.usyd.edu.au

Music Library
Seymour Centre, J09
Phone: (02) 9351 3334
Fax: (02) 9351 7343
Email: music@library.usyd.edu.au

Nursing Library
88 Mallett St, Camperdown, M02
Phone: (02) 9351 0541
Fax: (02) 9351 0634
Email: nursing@library.usyd.edu.au
General University information

**Orange library**
Leeds Parade, Orange
Phone: (02) 6360 5594
Fax: (02) 6360 5637
Email: lib@orange.usyd.edu.au

**Pharmacy Library**
Pharmacy Building, A15
Phone: (02) 9351 2333
Fax: (02) 9351 4445
Email: pharmacy@library.usyd.edu.au

**Physics Library**
New Wing, Physics Building, A29
Phone: (02) 9351 2550
Fax: (02) 9351 7767
Email: physics@library.usyd.edu.au

**Power Research Library**
Mills Building, A26
Phone: (02) 9351 2148
Fax: (02) 9351 7323
Email: john.spencer@arthist.usyd.edu.au

**Sydney College of the Arts Library**
Balmain Rd, Rozelle, N01
Phone: (02) 9351 1036
Fax: (02) 9351 1043
Email: scalib@sca.usyd.edu.au

**Sydney Conservatorium of Music Library**
109 Pitt St, Sydney, C41
Phone: (02) 9230 3701
Fax: (02) 9230 3707
Email: csymes@commusic.usyd.edu.au

**Mathematics Learning Centre**
The Mathematics Learning Centre runs bridging courses in mathematics at the beginning of the academic year (fees apply), and provides on-going support during the year through individual assistance and small group tutorials.
Level 4, Carslaw Building, F07
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 4061
Fax: (02) 9351 5797
Email: mlc@stuserv.usyd.edu.au

Web: www.usyd.edu.au/mlc

**Student Centre**
Level 1, Carslaw, F07
The University of Sydney
NSW 2006 Australia
The Student Centre enquiry counter can assist with the following types of enquiries:
General Enquiries: (02) 9351 3023
Academic Records: (02) 9351 4010
Discontinuation of Enrolment: (02) 9351 3023
Handbooks: (02) 9351 5057
Prizes: (02) 9351 5060
Fax: (02) 9351 5081, (02) 9351 5350 (Academic Records)

**Student identity cards**
Student identity cards will be provided to all commencing students at in-person enrolment or will be mailed to all continuing students who have successfully pre-enrolled. The card must be carried with you at all times on the site of the University, it must be displayed during examinations and must be produced on demand of any member of the staff or any other officer of the University. The card incorporates a photograph which you are required to provide. The photograph is to be colour and passport-sized showing your head and shoulders only. The photograph will be laminated to your student identity card on the day of your in-person enrolment if you are a commencing student. Pre-enrolling continuing students will be advised where to attend to have their photos and cards laminated. Student identity cards also function as transport concession cards for those students deemed eligible by the transport authorities. Transport concession eligibility will be confirmed with the application of a holographic sticker on the card.

**Student Services**
Student Services exists to help you achieve your educational goals by providing personal, welfare, and academic support services to facilitate your success at University. Many factors can impact on your wellbeing while studying at University and Student Services can assist you in managing and handling these more effectively. Refer to Accommodation Service, Casual Employment Service, Child Care, Disability Service, Financial Assistance Office, Learning Centre, Mathematics Learning Centre.
Room 711, Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia
Web: www.usyd.edu.au/stuserv

**Timetabling Unit**
The timetabling unit in the Student Centre is responsible for producing students’ class and tutorial timetables. Students can obtain their Semester 1 timetables from the Wednesday of Orientation Week via the web.
The Sydney Conservatorium of Music operates in accordance with a local calendar of dates and produces a complete timetable for all teaching that it delivers. The timetable is available on enrolment at the Conservatorium.

**Other student assistance**

**Careers information**
The Careers Centre provides careers information, advice and counselling, and assists in finding course-related employment both while you’re studying and when you’re ready to commence your career.
Ground floor, Mackie Building, K01
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 3481
Fax: (02) 9351 5134
Email: info@careers.usyd.edu.au
Web: www.careers.usyd.edu.au

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Information Protection Act or the Privacy Management Plan
Freedom of Information Act, the Privacy and Personal Principles (IPPs) which regulate the collection, management, use and disclosure of personal information.

* In response to Section 33 of the Act the University has developed a Privacy Management Plan which includes a new University Privacy Policy incorporating the requirements of the IPPS. Both the Plan and the new University Privacy Policy were endorsed by the Vice-Chancellor on 28 June 2000. The Privacy Management Plan sets out the IPPs and how they apply to functions and activities carried out by the University.

Further information and a copy of the Plan may be found at: www.usyd.edu.au/arms/privacy/. Any questions regarding the Freedom of Information Act, the Privacy and Personal Information Protection Act or the Privacy Management Plan should be directed to:

Tim Robinson: (02) 9351 4263 or
Judith Russell: (02) 9351 2684
Email: foi@mail.usyd.edu.au
General University information

Continuing Education
University Preparation courses; bridging courses; Accounting
Extension program; study skills courses; essay writing
courses; and many others for career development, skill
enhancement and general interest.
Centre for Continuing Education
Mackie Building, KO1
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 2907
Fax: (02) 9351 5022
Email: info@cce.usyd.edu.au
Web: www.usyd.edu.au/cce

University Health Service
Offers full general practitioner services and emergency
medical care to all members of the University community.
University Health Service (Wentworth)
Level 3, Wentworth Building, G01
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 3484
Fax: (02) 9351 4110
Email: director@unihealth.usyd.edu.au
Web: www.unihealth.usyd.edu.au/

Koori Centre and Yooroang Garang
The Koori Centre provides tutorial assistance: access to
computers, Indigenous counsellor, Aboriginal Studies library
studio rooms, Orientation program at the beginning of the year,
and assistance in study and learning skills. Education Unit:
courses in Education for ATSI students. Indigenous Studies
Unit: aims to increase the awareness of Indigenous Australian
issues through courses across the University.
Ground Floor, Old Teachers' College, A22
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 4095
Fax: (02) 9351 4338
Email: koori@koori.usyd.edu.au
Web: www.koori.usyd.edu.au/

