The University of Sydney

2010

Engineering and Information Technologies handbook

Set a course for Handbooks online: www.usyd.edu.au/handbooks

Acknowledgements

The Arms of the University

Sidere mens eadem mutato

Though the constellation may change
the spirit remains the same

Copyright

Official course information

Faculty handbooks and their respective online updates, along with the *University of Sydney Calendar*, form the official legal source of information relating to study at the University of Sydney. Please refer to the following websites:

www.usyd.edu.au/handbooks
www.usyd.edu.au/calendar

Amendments

All authorised amendments to this handbook can be found at www.usyd.edu.au/handbooks/handbooks_admin/updates2010

Disability access

An accessible version of this handbook (in Microsoft Word) is available at www.usyd.edu.au/handbooks/handbooks_disability

Resolutions

The Coursework Clause

Resolutions must be read in conjunction with the *University of Sydney (Coursework) Rule 2000 (as amended)*, which sets out the requirements for all undergraduate courses, and the relevant resolutions of the Senate.

The Research Clause

All postgraduate research courses must be read in conjunction with the relevant rules and resolutions of the Senate and Academic Board, including but not limited to:

1. The *University of Sydney (Amendment Act) Rule 1999 (as amended)*.
2. The *University of Sydney (Doctor of Philosophy (PhD)) Rule 2004*.
3. The resolutions of the Academic Board relating to the Examination Procedure for the Degree of Doctor of Philosophy.
4. The relevant faculty resolutions.

Disclaimers

1. The material in this handbook may contain references to persons who are deceased.
2. The information in this handbook was as accurate as possible at the time of printing. The University reserves the right to make changes to the information in this handbook, including prerequisites for units of study, as appropriate. Students should check with faculties for current, detailed information regarding units of study.

Price

The price of this handbook can be found on the back cover and is in Australian dollars. The price includes GST.

Handbook purchases

You can purchase handbooks at the Student Centre, or online at www.usyd.edu.au/handbooks

Production

Digital and Print Media Office
Website: www.usyd.edu.au/dpm

Printing

Impress Colour

Handbook enquiries

For any enquiries relating to the handbook, please email the handbook editors at info@publications.usyd.edu.au

Address

The University of Sydney
NSW 2006 Australia
Phone: +61 2 9351 2222
Website: www.usyd.edu.au

CRICOS Provider Code 00026A
ISSN: 1834-9544
ISBN: 978-1-74210-122-4

Important dates

University semester and vacation dates for 2010

Summer/Winter School lectures	**Dates**
Summer School – December program	Begins: Monday 7 December 2009
Summer School – main program	Begins: Monday 4 January 2010
Summer School – late January program	Begins: Monday 18 January
Winter School – main program	Monday 28 June to Friday 24 July
Semester One	**Dates**
International student orientation (Semester One) – STABEX	Monday 15 February and Tuesday 16 February
International student orientation (Semester One) – full degree	Wednesday 18 February and Thursday 19 February
Lectures begin	Monday 1 March
AVCC Common Week/non-teaching Easter period	Friday 2 April to Friday 9 April
International application deadline (Semester Two) *	Thursday 30 April *
Last day of lectures	Friday 4 June
Study vacation	Monday 7 June to Friday 11 June
Examination period	Tuesday 15 June to Saturday 26 June
Semester ends	Saturday 26 June
AVCC Common Week/non-teaching period	Monday 5 July to Friday 9 July
Semester Two	**Dates**
International student orientation (Semester Two) – STABEX	Monday 19 July and Tuesday 20 July
International student orientation (Semester Two) – full degree	Wednesday 22 July and Thursday 23 July
Lectures begin	Monday 26 July
AVCC Common Week/non-teaching period	Monday 27 September to Friday 1 October
Last day of lectures	Friday 29 October
International application deadline (for Semester One, 2011) *	Saturday 30 October *
Study vacation	Monday 1 November to Friday 5 November
Examination period	Monday 8 November to Saturday 20 November
Semester ends	Saturday 20 November

* Except for the faculties of Dentistry, Medicine and the Master of Pharmacy course. See www.acer.edu.au for details.

Last dates for withdrawal or discontinuation for 2010

Semester One – units of study	**Dates**
Last day to add a unit	Friday 12 March
Last day for withdrawal	Wednesday 31 March
Last day to discontinue without failure (DNF)	Friday 23 April
Last to discontinue (Discontinued – Fail)	Friday 4 June
Semester Two – units of study	**Dates**
Last day to add a unit	Friday 6 August
Last day for withdrawal	Tuesday 31 August
Last day to discontinue without failure (DNF)	Friday 10 September
Last day to discontinue (Discontinued – Fail)	Friday 29 October
Last day to withdraw from a non-standard unit of study	Census date of the unit, which cannot be earlier than 20 per cent of the way through the period of time during which the unit is undertaken.
Public holidays	**Dates**
Australia Day	Tuesday 26 January
Good Friday	Friday 2 April
Easter Monday	Monday 5 April
Anzac Day	Monday 26 April
Queen's Birthday	Monday 14 June
Labour Day	Monday 4 October

How to use this handbook

What is a handbook?

The handbook is an official publication and an essential guide for every student who studies at the University of Sydney. It is an important source of enrolment information. It can also help you with more than just planning your course of study.

As a student at the University of Sydney you need to be aware of course structures and content, who your lecturers are, as well as examination procedures.

You should also become familiar with University policies and faculty rules and regulations. This handbook supplies a lot of this information.

It will also point you to places and people around the University who can help with enquiries about library loans, child care, fees, casual employment, places to eat and stay, support groups and much more.

What new students need to know

- terminology used for courses and programs of study
- semester dates and examination periods
- important contact details
- how to plan your study program
- rules and policies on assessment, satisfactory progression, honours, etc
- what University services are available and where to find them
- how to get around campus.

At the beginning of many of these chapters there will be explanations to help you proceed further.

Where to find information

Course terminology

University terminology, such as 'credit point', 'unit of study', and 'WAM', can be found in the **Abbreviations** and **Glossary** chapters, at the back of this handbook.

Dates

The start and finish dates of semester can be found in the front section of the handbook. Summer School and Winter School dates are in the general information section at the back of the handbook.

Contents and index

The comprehensive **Contents** section at the front of the handbook explains the details you'll find within each chapter.

You'll find information like:

- how and where to contact faculty staff
- how to select your units of study and programs
- a list of degrees
- detailed information on all units of study, classified by unit identifiers (a four-alpha, four-digit code and a title)
- electives and streams
- scholarships and prizes
- information specific to faculties.

The **Index** lists units of study only. It allows you to check every reference which refers to your unit of study within the handbook. It is divided into two parts, and lists units of study alphabetically (by course name) and again by course code (alphanumeric).

Colour-coded sections

- Ivory – for undergraduate courses
- Blue – for postgraduate courses

Faculty rules and regulations

Faculty resolutions are the rules and regulations that relate to a specific faculty. They can generally be found in their own chapter, or next to the relevant units of study.

These should be read along with the University's own *Coursework Rule 2000 (as amended)* which is described in the **Essential information for students** chapter near the end of this book. Together they outline the agreement between student and faculty, and student and University.