Language Centre
The Language Centre supports the teaching and research of
the 34 languages taught through the Faculty of Arts and also
offers self-study materials in over 140 languages. Members
have access to audio-visual kits, reference books, videos,
satellite television, computer software and magazines. The
Language Centre also runs courses in Spanish, Russian,
Portuguese, Modern Irish and Welsh.
Level 2, Christopher Brennan Building, A18
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 2371
Fax: (02) 9351 4724
Email: language.enquiries@language.usyd.edu.au
Web: www.usyd.edu.au/langcent

Scholarships
The Scholarships Office is the University's internal and
external point of contact for matters related to scholarships
and awards. It provides information on undergraduate and
postgraduate award opportunities available at the University as
well as from external funding bodies, and advice to faculties
and administrative units on the establishment and
administration of their specific awards. The Scholarships
Office is also responsible for administering University-wide
awards and major government funded research scholarships.
Research and Scholarships Office
Scholarships Administration
Room K4.01, Main Quadrangle, A14
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 3250
Fax: (02) 9351 3256
Email: scholars@reschols.usyd.edu.au
Web: www.usyd.edu.au/su/reschols/scholarships/schol.html

Student organisations

Students' Representative Council
Level 1, Wentworth Building, G01
The University of Sydney
NSW 2006 Australia
Phone: (02) 9660 5222 Editors, Honi Soit/Legal Aid
(02) 9660 4745 Second-hand Bookshop
(02) 9351 0691 Mallett St
(02) 9230 3777 Pitt St-Conservatorium
Fax: (02) 9660 4260
Email: postmaster@src.usyd.edu.au
Sydney University Sports Union
Provides services, facilities and clubs for sport, recreation and
fitness.
Sports and Aquatic Centre, G09
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 4960
Fax: (02) 9351 4962
Email: sportsunion@susu.usyd.edu.au
Web: www.susport.com.au

University of Sydney Union
Provides welfare, social and recreational services to the
University community.
Holme Building, A09
The University of Sydney
NSW 2006 Australia
Phone: (02) 9563 6000 Switchboard/Enquiries
(02) 9563 6282 Academic Dress
(02) 9563 6103 ACCESS Centre, Manning
(02) 9563 6269 Campus Store, Holme
(02) 9563 6016 Campus Store, Wentworth
(02) 9563 6160 Clubs and Societies Office
(02) 9563 6010 School Tutoring Coordinator
(02) 9563 6032 Union Broadcasting Studio
(02) 9563 6115 Welfare & Information Services Manager
Fax: (02) 9563 6239
Email: email@usu.usyd.edu.au
Web: www.usu.usyd.edu.au/

Women's Sports Association
Provides for students, predominantly women, to participate in
sport and recreation through the provision of faculties, courses
and personnel.
Room 214, Sports Centre, A30
The University of Sydney
NSW 2006 Australia
Phone: (02) 9351 8111, (02) 9351 8112
Fax: (02) 9660 0921
Email: secretary@suwsa.usyd.edu.au
Web: www.usyd.edu.au/su/suwsa/welcome.html
Glossary

This glossary describes terminology in use at the University of Sydney.

Academic Board
The Academic Board is the senior academic body within the University. In conjunction with Faculties, the Academic Board has responsibility for approving, or recommending to Senate for approval, new or amended courses and Units of Study (UoSs), and policy relating to the admission of students. (For further information, see the University Calendar)

Academic Cycle
The Academic Cycle is the program of teaching sessions offered over a year. Currently the cycle runs from the enrolment period for 1st Semester through to the completion of the processing of results at the end of 2nd Semester.

Academic Record
The Academic Record is the complete academic history of a student at the University. It includes, among other things, personal details, all Units of Study and Courses taken, assessment results (marks and grades), awards and prizes obtained, infringements of progression rules, approvals for variation in course requirements and course leave, thesis and supervision details.

Access to a student's Academic Record is restricted to authorised University staff. A student’s Academic Record is not released to a third party without the written authorisation of the student.

Academic Transcript
An Academic Transcript is a printed statement setting out a student’s academic record at the University. There are two forms of Academic Transcripts: External and Internal.

Academic Year
An Academic Year is a normal full-time program taken in a course in a year. Some courses consist of stages, which may readily be equated with Academic Year. Others use the aggregation of credit points to do this (eg, 48 credit points = an Academic Year).

Academic Cycle, Stage
Addresses
All enrolled students need to have a current postal address recorded on FlexSIS to which all Official University correspondence is sent.

Admission
Admission is governed by the University’s Admission Policy and is the process for identifying applicants eligible to receive an initial offer of enrolment in a course at the University. Admission to most courses is based on performance in the HSC with applicants ranked on the basis of their UAI. Other criteria such as a portfolio, interview, audition, or results in standard tests may also be taken into account for certain courses.

Admission (deferment)
An applicant who receives an offer of admission to a course may apply to defer enrolment in that course for one semester or one academic cycle.

Admission Basis
The main criterion used by a Faculty in assessing an application for admission to a course. The criteria used include, among other things, previous secondary, TAFE or tertiary studies, work experience. Special Admission and the Universities Admission Index (UAI).

Admission Mode
Admission Mode is a classification based on how a student was admitted to a course, for example 'UAC or 'direct'.

Admission Period
The period during which applications for admission to courses are considered. The main Admission Period takes place before the first semester, but there may also be an Admission Period for mid year applicants before the beginning of the second semester and other Admission Periods.

Admission Reply
A code used by FlexSIS to indicate whether an applicant who has received an offer has accepted the offer or not.

Admission Result
A code used by FlexSIS to indicate the result of a direct application to study at the University (eg, Offer, Unsuccessful, Withdrawn).

Admission Year
The year the student began the course.