General University information

This is information about the University in general, rather than information specific to the faculty. This information is at the back of the book and includes, among other things:

- terminology and abbreviations used at the University
- campus maps to help you find your way around
- Summer School and Winter School information
- information for international students
- student services.

Course planner

You might like to plot the course of your degree as you read about your units of study. Use the planner at the back of this handbook.

Timetables

For information about personal timetables, centrally timetabled units of study, and venue bookings, see:
www.usyd.edu.au/studentcentre/timetabling.shtml

For the session calendar, see:
http://web.timetable.usyd.edu.au/calendar.jsp

Students with a disability

For accessible (word, pdf and html) versions of this document, see:
www.usyd.edu.au/handbooks/handbooks_disability

You can find information on Disability Services in the **General University information** section of the handbook. The service can provide information regarding assistance with enrolment and course requirement modifications where appropriate.

For details on registering with the service and online resources, see:
www.usyd.edu.au/disability

Handbook updates

The information in this handbook is current at the time of publication. Further information on University policies, such as plagiarism and special consideration, can be found on the University's website, along with official handbook amendments.

www.usyd.edu.au/handbooks/handbooks_admin/updates2010

Feedback regarding this handbook is welcome.
info@publications.usyd.edu.au

Contents

Welcome from the Dean

Welcome to the Faculty of Engineering and Information Technologies at the University of Sydney.

Our faculty has a long, proud history since 1883 producing many distinguished graduates who have made significant contributions to national and international infrastructure developments, and, played major roles in stimulating the Australian economy through inspirational technological developments.

Engineers and Information Technology professionals create new structures, systems and products to support the growth of many communities and they rely on an understanding of Mathematics and Science as well as knowledge of Business and Legal processes. Our graduates receive a well rounded understanding of the fundamentals and have design and research skills to lead innovation and shape our future.

The attributes of our graduates include being able to: create new knowledge and understanding through the process of research and inquiry; use information effectively in a range of contexts; work independently and sustainably, in a way that is informed by openness, curiosity and a desire to meet new challenges; hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities; and; recognise and value communication as a tool for negotiating and creating new understanding, interacting with others, and furthering their own learning.

The faculty has strong research and education links with Australian and global industry through our foundations, world leading research centres and outstanding alumni. These relationships are energised through collaborative research, consulting projects and industry and community relevant teaching programs.

The combination of our degrees with those of Science, Commerce, Medical Science, Arts and Law, also provide exciting and flexible pathways to suit the needs of our diverse student population.

We hope that you enjoy your educational journey at the University of Sydney and that this will stimulate a rich and lasting relationship with us.

Professor Archie Johnston
Dean, Faculty of Engineering and Information Technologies
October, 2009

1. Guide to the faculty

The Faculty of Engineering and Information Technologies
Faculty Building, J13
University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 2534
Fax: +61 2 9351 4654
Email: faculty@eng.usyd.edu.au
Website: www.eng.usyd.edu.au

Dean

Professor Archie Johnston PhD *Heriot Watt* FTSE FIEAust CPEng FICE MAICD

Executive Assistant to the Dean

Kay Fielding

Pro Dean and Associate Dean International

Professor Liyong Tong, BSc MEngSc *Dalian* PhD *BUAA* FIEAust MAIAA

Associate Dean (Research and Research Training) and Director of the Graduate School of Engineering and Information Technologies

Professor Assaad R Masri, BE PhD

Associate Dean (Postgraduate Coursework)

Associate Professor Fariba Dehghani, PhD *UNSW*

Associate Dean (Undergraduate)

Dr Douglass J Auld, BSc BE MEngSc PhD

Associate Dean (Learning and Teaching)

Dr Irena Koprinska, MSc *TU-Sofia* PhD *Sofia* MEd

Associate Dean (First Year)

Associate Professor Marjorie Valix, BSc PhD *UNSW*

Associate Dean (IT)

Dr Tim Wilkinson, BSc BE MA PhD

Director Master of Professional Engineering

Professor Masud Behnia, BSME MSME PhD *Purdue* FIEAust MASME MAIAA

Director Master of Project Management

Associate Professor Liaquat Hossain, BBA MSc *Assumption* PhD *Woll* Postdoc *MIT*

Director Master of Information Technology

Dr Uwe Rohm, Dip CS *Passau* PhD*ETH Zurich*

Chief Operating Officer

David Cox BA*UNSW*, BE*UNSW*, MSciSoc*UNSW*, FRAeS

Director Marketing and International

Eric van Wijk, BSc *ANU* GradDipEd *UC*
GradDipAppEcon *UC*

Engineering Sydney

Keiran Passmore BSW *UNSW* MA *UNSW* GradDipCareerEd *RMIT*
Executive Director
Ariel Riveros

Secretary to the Faculty

Annette Alexander

Student Administration Staff

Undergraduate Administration

Annamaria Brancato *Manager*
Rosaria Hamilton
Randa Farrelly

Graduate School of Engineering and Information Technology

Lesley Vanderkwast, Dip Frontline Management *Manager*
George Carayannopoulous BSW(Hons)
Jo Gillott BA (Hons) *Macquarie*
Emily Major BS Hons *Wellington*

Faculty Marketing Officer and Scholarships

Trish Dimasi Grad Dip Marketing *NT*

MPE Project Officer

Susan Day AFMIA

Faculty Librarian

Irene Rossendell, BA (*UQ*) Dip Lib *UNSW*, ALIA

Faculty branches

Aerospace, Mechanical and Mechatronic Engineering

Phone: +61 2 9351 2341
Fax: +61 2 9351 7060
Email: hod@aeromech.usyd.edu.au

Head of School

Professor Steven Armfield

Administrative Officers

Bronwyn Sexton
Vinita Martin
Wendy Liang

The School of Aerospace, Mechanical and Mechatronic Engineering offers four-year undergraduate programs leading to Bachelor of Engineering degrees in aeronautical, mechanical and mechatronic engineering as well as specialisations in biomedical and space engineering. There are also five-year combined degree programs with Science, Commerce, Arts, Medical Science and a six-year combined degree program with Law.

Aeronautical engineering is the study of the mathematics, physics, computer science, material science and design philosophy underlying the analysis, design, manufacture and operation of aerospace vehicles. Aeronautical engineers find a use for their skills in research, airline maintenance and operations, aerospace design and manufacturing, in both civil and military environments, defence, science,simulation and system engineering. There is also good demand for graduates with aeronautical skills outside the aerospace sector in defence, science, simulation and system engineering.

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.

Mechanical engineering is a very broad branch of professional engineering. 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. Mechanical engineers are found in a wide range of industries which manufacture machinery and consumer goods and offer research and technical services. They design machinery, engines, vehicles, agricultural and mining equipment, ships and household appliances.

Mechanical engineers often become 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.

Mechatronic engineering 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.

Space engineering is the study of the design, testing and implementation of engineering components in one of the most demanding of environments – space. Students have the opportunity to complete the Space stream with the Aeronautical, Mechanical or Mechatronic engineering programs.

In all programs described above, the first two years of undergraduate study 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 the third year, Aeronautical Engineering students will focus on the fundamentals of flight mechanics and dynamics, aircraft materials and structures, aerodynamics and aircraft design. 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.

In the fourth year, more advanced study is undertaken, which 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, thermofluids, environmental engineering, computational fluid dynamics, design, rheology, advanced materials, orthopaedic/biomedical engineering, mechatronics, aeronautical and space engineering.

The relatively small class sizes in the final two years make for an informal and friendly atmosphere. A student branch of the American Institute of Aeronautics and Astronautics (AIAA) operates in the School which, together with the Royal Aeronautical Society, caters to the professional needs of the students.

Chemical and Biomolecular Engineering

Phone: +61 2 9351 2455
Fax: +61 2 9351 2854
Email: hod@chem.eng.usyd.edu.au

Head

Associate Professor Timothy Langrish

Administration Manager

Katharyn Thomas

Chemical engineering is concerned with industrial processes in which material in bulk undergoes changes in its physical or chemical nature. Chemical engineers design, construct, operate and manage these processes and in this they are guided by economic, environmental and societal considerations.

The process industries continue to be major employers of chemical engineers: examples include the large complexes at Botany in New South Wales and Altona in Victoria, and the petroleum refineries in all mainland States; other examples are the minerals processing industries that refine Australian ores such as bauxite, nickel sulphides and rutile to produce aluminium, nickel and titanium. In addition there are the traditional metallurgical industries, steel, copper, zinc, lead etc, as well as general processing industries producing paper, cement, plastics, paints, glass, pharmaceuticals, alcohol and foodstuffs.

Allied process operations are those involving waste disposal, pollution abatement, power production and nuclear technology. In addition, over recent years chemical engineering has continued to develop, and now encompasses many other technologically important fields; examples include bio-processing and nano-technology.

Chemical engineering studies are based on chemistry, mathematics and physics and the first two are taken to some depth. Each student completes a common core of units of study, fundamental to the study of chemical engineering, and also takes a number of elective courses, chosen according to his or her particular field of interest from course options.

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

The school has a number of active exchange programs with leading Departments overseas. The exchanges, with the Royal Institute of Technology, Stockholm, the Ecole Nationale Superieure D'Ingenieurs de Genie Chimique in Toulouse, and Imperial College, London UK, see a number 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: +61 2 9351 2136
Fax: +61 2 9351 3343
Email: office@civil.usyd.edu.au

Head

Professor Kim Rasmussen

Administration Manager

Susanne Farrar

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 project 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 multidisciplinary teams of professionals in charge of large infrastructure projects, such as water supply or transportation systems.

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

In the third year, courses are given in structures, soil mechanics, structural design, environmental issues, social issues 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. 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 third and fourth 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.

Electrical, Electrical (Power), Computer, Software and Telecommunications Engineering

Phone: +61 2 9351 3229
Fax: +61 2 9351 3847
Email: ug.enquiry@ee.usyd.edu.au
Website: www.ee.usyd.edu.au

Head

Professor Branka Vucetic

School Manager

Claire Bridgeman

The School of Electrical and Information Engineering offers students the opportunity to study engineering in an exciting, innovative and relevant environment. Electrical, electrical (power), computer, software and telecommunications engineering are areas 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 specialisations offered by the School – Electrical, Electrical (Power), Computer, Software and Telecommunications Engineering – are four year programs (for both Pass and Honours). They can, however, be taken as five year combined degree programs with Arts, Commerce, Medical Science or Science or as a six-year combined degree program with Law.

Students are also able to participate in exchange programs with universities in Sweden, Hong Kong, the USA and other countries as part of their degree program.

The BE degree course includes 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-month practical training in industry at the end of third year.

Students in electrical, electrical (power), computer, software and telecommunications engineering have a 'common first year' where they enrol in the same units of study.

The ***electrical engineering*** specialisation 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 to take a broad selection in several areas.

The ***computer engineering*** specialisation has a greater emphasis on computer hardware and software, and in the third and fourth years it specialises 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.

Software engineering has an emphasis on the science and technology of computer software. There is a strong focus on embedded systems. A feature of the program is that students can start specialising in the second year by selecting software engineering electives in software, electronics and circuits, with application in CAD software, commerce and biology. Specialisations are available in software engineering databases, signal processing, information systems, telecommunication software systems, CAD, operating systems and compilers, real time systems and high performance computing.

Telecommunications engineering 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.

Power engineering studies systems and devices, energy transmission, distribution and utilisation.

Electrical, computer, software, telecommunications and power 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.

Information Technologies

Phone: +61 29351 3423
Fax: +61 29351 3838
Email: info@it.usyd.edu.au
Web: www.it.usyd.edu.au

Head

Associate Professor Sanjay Chawla

School Manager

Shari Lee

The School of Information Technologies (SIT), previously known as the Basser Department of Computer Science, is the first computer science department in Australia. Our teaching focuses on providing the student with fundamental principles and practical skills in IT, establishing a foundation for your entire career. With extensive group-work and exciting projects you will also develop vital communication and project management skills.

The School of IT offers the following degrees: Bachelor of Computer Science and Technology (BCST); BCST (Advanced) and Bachelor of Information Technology (BIT); and combined degrees BIT/Bachelor of Arts (BIT/BA), BIT/Bachelor of Commerce (BIT/BCom), BIT/Bachelor of Law (BIT/LLB), BIT/Bachelor of Medical Science (BIT/BMedSc) and BIT/Bachelor of Science (BIT/BSc). Within the IT degrees, study is offered in two streams – Computer Science and Information Systems.

The ***computer science*** stream is the study of computers and the programs that run on computers. Much of the field of computer science takes an engineering approach where the main question is how to design a system to fulfill a purpose. A scientific approach is also used, with an emphasis on finding the right abstractions to explain how systems work. A third thread in the field comes from mathematics, leading to proofs of the correctness or efficiency of a system. In higher years, the subjects available include topics in artificial intelligence, bioinformatics, graphics and multimedia, operating systems and databases.

The ***information systems*** stream provides an integrated perspective that combines the technical and business aspects of computing. It is about designing and managing the computer systems in order to make them work for people. It equips students to acquire proficiency in a range of information technologies and to adapt them to satisfy individual and organisational needs. Information systems encompasses issues such as strategic planning, system development, system implementation, IT innovation and project management, operational management and end-user needs.

Whether you are enrolled in an IT degree, or undertaking Computer Science or Information Systems as majors within other degree programs, or just studying a few IT subjects, you will benefit from our curriculum, which will help you develop crucial life-long learning skills. Our graduates will be well equipped for a career in IT, or be sufficiently skilled to apply IT in future employment in the industry of their choice.

2. Undergraduate degree regulations

This chapter contains the regulations governing undergraduate degrees offered by the Faculty of Engineering and Information Technologies.