Advanced Diplomas
(See Award Course)
Advanced Standing
(See Credit)

Advisor
A member of academic staff appointed in an advisory role for some postgraduate coursework students.

Annual Progress Report
The Annual Progress Report is a form issued by Faculties which is used to monitor a research student's progress each year. The form provides for comments by the student, the Supervisor, the Head of the Department and the Dean (or nominee). The completed form is attached to the student's official file.

Australian Postgraduate Awards. (See also Scholarships, UPA)

Appeals
Students may lodge appeals against academic or disciplinary decisions. FlexSIS will record an academic appeal (eg, against exclusion) while they are under consideration and will record the outcome of the appeal. Disciplinary (that is, non-academic) appeals are not recorded on FlexSIS.

Assessment
The process of measuring the performance of students in UoSs and courses. The assessment of performance in a UoS may include examinations, essays, laboratory projects, or assignments.

Associate Supervisor
A person who is appointed in addition to the Supervisor of a research student who can provide the day-to-day contact with the candidate or provide particular expertise or additional experience in supervision.

Associate Supervisor (teacher), Research Supervisor, Supervision

Assumed Knowledge
For some Units of Study, a student is assumed to have passed a relevant subject at the HSC and this is called Assumed Knowledge. While students are generally advised against taking a Unit of Study for which they do not have the assumed knowledge, they are not prevented from enrolling in the Unit of Study.

(See also Prerequisite)
Attendance Mode
Refers to whether a Unit of Study is taken by the student internally (i.e., by attending classes at a campus of the university) or externally (i.e., remotely by correspondence or other distance education means). While most Units of Study are offered internally, the Faculty of Health Sciences and the Orange Agricultural College offer Units of Study externally.

Attendance Type
Refers to whether the student is studying part-time or full-time. For coursework students this is a function of course load: the proportion being undertaken by the student of the normal full-time load specified for the course load over the academic cycle or at least 0.375 if only enrolling in half of an academic year (one semester). It is important to note, however, that, for some purposes, to be considered full-time a student may need to be enrolled in at least 0.375 in each session. Research students, with the approval of their Faculty, nominate whether they wish to study part-time or full-time. The Attendance Status is then recorded on FlexSIS as part of the application or enrolment process.

AusAID
Australian Agency for International Development.

Award Course
An award course is a formally approved program of study that can lead to an academic award granted by the University. The University broadly classifies courses as Undergraduate and Postgraduate (research and coursework). The Award Courses offered by the University are:

- Higher Doctorates
- Doctor of Philosophy (PhD)
- Doctorates by research and advanced coursework
- Master's Degree
- Graduate Diploma
- Graduate Certificate
- Bachelor's Degrees
- Advanced diplomas
- Diplomas
- Certificates

(See also Major, Minor and Stream)

Bachelor's Degree
The highest undergraduate award offered at the University of Sydney. A Bachelor's degree course normally requires three or four years of full-time study (or the part-time equivalent).

(See also Award Course)

Barrier
A barrier is an instruction placed on a student's FlexSIS record that prevents the student from re-enrolling or graduating.

(See also Deadline (fees), Suppression of Results)

Board of Examiners
A Board of Examiners was a body appointed by a Faculty or Board of Studies which met to approve the results of all students undertaking Courses supervised by that Faculty or Board of Studies. Boards of Examiners were dis-established following the revision of the University's examination procedures in 2001. (See also Assessment, Result Processing, Result Processing Schedule)

Board of Studies
An academic body which supervises a course or courses and which is similar to a Faculty except that it is headed by a Chair rather than a Dean and does not supervise PhD candidates.

(See Scholarships)

Business Address
FlexSIS can record a student's Business Address and contact details.

(See also Addresses, Permanent Home Address, Semester Address, Temporary Address)

Cadigal Program
The Cadigal Program is a University wide access and support scheme for Aboriginal and Torres Strait Islanders.

Campus
The grounds on which the University is situated. There are eleven campuses of the University of Sydney: Burren Street (Australian Graduate School of Management), Camperdown and Darlington ('Main Campus'), Camden (Agriculture and Veterinary Science), Conservatorium (Conservatorium of Music), Cumberland (Health Sciences), Mallett Street (Nursing), Orange (Faculty of Rural Management), Rozelle (Sydney College of the Arts), St James (Law) and Surry Hills (Dentistry).

Census date
(See HECS Census Date)

Ceremony
(See Graduation Ceremony)

Chancellor
The non-executive head of the University. An honorary position, the Chancellor chairs meetings of the University's governing body, the Senate, and presides over graduation ceremonies amongst other duties.

Class list
A listing of all Currently Enrolled students in a particular Unit of Study.

(See also Unit of Study)

Combined Course
A course which leads to two awards. For example the Arts/Law course leads to the separate awards of Bachelor of Arts and Bachelor of Laws.

Combined degree
(See Combined Course)

Commencing Student
A student enrolling in an award course at the University of Sydney for the first time. The DETYA Glossary provides a more detailed definition.

Compulsory Subscription Rates
There are two rates for some annual subscriptions: full-time and part-time.

(See also Compulsory Subscriptions)

Compulsory Subscription Waiver Provision
Certain students over a certain age or with disabilities or medical conditions may be exempted from the subscription to the sports body.

Students with a conscientious objection to the payment of subscriptions to Unions of any kind may apply to the Registrar for exemption. The Registrar may permit such a student to make the payment to the Jean Foley Bursary Fund instead.

(See also Compulsory Subscriptions)

Compulsory Subscriptions
Each enrolled student is liable to pay annual (or semester) subscriptions as determined by the Senate to the student organisations at the University. These organisations are different on different campuses. There are different organisations for undergraduate and postgraduate students.

At the Main Campus, compulsory submissions depend on the level of study:

- Undergraduate - the University of Sydney Union, Students Representative Council (SRC) and the University Men's Sports Union or the University Women's Sports Association.
- Postgraduate - the University of Sydney Union and the Sydney University Postgraduate Representative Association (SUPRA).