Senate resolutions

Degrees in the Faculty of Engineering and Information Technologies

1. The degrees in the Faculty of Engineering and Information Technologies shall be:
1.1 Bachelor of Engineering (BE)
1.2 Bachelor of Information Technology (BIT)
1.3 Bachelor of Computer Science and Technology (BCST)
1.4 Bachelor of Computer Science and Technology (Advanced)(BCST(Advanced))
2. The combined degrees in the Faculty of Engineering and Information Technologies shall be:
2.1 Bachelor of Engineering/Bachelor of Arts (BE/BA)
2.2 Bachelor of Engineering/Bachelor of Commerce (BE/BCom)
2.3 Bachelor of Engineering/Bachelor of Laws (BE/LLB)
2.4 Bachelor of Engineering/Bachelor of Medical Science (BE/BMedSci)
2.5 Bachelor of Engineering/Bachelor of Science (BE/BSc) (or Advanced Science or Advanced Mathematics)
2.6 Bachelor of Engineering/Bachelor of Design in Architecture (BE/BDesArch)
2.7 Bachelor of Information Technology/Bachelor of Arts (BIT/BA)
2.8 Bachelor of Information Technology/Bachelor of Commerce (BIT/BCom)
2.9 Bachelor of Information Technology/Bachelor of Law (BIT/LLB)
2.10 Bachelor of Information Technology/Bachelor of Medical Science (BIT/BMedSc)
2.11 Bachelor of Information Technology/Bachelor of Science (BIT/BSc)

Bachelor of Engineering

1. These Resolutions must be read in conjunction with the University of Sydney (Coursework) Rule 2000 (as amended), which sets out the requirements for all coursework courses, and the relevant Faculty Resolutions.
2. Specialisations
2.1 The BE degree is awarded in the following specialisations:
2.1.1 *School of Aerospace, Mechanical and Mechatronic Engineering*
2.1.1.1 Aeronautical Engineering
2.1.1.2 Aeronautical Engineering (Space)
2.1.1.3 Mechanical Engineering
2.1.1.4 Mechanical Engineering (Biomedical)
2.1.1.5 Mechanical Engineering (Space)
2.1.1.6 Mechatronic Engineering
2.1.1.7 Mechatronic Engineering (Space)
2.1.2 *School of Chemical and Biomolecular Engineering*
2.1.2.1 Chemical and Biomolecular Engineering
2.1.3 *School of Civil Engineering*
2.1.3.1 Civil Engineering
2.1.3.2 Civil Engineering (Construction Management)
2.1.3.3 Civil Engineering (Environmental)
2.1.3.4 Civil Engineering (Geotechnical)
2.1.3.5 Civil Engineering (Structures)
2.1.3.6 Project Engineering and Management (Civil)
2.1.4 *School of Electrical and Information Engineering*
2.1.4.1 Computer Engineering
2.1.4.2 Electrical Engineering
2.1.4.3 Electrical Engineering (Power Engineering)
2.1.4.4 Software Engineering
2.1.4.5 Telecommunications Engineering
3. Requirements for the degree at pass level
3.1 To qualify for the award of the BE degree at pass level, a student must:
3.1.1 complete successfully units of study giving credit for a total of 192 credit points;
3.1.2 complete the core requirements of an Engineering specialisation as shown in the Faculty Engineering Specialisation Tables; and
3.1.3 satisfy the requirements of all other relevant By-Laws, Rules and Resolutions of the Faculty and the University.
4. Requirements for the degree with honours
4.1 To qualify for the award of the BE degree with honours, a student must:
4.1.1 complete the requirements for the pass degree;
4.1.2 complete the honours requirements published in the Resolutions of the Faculty of Engineering and Information Technologies relating to the BE degree.

Bachelor of Information Technology

1. These Resolutions must be read in conjunction with the University of Sydney (Coursework) Rule 2000 (as amended), which sets out the requirements for all undergraduate courses, and the relevant Faculty Resolutions.
2. Requirements for the pass degree
2.1 To qualify for the award of the pass degree students must:
2.1.1 complete successfully units of study giving credit for a total of 192 credit points;
2.1.2 complete an IT stream in at least one of the following areas:
2.1.2.1 Computer Science,
2.1.2.2 Information Systems; and
2.1.3 satisfy the requirements of all other relevant By–Laws, Rules and Resolutions of the University.
3. Requirements for the honours degree
3.1 To qualify for the award of the honours degree students must complete the honours requirements published in the Faculty resolutions relating to the course.

Bachelor of Computer Science and Technology

1. These Resolutions must be read in conjunction with the University of Sydney (Coursework) Rule 2000 (as amended), which sets out the requirements for all undergraduate courses, and the relevant Faculty Resolutions.
2. Requirements for the pass degree
2.1 To qualify for the award of the pass degree students must:
2.1.1 complete successfully units of study giving credit for a total of 144 credit points; and
2.1.2 complete an IT stream in at least one of the following areas:
2.1.2.1 Computer Science,
2.1.2.2 Information Systems; and
2.1.3 satisfy the requirements of all other relevant By–Laws, Rules and Resolutions of the Faculty and the University.
3. Requirements for the honours degree
3.1 After completing the requirements for a BCST degree or a pass degree from the Faculty of Science or a degree equivalent to the BCST from another institution, students can apply for enrolment in the Honours degree. A successful completion of this course will lead to the award of BCST(Honours)
3.2 The normal duration of the Honours course is 1 year.
3.3 Entry, progression and completion requirements for the BCST(Honours) program are published in the Engineering and Information Technologies Faculty resolutions relating to the course.

Bachelor of Computer Science and Technology (Advanced)

1. These Resolutions must be read in conjunction with the University of Sydney (Coursework) Rule 2000 (as amended), which sets out the requirements for all undergraduate courses, and the relevant Faculty Resolutions.
2. Requirements for the pass degree
2.1 To qualify for the award of the pass degree students must:
2.1.1 complete successfully units of study giving credit for a total of 144 credit points; and
2.1.2 complete an IT stream in at least one of the following areas:
2.1.2.1 Computer Science,
2.1.2.2 Information Systems; and
2.1.3 maintain an average mark of 65% in units of study for each year of enrolment.
2.1.3.1 students failing to attain this progress requirement will be transferred to the BCST standard degree program.
2.1.4 satisfy the requirements of all other relevant By–Laws, Rules and Resolutions of the Faculty and the University.
3. Requirements for the honours degree
3.1 After completing the requirements for a BCST(Advanced) degree or an advanced degree from the Faculty of Science or a degree equivalent to the BCST(Advanced) from another institution, students can apply for enrolment in the Honours degree. A successful completion of this course will lead to the award of BCST(Advanced)(Honours).
3.2 The normal duration of the Honours course is 1 year.
3.3 Entry, progression and completion requirements for the BCST(Advanced)(Honours) program are published in the Engineering and Information Technologies Faculty resolutions relating to the course.

Bachelor of Engineering Combined and Double Degrees

1. These Resolutions must be read in conjunction with the University of Sydney (Coursework) Rule 2000 (as amended), which sets out the requirements for all coursework courses, and the relevant Faculty Resolutions.
2. Combined degrees
2.1 The BE is available in the following combined degree programs.
2.1.1 Bachelor of Engineering/Bachelor of Arts (BE/BA)
2.1.2 Bachelor of Engineering/Bachelor of Commerce (BE/BCom)
2.1.3 Bachelor of Engineering/Bachelor of Laws (BE/LLB)
2.1.4 Bachelor of Engineering/Bachelor of Medical Science (BE/BMedSc)
2.1.5 Bachelor of Engineering/Bachelor of Science (BE/BSc)
2.1.6 Bachelor of Engineering/Bachelor of Design in Architecture (BE/BDesArch)
2.2 The BE is available to be taken in a double degree combination with Bachelor of Science (BE/BSc)
3. Requirements for the degrees at pass level
3.1 To qualify for the award of the degrees at pass level, a student must:
3.1.1 for the BE/BA,BE/BCom,BE/BMedSc, BE/BDesArch and BE/BSc combined degrees and the BE/BSc double degree, complete successfully units of study giving credit for a total of 240 credit points;
3.1.2 for the BE/LLB combined degree, complete successfully units of study giving credit for a total of 288 credit points.
3.1.3 complete the core requirements of an Engineering specialisation as shown in the Faculty Engineering Specialisation Tables; and
3.1.4 must complete the requirements published in the Resolutions of the Faculty of Engineering and Information Technologies and in the Joint Resolutions of the Faculty of Engineering and Information Technologies and the Faculties of Arts, Economics and Business, Law, Architecture and Planning or Science, as the case may be, as well as all other relevant By-Laws, Rules and Resolutions of the University.
4. Requirements for the degrees with honours
4.1 To qualify for the award of the BE degree with honours as part of a combined degree, a student must:
4.1.1 complete the requirements for the pass degree;
4.1.2 complete the honours requirements published in the Resolutions of the Faculty of Engineering and Information Technologies relating to the BE combined degrees.
4.2 To qualify for the award of Honours in the partner degree, either BA, BCom, BDesArch, LLB, BMedSc or BSc, a student must:
4.2.1 complete the requirements pertaining to Honours published in the Joint Resolutions of the Faculty of Engineering and Information Technologies and the Faculties of Arts, Economics and Business, Law, Architecture and Planning or Science, as the case may be.

Bachelor of Information Technology Combined Degrees

1. These Resolutions must be read in conjunction with the University of Sydney (Coursework) Rule 2000 (as amended), which sets out the requirements for all coursework courses, and the relevant Faculty Resolutions.
2. Combined degrees
2.1 The BIT is available in the following combined degree programs:
2.1.1 Bachelor of Information Technology/Bachelor of Arts (BIT/BA)
2.1.2 Bachelor of Information Technology/Bachelor of Commerce (BIT/BCom)
2.1.3 Bachelor of Information Technology/Bachelor of Law (BIT/LLB)
2.1.4 Bachelor of Information Technology/Bachelor of Medical Science (BIT/BMedSc)
2.1.5 Bachelor of Information Technology/Bachelor of Science (BIT/BSc)
3. Requirements for the degrees at pass level
3.1 To qualify for the award of the degrees at pass level, a student must:
3.1.1.1 for the BIT/BA, BIT/BCom, BIT/BMedSc and BIT/BSc combined degrees , complete successfully units of study giving credit for a total of 240 credit points;
3.1.1.2 for the BIT/LLB combined degree, complete successfully units of study giving credit for a total of 288 credit points;
3.1.2 complete the core requirements of an Information Technology specialisation as shown in the Faculty Engineering and Information Technologies Specialisation Tables; and
3.1.3 must complete the requirements published in the Resolutions of the Faculty of Engineering and Information Technologies and in the Joint Resolutions of the Faculty of Engineering and Information Technologies and the Faculties of Arts, Economics and Business, Law or Science, as the case may be, as well as all other relevant By-Laws, Rules and Resolutions of the University.
4. Requirements for the degree with honours
4.1 To qualify for the award of the BIT degree with honours as part of a combined degree, a student must:
4.1.1 complete the requirements for the pass degree;
4.1.2 complete the honours requirements published in the Resolutions of the Faculty of Engineering and Information Technologies relating to the BIT combined degrees.
4.2 To qualify for the award of Honours in the partner degree, either BA, BCom, LLB, BMedSc or BSc, a student must:
4.2.1 complete the requirements pertaining to Honours published in the Joint Resolutions of the Faculty of Engineering and Information Technologies and the Faculties of Arts, Economics and Business, Law or Science, as the case may be.

Faculty resolutions

The following general resolutions pertaining to all students enrolled in the degrees of the faculty must be read in conjunction with specific degree resolutions below and the *University of Sydney Coursework Rule 2000 (as amended)*.

Undergraduate degrees in the Faculty of Engineering and Information Technologies

1. The undergraduate degrees in the Faculty of Engineering and Information Technologies shall be:

1.1 Bachelor of Engineering (BE), offered in the following specialisations:

1.1.1 in the School of Aerospace, Mechanical and Mechatronic Engineering:
1.1.1.1 Aeronautical Engineering
1.1.1.2 Aeronautical Engineering (Space Engineering)
1.1.1.3 Mechanical Engineering
1.1.1.4 Mechanical Engineering (Biomedical)
1.1.1.5 Mechanical Engineering (Space Engineering)
1.1.1.6 Mechatronic Engineering
1.1.1.7 Mechtronic Engineering (Space Engineering)
1.1.2 in the School of Chemical and Biomolecular Engineering:
1.1.2.1 Chemical and Biomolecular Engineering
1.1.3 in the School of Civil Engineering:
1.1.3.1 Civil Engineering
1.1.3.2 Civil Engineering (Construction Management)
1.1.3.3 Civil Engineeirng (Environmental)
1.1.3.4 Civil Engineering (Geotechnical)
1.1.3.5 Civil Engineering (Structures)
1.1.3.6 Project Engineering and Management (Civil)
1.1.4 in the School of Electrical and Information Engineering:
1.1.4.1 Computer Engineering
1.1.4.2 Electrical Engineering
1.1.4.3 Electrical Engineering (Power Engineering)
1.1.4.4 Software Engineering
1.1.4.5 Telecommunications Engineering

1.2 Bachelor of Engineering combined degrees

1.2.1 The Bachelor of Engineering degree is offered in the following designated combined or double degree courses:
1.2.1.1 Bachelor of Engineering and Bachelor of Commerce (BE/BCom)
1.2.1.2 Bachelor of Engineering and Bachelor of Science (BE/BSc), offered as combined degree or double degree
1.2.1.3 Bachelor of Engineering and Bachelor of Medical Science (BE/BMedSc)
1.2.1.4 Bachelor of Engineering and Bachelor of Arts (BE/BA)
1.2.1.5 Bachelor of Engineering and Bachelor of Laws (BE/LLB)
1.2.1.6 Bachelor of Engineering and Bachelor of Design in Architecture (BE/BDesArch) offered in the stream of Civil Engineering
1.2.2 The availability of a specific stream, combined degree combination is determined by the relevant school.
1.2.3 Resolutions relating to the combined courses are set out in the Joint Resolutions of the Faculty of Engineering and Information Technologies and the Faculty of Architecture, Design and Planning, Arts, Economics and Business, Law or Science, as the case may be.