At other campuses, student organisations include:

- the Cumberland Student Guild
- student organisations at Orange Agricultural College and the Sydney College of the Arts.

(See also Compulsory Subscription Rates, Compulsory Subscription Waiver Provision, Joining Fee, Life membership)
Course Type
Course Type is a DETYA code.

Coursework
Coursework is a classification used to describe those courses that consist of UoSs rather than research work. All Undergraduate courses are coursework programs.
Postgraduate courses can be either research courses or coursework courses. (See also Course (Research)

Credit
Students admitted to a course at the University may be granted Advanced Standing based on previous attainment in another course at the University, or at an overseas institution. The credit points granted count towards the course.
 Credit may be granted as specific credit or non-specific credit.
 Specific credit is the recognition of previously completed studies as directly equivalent to UoSs. Specific credit is recorded on FlexSIS as credit for a particular UoS or UoSs.
 Non-Specific credit takes the form of a 'block credit' for a specified number of credit points at a particular level (eg, 12 Junior level credit points). These credit points may be in a particular subject area. The credit is not linked to a specific UoS. (See also Waiver)

Credit Points
Credit Points are a measure of value indicating the contribution each Unit of Study provides towards meeting course completion requirements stated as a total Credit Point value. Each Unit of Study will have a Credit Point value assigned to it, normally in the range 3 to 24. Resolutions of Senate set the number and level of Credit Points required for graduation.

Cross-institutional Enrolment
Cross-institutional Enrolment is an enrolment in Units of Study at one university to count towards an award course at another university. Cross-institutional enrolments incur a HECS liability or tuition fee charge at the institution at which the UoS is being undertaken. Students pay compulsory subscriptions to one university only (usually their home university - ie, the university which will award their degree).

DAC (Data Audit Committee)
DAC is a sub-committee of the VCAC Enrolment Working Party, chaired by the Registrar, with membership including the Deans, the Student Centre, FlexSIS and the Planning Support Office. Its role is to oversee the integrity and accuracy of the Course and Unit of Study data as strategic university data. It has a role in advising the Academic Board on suggested policy changes with relation to Course and Unit of Study data.

Deadlines (enrolment variations)
(See Enrolment Variations)

Deadlines (fees)
The University has deadlines for the payment of fees (eg, HECS, Compulsory Subscriptions, course fees etc). Students who do not pay fees by these deadlines may have their enrolment cancelled or they may have a barrier placed on the release of their record. (See also Barrier)

Dean
The head of a Faculty or the principal or director of a College (such as the Conservatorium of Music or the Sydney College of Arts).

Dean's Certificate
A statement from the Dean certifying that all requirements, including fieldwork and practical work, have been met and that the student is eligible to graduate. Not all Faculties use Deans' Certificates. In Faculties that do, qualified students have 'Dean's Certificate' noted on their academic record.
DETYA
The Department of Education Training and Youth Affairs is the Commonwealth Government Department responsible for Higher Education. The University is required to provide DETYA with information about its students three times a year. The Government in its funding deliberations uses this information.

Degree
(See also Award Course, Bachelor's Degree)

Department
For the purposes of FlexSIS, a Department is the academic unit, which is responsible for teaching and examining a UoS. It may be called a School, a Department, a Centre or a Unit within the University.

Differential HECS
(See Higher Education Contribution Scheme (HECS))

Diploma
The award granted following successful completion of Diploma course requirements. A Diploma course usually requires less study than a degree course. Graduate Diploma courses are only available to students who already hold an undergraduate degree.

Direct Admissions
For some courses, applications may be made directly to the University. Applications are received by Faculties or the International Office, registered on FlexSIS and considered by the relevant Department or Faculty body. Decisions are recorded on FlexSIS and FlexSIS produces letters to applicants advising them of the outcome.

Disability Information
Students may inform the University of any temporary or permanent disability, other than a financial disability, which affects their life as a student. Disability Information is recorded in FlexSIS but it is only visible to particular authorised users because of its sensitive nature.

Discipline Codes
Discipline Codes are four-letter codes for each area of study available at the university (eg. CHEM Chemistry, ECON Economics)

Discipline Group
A DETYA code used to classify UoSs in terms of the subject matter being taught or being researched.

Discontinuation (Course)
(See Enrolment Variation)

Discontinuation (Unit of Study)
(See Enrolment Variation)

Dissertation
A Dissertation is a written exposition of a topic and may include original argument substantiated by reference to acknowledged authorities. It is a required Unit of Study for some postgraduate award courses in the Faculties of Architecture and Law.

Doctor of Philosophy (PhD)
(See Award Course, Doctorate, PhD)

Doctorate
The Doctorate and the PhD are high-level postgraduate awards available at the University of Sydney. A Doctorate course normally involves research and coursework; the candidate submits a thesis that is an original contribution to the field of study. Entry to a Doctorate course often requires completion of a Master's degree course. Note that the Doctorate course is not available in all Departments at the University of Sydney.

(See also Award Course, PhD)

Earliest date
(See Research Candidature)

EFTSU
The Equivalent Full-Time Student Unit (EFTSU) is a measure of student load expressed as a proportion of the workload for a standard annual program for a student undertaking a full year of study in a particular award course. A student undertaking the standard annual program of study (normally 48 credit points) generates one EFTSU.

EFTYR
The Effective Full-time Enrolment Year (EFTYR) is a calculation of how long, in terms of equivalence to full-time years of enrolment, a student has been enrolled in a course. If a student has always been full-time, the calculation is straightforward (for example, the fifth year of enrolment is EFTYR 5). If the student has had a mixture of part-time and full-time enrolment, this can be equated with an EFTYR.

Enrolment
A student enrolls in a course by registering with the Supervising Faculty in the Units of Study to be taken in the coming year, semester or session. The student pays whatever fees are owing to the University by the deadline for that semester. New students currently pay on the day they enrol which is normally in early February. Students already in a course at the University re-enrol each year or semester; for most students Pre-enrolment is required.