1.3 Information Technology degrees

1.3.1 Offered by the School of Information Technologies:
1.3.1.1 Bachelor of Information Technology (BIT),
1.3.1.1.1 offered in the streams:
1.3.1.1.1.1 Computer Science
1.3.1.1.1.2 Information Systems
1.3.1.2 Bachelor of Computer Science and Technology (BCST),
1.3.1.2.1 offered in the streams:
1.3.1.2.1.1 Computer Science
1.3.1.2.1.2 Information Systems
1.3.1.3 Bachelor of Computer Science and Technology (Advanced) (BCST(Adv)),
1.3.1.3.1 offered in the streams:
1.3.1.3.1.1 Computer Science
1.3.1.3.1.2 Information Systems

1.4 Bachelor of Information Technologies combined degrees

1.4.1 The Bachelor of Information Technology is offered in the following combined degree courses:
1.4.1.1 Bachelor of Information Technology and Bachelor of Arts (BIT/BA),
1.4.1.2 Bachelor of Information Technology and Bachelor of Commerce (BIT/BCom),
1.4.1.3 Bachelor of Information Technology and Bachelor of Medical Science (BIT/BMedSc),
1.4.1.4 Bachelor of Information Technology and Bachelor of Science (BIT/BSc)
1.4.1.5 Bachelor of Information Technology and Bachelor of Laws (BIT/LLB)
1.4.2 Bachelor of Information Technology combined degrees are offered in the follow streams of Information Technology:
1.4.2.1 Computer Science
1.4.2.2 Information Systems
1.4.3 Resolutions relating to the combined course is set out in the Joint Resolutions of the Faculty of Engineering and Information Technologies and the Faculties of Economics and Business, Arts and Science.

General Resolutions for undergraduate degrees of the Faculty of Engineering and Information Technologies

1. Glossary

1.1 For the purposes of these Resolutions:
1.1.1 **a stream** means an Engineering degree specialisation or an Information Technology degree area of study and may include groups of units at the advanced level;
1.1.2 a stream in an Information Technologies degree requires the completion of units of study in one IT area, including any units of study specified in the unit of study tables as compulsory for that stream.
1.1.3 A student may not count a unit of study toward more than one stream.
1.2 Unit of study requirements for completing a degree in a particular stream are shown in the following sections of this chapter and in the stream or specialisation requirements tables for the specific degree appended to these Resolutions.
1.2.1 **A core unit** means a unit of study that must be completed in order to qualify for the award of the degree in the stream that the student is pursuing, unless exemption is granted by the head of the relevant school;
1.2.2 an advanced version of a specific core unit can be taken as an alternate to a core unit;
1.2.3 a recommended units mean units of study listed in the various stream requirements tables, from which students must complete a specific number of credit points as prescribed for the relevant stream;
1.2.4 **a free elective unit** means a unit of study other than a core or recommended unit of study;
1.2.5 units of study not associated with the Faculty of Engineering and Information Technologies may be taken as free electives for an Engineering and Information Technologies degree subject to the approval of the relevant Head of School;
1.2.6 **assumed knowledge** means curricular material that is taken to be known by each student who enrols in a unit of study;
1.2.7 **a prerequisite** means a unit of study that must have been completed with a grade of pass or better before a student may enrol in any unit of study for which that unit of study has been prescribed as a prerequisite;
1.2.8 **a corequisite** means a unit of study in which a student must enrol concurrently with any unit of study for which that unit of study has been prescribed as a corequisite unless the unit has been completed previously;
1.2.9 **prohibition** refers to two or more units of study deemed to be mutually exclusive.
1.2.10 **Completion of a unit of study** means that the assessment requirements have been satisfied and a grade of pass or better has been achieved.
1.2.11 **Requirements** means coursework requirements for the award of a degree.
1.2.12 1000 level unit is a junior unit of study or first-year stage unit.

1.2.13 2000 level unit is an intermediate unit of study or second-year stage unit.
1.2.14 3000 level unit is a senior unit of study or third-year stage unit.
1.2.15 4000 level unit is a Senior Advanced or Honours unit of study or fourth-year stage unit or unit offered within an Honours course.
1.2.16 **Advanced unit of study** is a unit which generally parallels a normal unit of study but which provides added breadth of material and/or sophistication of approach. This also includes units given as part of the Science Faculty Talented Student Program.
1.3 **Dean** means the Dean of Engineering and Information Technologies.
1.4 **Faculty** means the Faculty of Engineering and Information Technologies.
1.5 **Student** means a person enrolled as a candidate for a degree in the Faculty of Engineering and Information Technologies.
1.6 **ISWAM** means the weighted average mark calculated by the Faculty from the results for all 2000 and 3000 level units of study with a weighting of 2 and 3 for the respective levels. This is used for progression and Honours entry in the BE, BIT and BCST degrees.
1.7 **HWAM** (Honours WAM) means the weighted average mark calculated by the Faculty used to determine the award of Honours in integrated Honours degrees or separate appended Honours year. The method of determining Honours for a particular degree is shown in the resolutions of that degree.

General resolutions for undergraduate degrees

2. Degree resolutions pertaining to the Bachelor of Engineering degree, combined Engineering degrees and Information Technology degrees

2.1 The testamur for the degree shall specify the stream for which the degree is awarded.
2.2 The testamur for the degree shall indicate the level of pass or Honours awarded.

3. Admissions

3.1 An applicant may gain admission to the Faculty of Engineering and Information Technologies degrees by satisfying requirements as set out below:
3.2 School leavers
3.2.1 The NSW Higher School Certificate (HSC), or its interstate or overseas equivalent, at a level determined each year by the Faculty of Engineering and Information Technologies.
3.2.2 Entry levels are determined based on University Admission Index (UAI) and may vary depending on the stream of Engineering or Information Technologies for which entry is sought.
3.3 Mature age students
3.3.1 Applicants who have attained the age of 21 years by 1 March in the year of intended enrolment may apply for Mature Age Admission.
3.3.2 Applicants for Mature Age Admission must present evidence that they have attained a standard of education and experience adequate for entry to the stream of Engineering or Information Technologies through an approved preparation program under the terms set out in the Admissions policy of the University of Sydney.
3.4 Previous tertiary study
3.4.1 Applicants who have completed the requirements of a BSc or BST at the University of Sydney or related degrees at other universities may apply for admission to the Bachelor of Engineering or Bachelor of Information Technology.
3.4.2 Entry levels for the different streams will be determined by the faculty and will be based on the Weighted Average Mark (WAM) achieved in the BSc, BST or equivalent degree.
3.4.3 The minimum requirements for entry to any stream of Engineering or Information Technologies is a WAM of 50 for BSc, BST or equivalent degree.
3.5 Other categories of admission
3.5.1 Other applicants may gain admission to the Faculty degrees under the conditions set out in the Admissions policy of the University of Sydney.

4. Flexible First Year

4.1 Students entering first year may choose to undertake the Flexible First Year program in place of a stream.
4.2 Two types of Flexible First Year program are available:
4.2.1 Students planning on entering Aeronautical, Mechanical(Biomedical), Chemical, Civil, Project Management, Mechanical, Aeronautical(Space) or Mechanical(Space) Engineering streams can enrol in program A.
4.2.1.1 Students in this program undertake a common set of units in Semester One. They can then transfer to a stream in semester two or at the end of the year. The Semester Two enrolment will consist of common units and a choice of core or elective units for the stream that students plan to pursue in later years.
4.2.2 Students planning on entering Computer, Electrical, Electrical(Power), Mechatronic, Software, Mechatronic(Space) or Telecommunications Engineering or the Bachelor of Computer Science and Technology or Bachelor of Information Technology degrees can enrol in program B.
4.2.2.1 Students in this program undertake a common set of units in Semester One. They can then transfer to a stream in Semester Two or at the end of the year. The Semester Two enrolment will consist of common units and a choice of core or elective units for the stream or degree that students plan to undertake in later years.
4.3 Those students who have met the requirements for first year entry (UAI cut-off) into a particular degree and stream will be guaranteed a place in second year in that stream or degree even though they choose the Flexible First Year program.
4.4 Students attaining high average marks in the Flexible First Year program will be eligible to apply for second year entry into higher UAI cut-off degrees or streams. See transfer requirements in the table shown below.
4.5 Students gaining entry to any of the combined degree courses may also choose to undertake the Flexible First Year program.
4.5.1 The above conditions (clauses 4.3 and 4.4) for entry into a second year specialist stream will also apply for combined degree students.
4.6 Transfer from Flexible First Year into streams or degrees will be assessed based on either of the following two conditions:
4.6.1 Students have met the UAI requirement for the stream at the time of initial enrolment;
4.6.2 Students have achieved a Weight Average Mark (WAM) as shown in the following requirements table, based on units of study completed over the previous year.
4.7 Degree/stream transfer table

Degree/stream	Flexible entry stream	WAM requirement
BE(Aero)	A	65
BE(Aero)(Space)	A	75
BE(Chem)	A	always allowed
BE(Civil)	A	always allowed
BE(Civil)(Construction)	A	65
BE(Civil)(Environmental)	A	65
BE(Civil)(Geotechnical)	A	65
BE(Civil)(Structures)	A	65
BE(Computer)	B	65
BE(Electrical)	B	always allowed
BE(Electrical)(Power)	B	65
BE(Mechanical)	A	always allowed
BE(Mech)(Biomedical)	A	70
BE(Mech)(Space)	A	75
BE(Mechatronics)	B	70
BE(Mechatronics)(Space)	B	75
BE(Project Mgt)(Civil)	A	65
BE(Software)	B	65
BE(Telecomms)	B	65
BCST	B	always allowed
BCST(Adv)	B	70

Degree/stream	Flexible entry stream	WAM requirement
BIT	B	70

4.8 Students wishing to transfer between streams need to apply to the head of the school supervising the stream. Students will be assessed based on the above WAM criteria but will also be required to show that they have met progression requirements in their current stream as specified by the school and that they will able to complete the new stream in the normal time period.

4.9 Students wishing to transfer between degrees outside the Faculty of Engineering and Information Technologies or to combined degrees must reapply to the Faculty or the University Admission Centre to be considered for entry to the new degree.

5. Units of study

5.1 The programs of units of study for each of the streams and the flexible first year program are set out in the stream requirements tables appended to these Resolutions.

5.2 The stream requirements tables indicate:

5.2.1 the core units of study prescribed, and the recommended units available, for each Engineering stream or specialisation; and/or

5.2.2 the requirements for a stream in an IT area;

5.2.3 the credit point values of the units;

5.2.4 any assumed knowledge, prerequisite or corequisite requirements; and

5.2.5 any prohibitions placed on units of study.

5.3 A unit of study shall comprise such lectures, tutorial instruction, assignments and practical work as the Faculty may prescribe.

5.4 In order to complete a unit of study a student shall, except as provided in clause 11.3:

5.4.1 attend the lectures and laboratory/tutorial classes;

5.4.2 complete satisfactorily any assignments and practical work; and

5.4.3 pass any examinations prescribed for that unit.

5.5 A student may enrol in units of study only in accordance with these Resolutions and subject to the constraints of the timetable, unless approval is given by the head of the relevant school.

5.6 Units of study offered by schools outside the Faculty of Engineering and Information Technologies

5.6.1 A student who enrols in a unit of study offered by a school other than an Engineering and Information Technologies school shall do so in accordance with any rules and requirements prescribed by the faculty offering that unit of study.

5.7 Core and recommended units of study

5.7.1 The Dean may permit a student of exceptional merit to undertake a unit or units of study within the Faculty other than those specified in the stream requirements tables.

5.7.2 The head of the relevant school may:

5.7.2.1 prescribe any unit of study as an acceptable alternative to one or more of the units of study set out in the stream requirements tables;

5.7.2.2 designate as a recommended unit, a unit of study not listed in the relevant stream requirements tables;

5.7.2.3 accept other work completed by a student as the equivalent to a specific unit given by that school.

5.8 Not all recommended units of study set out in the stream requirements tables shall necessarily be available each year.

6. Enrolment restrictions

6.1 Bachelor of Engineering and Engineering combined degrees

6.1.1 First Year

6.1.1.1 A student in the first year of attendance, who commences candidature in Semester One, shall normally enrol in level 1000 units of study totalling not less than 48 credit points and not more than 54 credit points, with no more than 30 credit points being attempted in either of the first two semesters of enrolment.

6.1.2 Later years

6.1.2.1 In each year of attendance after the first, a student may enrol in any of the units of study for which there is no prerequisite or for which the student has completed the prerequisite(s), provided that:

6.1.2.2 in the second year of attendance a student may enrol in level 1000 and/or level 2000 units of study only;

6.1.2.3 a student shall enrol in any core units of study for which he or she was qualified to enrol in the previous year of attendance and for which credit has not yet been gained; and

6.1.2.4 a student may not enrol in units of study:

6.1.2.4.1 totalling more than 54 credit points for the year or totalling more than 30 credit points in either semester, unless

6.1.2.4.2 given approval in accordance with clauses 6.3 or 6.4.

6.1.2.5 a student may not enrol in units of study:

6.1.2.5.1 totalling less than 36 credit points for the year, unless

6.1.2.5.2 the student already has credit for 156 or more credit points or

6.1.2.5.3 is granted special permission by the relevant Head of School or the Chair of the Committee for Undergraduate Studies.

6.2 Bachelor of Information Technology, Bachelor of Computer Science and Technology and Bachelor of Computer Science and Technology (Advanced)

6.2.1 Students may enrol on either a full-time or part-time basis.

6.2.2 A candidate may not enrol in units of study having a total value of more than 30 credit points in a semester, unless given approval in accordance with clauses 6.3 or 6.4.

6.3 The Director of Undergraduate Studies in the relevant school may permit a student who has demonstrated academic merit in the two previous consecutive semesters of enrolment to enrol in up to 60 credit points in one year and/or up to 30 credit points in one semester.

6.4 In exceptional circumstances, the Chair of the Committee for Undergraduate Studies may permit a student who has demonstrated academic merit (WAM greater than 75) in the two previous consecutive semesters of enrolment to enrol in excess of 60 credit points in one year and/or in excess of 30 credit points in one semester.