Enrolment Non Award
Non Award enrolment is an enrolment in a Unit or Units of Study, which does not count towards a formal award of the University. Normally Tuition Fees are levied on non-award Units of Study.

Enrolment Status
A student’s enrolment status is either:
• Enrolled; or
• Not enrolled
An enrolment status is linked to an enrolment status reason or category.

Enrolment Status Reason/ Category
Not enrolled status reasons/categories include: Withdrawn, Totally Discontinued, Cancelled, on Leave (suspended), Transferred, Lapsed, Terminated, Qualified and Conferred.

Enrolment Variation
Students may vary their enrolment at the beginning of each semester. Each Faculty determines its deadlines for variations, but HECS liability depends on the HECS Census Date. (See also HECS)

Enrolment Year
See EFTYR, Stage

Examination
See Examination Paper Code, Examination Period, Supplementary Exams

Examination Paper Code
A code that identifies each individual examination paper. Used to help organise examinations.

Examination Period
The Examination Period is the time set each semester for the conduct of formal examinations.

Exchange Student
An Exchange student is either a student of this University who is participating in a formally agreed program involving study at an overseas university or an overseas student who is studying here on the same basis. The International Office provides administrative support for some exchanges.

Students at this University will have recorded on their academic record the fact that they have participated in an exchange program.
Exclusion
The Faculty may ask a student whose academic progress is considered to be unsatisfactory to Show Cause why the student should be allowed to re-enrol. If the Faculty deems the student’s explanation unsatisfactory or if the student does not provide an explanation the student may be excluded either from a Unit of Study or from a course. An excluded student may apply to the Faculty for permission to re-enrol. Normally at least two years must have elapsed before such an application would be considered.

University policy relating to exclusion is set out in the Calendar.

(See also Senate Appeals)

External
See Attendance Mode

External Transcript
An External Transcript is a certified statement of a student’s academic record printed on official university security paper. It includes the student’s name, any credit granted, all courses the student was enrolled in and the final course result and all UoSs attempted within each course together with the UoS result (but not any UoS which has the status of Withdrawn). It also includes any scholarships or prizes the student has received. Two copies are provided to each student on graduation (one with marks and grades for each UoS and one with grades only). External transcripts are also produced at the request of the student. The student can elect either to have marks appear on the transcript or not.

(See also Academic Transcript, Internal Transcript)

Faculty
A Faculty, consisting mainly of academic staff members and headed by a dean, is a formal part of the University’s academic governance structure, responsible for all matters concerning the award courses that it supervises (see the 1999 Calendar, pp 110-111). Usually, a Faculty office administers the Faculty and student or staff inquiries related to its courses. The Calendar sets out the constitution of each of the University’s 17 Faculties.

(See also Board of Studies, Supervising Faculty)

Fail
A mark of less than 50% which is not a Concessionary Pass.

(See also Results)

Fee Paying Students
Fee Paying Students are students who pay tuition fees to the University and are not liable for HECS.

Fee Rate
Local fees are charged in bands, a band being a group of subject areas. The bands are recommended by Faculties and approved by the DV-C (Planning and Resources).

Fee Type
Fee Type can be International or Local.

FlexSIS
FlexSIS is the computer-based Flexible Student Information System at the University. FlexSIS holds electronically details of courses and UoSs being offered by the University and the complete academic records of all students enrolled at the University. FlexSIS also holds the complete academic records of many (but not all) past students of the university. For past students whose complete records are not held on FlexSIS, there will be a reference on FlexSIS to card or microfiche records where details are kept.

Full-Time Student
(See Attendance Status, EFTSU)

Grade
A Grade is a result outcome for a Unit of Study normally linked with a mark range. For example, in most Faculties, a mark in the range 85-100 attracts the Grade ‘High Distinction’ (‘HD’).

(See also Mark)
In absence

In absentia is Latin for 'in the absence of'. Awards are conferred in absentia when a graduand does not, or cannot, attend the graduation ceremony scheduled for them.

Those who have graduated in absentia may later request that they be presented to the Chancellor at a graduation ceremony. (See also Graduation)

Instrumental Supervisor (teacher)

All students at the Conservatorium of Music and BMus students on the Camperdown campus have an instrumental teacher appointed. (See also Advisor, Associate Supervisor, Research Supervisor, Supervision.)

Internal

(In See Attendance Mode)

Internal Transcript

An Internal Transcript is a record of a student's academic record for the University's own internal use. It includes the student's name, SID, address, all courses in which the student was enrolled and the final course result and all UoSs attempted within each course together with the UoS result. (See also Academic Transcript, External Transcript)

International Student

An International Student is required to hold a visa to study in Australia and may be liable for international tuition fees. Any student who is not an Australian or New Zealand citizen or a permanent resident of Australia is an international student. New Zealand citizens are not classified as international students but have a special category under HECS that does not permit them to defer their HECS liability. (See also Local Student, Student Type)

Joining Fee

Students enrolling for the first time pay, in addition, a joining fee for the University of Sydney Union or equivalent student organisation. (See also Compulsory Subscription)

Leave

(See Course Leave)

Life membership

Under some circumstances (eg, after five full-time years of enrolments and contributions) students may be granted life membership of various organisations, which means they are exempt from paying yearly fees. (See also Compulsory Subscription)

Load

Load for an individual student is the sum of the weights of all the UoSs in which the student is enrolled. (See also EFTSU, HECS)

Local Student

A Local Student is either an Australian or New Zealand citizen or Australian permanent resident. New Zealand citizens are required to pay their HECS upfront. (See also Fee type, HECS, International Student)

Major

A Major is a defined program of study, generally comprising specified Units of Study from later stages of the Award Course. Students select and transfer between Majors by virtue of their selection of Units of Study. One or more Majors may be prescribed in order to satisfy course requirements. (See also Award Course, Minor and Stream)

Major Timetable Clash

Used by FlexSIS to denote occasions when a student attempts to enrol in Units of Study which have so much overlap in the teaching times that it has been decided that students must not enrol in the units together.

Mark

An integer (rounded if necessary) between 0 and 100 inclusive, indicating a student's performance in a UoS. (See also Grade)

Master's Degree

A postgraduate award. Master's degree courses may be offered by coursework, research only or a combination of coursework and research. Entry to the course often requires completion of an Honours year at an undergraduate level. (See also Award Course)

Method of candidature

A course is either a research course or a coursework course and so the Methods of Candidature are 'Research' and 'Coursework'. (See also Course, Course (Research), Coursework)

Minor

A Minor is a defined program of study, generally comprising Units of Study from later stages of the Award Course and requiring a smaller number of Credit Points than a Major. Students select and transfer between Minors (and Majors) by virtue of their selection of Units of Study. One or more Minors may be prescribed in order to satisfy course requirements. (See also Award Course, Major and Stream)

Minor Timetable Clash

Used by FlexSIS to denote occasions when a student attempts to enrol in Units of Study which have some identical times of teaching.

Mutually Exclusive Units of Study

(See Prohibited Combinations of Units of Study)

MyUni

MyUni is a personalised space for staff and students on the University of Sydney's intranet, called USYDnet. MyUni is used to deliver information and services directly through a central location, while also allowing users to customise certain information. Students are able to access such services as Exam Seat Numbers, Results, Timetables and FlexSIS Enrolment Variations on MyUni.

Non Award

(See Enrolment - Non Award)

OPRS

Overseas Postgraduate Research Scholarship.

Orientation Week

Orientation or 'O Week', takes place during the week prior to lectures in Semester 1. During O Week, students can join various clubs, societies and organisations, register for courses with departments and take part in activities provided by the University of Sydney Union.

Part-time student

(See Attendance Status, EFTSU)

Permanent Home Address

The Permanent Home Address is the address for all official University correspondence both inside and outside of Semester time (eg, during Semester breaks), unless overridden by Semester Address. (See also Addresses, Business Address, Semester Address, Temporary Address)

PhD

The Doctor of Philosophy (PhD) and other Doctorate awards are the highest awards available at the University of Sydney. A PhD course is normally purely research-based; the candidate submits a thesis that is an original contribution to the field of study. Entry to a PhD course often requires completion of a Master's degree course. Note that the PhD course is available in most departments in the University of Sydney. (See also Award Course, Doctorate)

Postgraduate

A term used to describe a course leading to an award such as Graduate Diploma, a Master's Degree or PhD, which usually requires prior completion of a relevant undergraduate degree (or diploma) course. A 'postgraduate' is a student enrolled in such a course.

Potential Graduand

Potential Graduands are students who have been identified as being eligible to graduate on the satisfactory completion of their current studies. (See also Graduand, Graduation)
Pre-enrolment
Pre-enrolment takes place in October for the following year. Students indicate their choice of UoS enrolment for the following year. After results are approved, registered students are regarded as enrolled in those UoSs they chose and for which they are qualified. Their status is 'enrolled' and remains so provided they pay any money owing or comply with other requirements by the due date. Re-enrolling students who do not successfully register in their Units of Study for the next regular session are required to attend the University on set dates during the January/February enrolment period. Pre-enrolment is also known as Provisional Re-enrolment. (See also Enrolment)

Prerequisite
A prerequisite is a Unit of Study that is required to be completed before another UoS can be attempted. (See also Assumed Knowledge, Corequisite, Waiver)

Prizes
Prizes are awarded by the University, a Faculty or a Department for outstanding academic achievement. Full details can be found in the University Calendar."

Probationary Candidature
A Probationary Candidate is a student who is enrolled in a postgraduate course on probation for a period of time up to one year. The Head of Department is required to consider the candidate’s progress during the period of probation and make a recommendation for normal candidature or otherwise to the Faculty.

Progression
(See Course Progression)

Prohibited Combinations of Units of Study
When two or more Units of Study contain a sufficient overlap of content, enrolment in any one such Unit prohibits enrolment in any other identified Unit. A Unit related in this way to any other Unit is linked in Tables of Units of Study via use of the symbol N to identify related prohibited Units.

Provisional Re-enrolment
(See Pre-enrolment)

Qualification
A qualification is an academic attainment recognised by the University.

Registrar
The Registrar is responsible to the Vice-Chancellor for the keeping of official records and associated policy and procedures within the University. (See the University Calendar for details.)

Registration
In addition to enrolling with the Faculty in Units of Study, students must register with the Department responsible for teaching each unit. This is normally done during Orientation Week. Note that unlike enrolment, registration is not a formal record of Units attempted by the student.

Research Course
(See Course (Research))

Research Supervisor
A Supervisor is appointed to each student undertaking a research postgraduate degree. The person will be a full-time member of the academic staff or a person external to the University appointed in recognition of their association with the clinical teaching or the research work of the University. A Research Supervisor is commonly referred to as a Supervisor. (See also Advisor, Associate Supervisor, Instrumental Supervisor (teacher), Supervision)

Resolutions of Senate
Regulations determined by the Senate of the University of Sydney that pertain to degree and diploma course requirements and other academic or administrative matters.

Result Processing
Refers to the processing of assessment results for UoSs. Departments tabulate results for all assessment activities of a UoS and assign preliminary results for each UoS. Preliminary results are considered by the relevant Board of Examiners, which approves final results. Students are notified of results by result notices that list final marks and grades for all UoSs. (See also Assessment, Examination Period)

Result Processing Schedule
The Result Processing Schedule will be determined for each Academic Cycle. It is expected that all Departments and Faculties will comply with this schedule. (See also Assessment, Examination Period, Result Processing)

Results
The official statement of the student’s performance in each Unit of Study attempted, as recorded on the academic transcript, usually expressed as a grade.

HD
High Distinction, a mark of 85-100

D
Distinction, a mark of 75-84

CR
Credit, a mark of 65-74

P
Pass, a mark of 50-64

S
Satisfied requirements. This is used in Pass/Fail only outcomes

UCN
Unit of Study continuing. Used at the end of semester for UoSs that have been approved to extend into a following semester. This will automatically flag that no final result is required until the end of the last semester of the UoS.

PCON
Pass (Concessional), a mark of 46-49. Use of this grade is restricted to those courses that allow for a Concessional Pass of some kind to be awarded: A student may re-enrol in a Unit of Study for which the result was PCON. Each faculty will determine and state in its course regulations what proportion, if any, may count - eg, ‘no more than one sixth of the total credit points for a course can be made up from PCON results’.

F
Fail. This grade may be used for students with marks from 46-49 in those faculties which do not use PCON.

AF
Absent Fail. Includes non-submission of compulsory work (or non-attendance at compulsory labs etc) as well as failure to attend an examination.

W
Withdrawn. Not recorded on an external transcript. This is the result that obtains where a student applies to discontinue a Unit of Study by the HECS Census Date (ie, within the first four weeks of enrolment).

DNF
Discontinued - Not to count as failure. Recorded on external transcript. This result applies automatically where a student discontinues after the HECS Census Date but before the end of the seventh week of the semester (or before half of the Unit of Study has run, in the case of Units of Study which are not semester-length). A faculty may determine that the result of DNF is warranted after this date if the student has made out a special case based on illness or misadventure.

DF
Discontinued - Fail. Recorded on transcript. This applies from the time DNF ceases to be automatically available up to the cessation of classes for the Unit of Study.

MINC
Incomplete, with a mark of at least 50. This result may be used when examiners have grounds (such as illness or misadventure) for seeking further information or for considering additional work from the student before confirming the final mark and passing grade. Except in special cases approved by the Academic Board, this result will be converted to a normal passing mark and grade either:

(a) by the Dean at the review of examination results conducted pursuant to section 2 (4) of the Academic Board policy Examinations and Assessment Procedures; or
(b) automatically to the indicated mark and grade by the third week of the immediately subsequent academic session.

Deans are authorised to approve the extension of a MINC grade for individual students having a valid reason for their incomplete status.

INC
Incomplete. This result is used when examiners have grounds (such as illness or misadventure) for seeking further information or for considering additional work from the student before confirming the final result. Except in special cases approved by the Academic Board, this result will be converted to a normal permanent passing or failing grade either:

(a) by the Dean at the review of examination results conducted pursuant to section 2 (4) of the Academic Board policy

Examinations and Assessment Procedures'; or

(b) automatically to an AF grade by the third week of the immediately subsequent academic session. Deans are authorised to approve the extension of a MINC grade for individual students having a valid reason for their incomplete status.

UCN
Incomplete. A MINC or INC grade is converted, on the advice of the Dean, to UCN when all or many students in a Unit of Study have not completed the requirements of the Unit. The students may be engaged in practicum or clinical placements, or in programs extending beyond the end of semester (eg, Honours).

Scholarships
Scholarships are financial or other forms of support made available by sponsors to assist Australian and international students to pursue their studies at the University. When a student's means are a criterion, scholarships are sometimes called bursaries.

(See also Prizes)

School
(See Department)

SCR
System Change Request.

Semester
A semester is the Academic Teaching period of approximately 14 weeks duration. All Units of Study have been semesterised, both at the undergraduate and postgraduate level, except for those components of final honours year or postgraduate courses relating to diessis or other similar research oriented projects for which two or more semesters are normally assigned for completion. Units of Study are taught and examined in either the first semester or the second semester (or in both semesters if the course is offered twice).

Semester Address
The Semester Address is the address to which all Official University correspondence is sent during semester time, if it is different to the Permanent Address. Unless overridden by a Temporary Address all Official University correspondence during Semester (including Session 4 for students enrolled in Summer School) will be sent to this address.

(See also Addresses, Business Address, Permanent Home Address, Temporary Address)

Senate
The Senate of the University is the governing body of the University.

(See the University Calendar)

Senate Appeals
Senate appeals are held for those students who, after being excluded by the Faculty from a course, appeal to the Senate for readmission. While any student may appeal to the Senate against an academic decision, such an appeal will normally be heard only after the student has exhausted all other avenues - ie, the Department, Faculty, Board of Study and, in the case of postgraduates, the Committee for Graduate Studies.

(See also Exclusion)

Session
A session is a defined teaching period of the University. The two major sessions are called semesters and are defined by the DETYA HECS Census date they contain (eg, first and second semester). The Academic Board must approve variation to the normal session pattern.

Session Address
(See Semester Address)

Special Consideration
Candidates who have medical or other serious problems, which may affect performance in any assessment, may request that they be given Special Consideration in relation to the determination of their results.

They can obtain an official form from the Student Centre. The Student Centre stamps the form and the medical or other documentation. The student gives a copy of the material to the Student Centre staff and takes copies to the relevant Departments. The student retains the originals. The dates for which Special Consideration is sought are recorded on FlexSIS and printed on the Examination Register.

Special Permission
(See Waiver)

Sponsorship
Sponsorship is the financial support of a student by a Company or Government body. Sponsors are frequently invoiced directly.

Stage
For the purposes of administration, a course may be divided into stages to be studied consecutively. The stages may be related to sessions or they may relate to an Academic Cycle.

Part time students progress through a course more slowly and would often enrol in the same stage more than once.

Status
Status is a variable for students both with relation to Course and Unit of Study. With relation to Course, students can have the status of Enrolled or Not Enrolled. Not Enrolled reasons can be Totally Discontinued, Withdrawn, Suspended, Cancelled, Awarded, etc. With relation to Unit of Study, students can have the status of CURENR or WITHDN, Discontinued, etc.

Stream
A Stream is a defined program of study, selected from a table of Units of Study. Students enrolled in award courses that involve streams will have the stream recorded in their enrolment record. A student generally enters streams at the time of admission, although some award courses require students to enrol in streams after the completion of Level 1000. Students may transfer between Streams by altering their enrolment status within their Award Course, but only when permitted to do so by Faculty Resolution.

(See also Award Course, Major and Minor)

Student ID card
All students who enrol are issued with an identification card. The card includes the student name, SID, the course code, and a library borrower's bar code. The card identifies the student as eligible to attend classes and must be displayed at formal examinations. It must be presented to secure student concessions and to borrow books from all sections of the University Library.

Student Identifier (SID)
A nine-digit number which uniquely identifies a student at the University.

Student Load
(See Load)

Study Abroad Program
A scheme administered by the International Education Office which allows international students who are not part of an exchange program, to study UoSs at the University of Sydney, but not towards an award program. In most cases the UoSs studied here are credited towards an award at their home institution.

(See also Exchange Student)
Subject Area
A Unit of Study may be associated with one or more Subject Areas. The Subject Area can be used to define Prerequisite and Course Rules - eg, the Unit of Study 'History of Momoyama and Edo Art' may count towards the requirements for the Subject Areas 'Art History and Theory' or, 'Asian Studies'.

Supervising Faculty
The Supervising Faculty is the Faculty which has the responsibility for managing the academic administration of a particular course ie, the interpretation and administration of course rules, approving students’ enrolments and variations to enrolments. Normally the supervising Faculty is the Faculty offering the course. However, in the case of combined courses, one of the two Faculties involved will usually be designated the Supervising Faculty at any given time. Further, in the case where one course is jointly offered by two or more Faculties (eg, the Liberal Studies course) a Joint Committee may make academic decisions about candidature and the student may be assigned a Supervising Faculty for administration.

The International Office has a supporting role in the administration of the candidatures of international students and alerts the Supervising Faculty to any special conditions applying to these candidatures (eg, that enrolment must be full-time).

Supervision
Supervision refers to a one to one relationship between a student and a nominated member of the academic staff or a person specifically appointed to the position.

Supplementary Examination
(See Supplementary Exams)
Supplementary exams may be offered by Faculties to students who fail to achieve a passing grade or who were absent from assessment due to illness or misadventure.

Suppression of Results
Results for a particular student can be suppressed by the University for the following reasons:

- the student has an outstanding debt to the University
- the student is facing disciplinary action.

Suspension
(See Course Leave)
Teaching Department
(See Department)
Temporary address
Students may advise the University of a Temporary Address. Correspondence will be sent to this address between the dates specified by the student.

Testamur
A testamur is a certificate of award provided to a graduate usually at a graduation ceremony.

Thesis
A thesis is a major work that is the product of an extended period of supervised independent research.

‘Earliest date’ is the earliest date at which a research student can submit the thesis.

‘Latest date’ is the latest date at which a research student can submit the thesis.

Timetable
Timetable refers to the schedule of lectures, tutorials, laboratories and other academic activities that a student must attend.

Transcript
(See Academic Transcript)
Transfer
(See Course Transfer)

Glossary

Tuition Fees
Tuition fees may be charged to students in designated tuition fee-paying courses. Students who pay fees are not liable for HECS.

UAC
The Universities Admissions Centre (UAC) receives and processes applications for admission to undergraduate courses at recognised universities in NSW and the ACT. Most commencing undergraduate students at the University apply through UAC.

UAC Admissions
Most local undergraduates (including local undergraduate fee payers) apply through the Universities Admission Centre (UAC).

The University Admissions Office coordinates the processing of UAC applicants with Faculties and Departments and decisions are recorded on the UAC system.

Applicants are notified by UAC and an electronic file of applicants who have been made offers of admission to courses at the University is loaded onto FlexSIS.

UAI (Universities Admission Index)
The Universities Admission Index (UAI) is a number between 0.00 and 100.00 with increments of 0.05. It provides a measure of overall academic achievement in the HSC that assists universities in Tanking applicants for university selection.

The UAI is based on the aggregate of scaled marks in ten units of the HSC.

Undergraduate
A term used to describe a course leading to a Diploma or Bachelor's Degree. An 'undergraduate' is a student enrolled in such a course.

Unit of Study (UoS)
A Unit of Study is the smallest stand-alone component of a student’s course that is recordable on a student's transcript. UoSs have an integer credit point value, normally in the range 3-24. Each approved UoS is identified by a unique sequence of eight characters, consisting of a four character alphabetical code which usually identifies the Department or subject area, and a four character numeric code which identifies the particular UoS. Units of Study can be grouped by subject and level.

Unit of Study Enrolment Status

The UoS Enrolment Status indicates whether the student is still actively attending the UoS (ie, currently enrolled) or is no longer enrolled (withdrawn or discontinued)

Unit of Study Group
A grouping of Units of Study within a course. The Units of Study which make up the groups are defined within FlexSIS.

Unit of Study Level
Units of Study are divided into Junior, Intermediate, Senior, Honours, 5th Year, and 6th Year. Most Majors consist of 32 Senior Credit Points in a subject area (either 3000 level Units of Study or a mix of 2000 and 3000 level Units of Study).

University
Unless otherwise indicated, University in this document refers to the University of Sydney.

University Medal
A Faculty may recommend the award of a University Medal to students qualified for the award of an undergraduate Honours degree or some Masters degrees, whose academic performance is judged outstanding.

UPA
(See Unit of Study)

University Postgraduate Award.
Glossary

**USYDnet**
USYDnet is the University of Sydney's intranet system. In addition to the customised MyUni service, it provides access to other services such as Directories (Maps, Staff and Student, Organisations), a Calendar of Events (to which staff and students can submit entries), and a software download area.

Variation of Enrolment
(See Enrolment Variation)

**Vice-Chancellor**
The chief executive officer of the whole University, responsible for its leadership and management. He is head of both academic and administrative divisions.

**Waiver**
In a prescribed course, a Faculty may waive the Prerequisite or corequisite requirement for a Unit of Study or the course rules for a particular student. Waivers do not involve a reduction in the number of credit points required for a course.
(See also Credit)

**Weighted Average Mark (WAM)**
The Weighted Average Mark (WAM) is the average mark in the UoSs completed, weighted according to credit point value and level. The formulae used to calculate the WAMs are course-specific: there are many different WAMs in the University.

**Year of First Enrolment (YFE)**
The year in which a student first enrolls at the University.
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