6.5 Students admitted with advanced standing or in Semester Two

6.5.1 The Head of the relevant School may vary the requirements of clauses 6.1 and 6.2 in respect of students who have either been admitted to candidature with advanced standing or who have commenced candidature in Semester Two.

6.6 Summer and Winter School sessions

6.6.1 Units of study completed at the University of Sydney Summer/Winter School which correspond to units of study specified in stream requirements tables may be credited towards the course requirements.

6.6.2 The enrolment restrictions set out in clauses 6.1 and 6.2 do not apply to any units of study that a student may attempt during the Summer or Winter Short Semester Sessions.

6.6.3 A student may not enrol in more than 12 credit points during a summer or winter session.

6.7 A student may not enrol in a unit of study that they have completed previously with a grade of pass or better.

7. Credit for previous studies

7.1 The Head of the relevant School may grant to a student admitted to candidature credit towards the degree for previously completed studies.

7.2 A student who has completed units of study towards a course in another faculty of the University or at another tertiary institution may be granted credit,

7.2.1 in the BE, BE combined, BIT and BIT combined degree for:

7.2.1.1 any of the specific units of study set out in the stream requirements tables, up to a maximum of 96 credit points, if that other course has been awarded or conferred or if the credit points accumulated towards that course are being maintained with a view to completion/award of the course; or

7.2.1.2 any of the specific units of study set out in the stream requirements tables, provided that the student has abandoned credit for such units in the other faculty;

7.2.2 in the BCST and BCST(Advanced) degree for:

7.2.2.1 any of the specific units of study set out in the stream requirements tables, up to a maximum of 48 credit points, if that other course has been awarded or conferred or if the credit points accumulated towards that course are being maintained with a view to completion/award of the course; or

7.2.2.2 any of the specific units of study set out in the stream requirements tables, provided that the student has abandoned credit for such units in the other faculty;

7.2.3 Subject to the credit point upper limit prescribed in clauses 7.2.1 and 7.2.2, a student who has completed units of study that are not comparable with any of the units of study set out in the stream requirements tables may be granted non-specific credit at 1000, 2000, 3000 and/or 4000 level.

8. Cross-institutional study

8.1 The head of the relevant school may permit a student to undertake units of study at another tertiary institution, to count towards the degree.

8.2 Normally such permission will be given only where a comparable unit is not available at the University.

8.3 Where a student completes such approved studies, the Head of the School may grant credit for:

8.3.1 any of the specific units of study set out in the stream requirements tables, and/or

8.3.2 non-specific credit at 1000, 2000, 3000 and/or 4000 level.

9. Assessment

9.1 Forms of assessment

9.1.1 Students may be tested by written and oral examinations, assignments and practical work, or any combination of these, as the Faculty may determine.

9.1.2 Written information on class requirements and attendance and all aspects of assessment (including criteria for satisfactory and meritorious performance, and the weighting of assessment components), will be made available to students within one week of the commencement of a unit of study.

9.2 Results in units of study

9.2.1 A student will be awarded a final grade in each unit of study attempted.

9.2.2 The permanent results used by the Faculty of Engineering and Information Technologies are as follows:

Grade	Description	Comments
HD	High Distinction	85-100
D	Distinction	75-84
CR	Credit	65-74
P	Pass	50-64
R	Satisfied requirements	Used in Pass/Fail only outcomes
UCN	Unit of study continuing	Used at the end of a semester for units of study that have been approved to extend into the following semester
F	Fail	0-49
AF	Absent Fail	Absent from any assessment
W	Withdrawn	This is the result that applies where a student applies to discontinue a unit of study by the HECS census date (that is, within the first four weeks of semester)
DNF	Discontinue-Not to count as Fail	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). The 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	Discontinue-Fail	This applies from the time DNF ceases to be automatically available up to the cessation of classes for the unit of study

9.2.3 Various temporary results such as 'INC' (Incomplete) may also be used from time to time.

10. Appeals against academic decisions

10.1 Any appeal by a student against an academic decision will be dealt with in accordance with the appropriate Resolutions of the Senate.

11. Progression

11.1 Attendance

11.1.1 In order to complete a unit of study, a student must attend the prescribed lectures, tutorials and practical classes.

11.1.2 A student who has been absent from a significant number of classes in any one semester because of accident, illness or misadventure shall report the circumstances to the relevant school(s) on an 'Application for Special Consideration' form.

11.1.3 A student who misses more than a fortnight of classes in any one semester may be called upon to show good cause by the relevant head of school why he or she should not be deemed to have failed that unit of study.

11.1.4 If the student does not show good cause, he or she may be failed in that unit of study.

11.2 Credit for units of study

11.2.1 A student shall receive credit towards the degree requirements for the credit point value of each unit of study completed in accordance with the relevant stream requirements or degree enrolment tables, or with special permission in accordance with these Resolutions, except that:

11.2.1.1 a student may not receive credit for more than one of such units of study that are deemed to be prohibited or mutually exclusive in the stream requirements and degree enrolment tables;

11.2.1.2 a student may not receive credit for units of study that the head of school has deemed or regards as being mutually exclusive;

11.2.1.3 a student may not enrol in and receive additional credit for units of study for which the student has already been granted credit on the basis of previous study completed in another faculty or at another institution.

11.3 Repeating a unit of study

11.3.1 Where a student re-enrols in a unit of study, the student shall attend all classes and complete all practical and written work prescribed for that unit, unless exempted from any of these requirements by the unit coordinator.

11.3.2 A student who has failed and repeats a unit of study shall not be eligible for any prize or scholarship awarded in connection with that unit of study.

11.3.3 Where a student has failed a core unit of study in a particular semester, the student must repeat that unit or its equivalent in the next session in which it is available.

11.4 Special consideration on the grounds of illness and misadventure

11.4.1 A student who has been prevented by duly certified illness or misadventure from completing all or part of the assessment for a unit of study may be tested at such times and in such a way as the relevant head of school shall determine.

11.4.2 This shall not be regarded as a re-examination.

11.5 Time limits

11.5.1 Bachelor of Engineering

11.5.1.1 A student must complete all the requirements for the BE degree within eight calendar years.

11.5.2 Bachelor of Engineering combined degree

11.5.2.1 A student must complete all the requirements for the BE combined degree within ten calendar years.

11.5.3 Bachelor of Information Technology, Bachelor of Information Technology and Batchelor of Commerce, Bachelor of Computer Science and Technology and Bachelor of Computer Science and Technology (Advanced)

11.5.3.1 A student must complete all the requirements for the BIT or BIT/BCom or BCST or BCST(Advanced) degrees within ten calendar years.

11.6 Discontinuation of enrolment

11.6.1 Degree course

11.6.1.1 A student who wishes to discontinue enrolment for a degree offered by the Faculty must apply to the Dean and will be presumed to have discontinued from the date of that application, unless evidence is produced showing that:

11.6.1.1.1 the discontinuation occurred at an earlier date; and

11.6.1.1.2 there was good reason why the application could not be made at the earlier time.

11.6.1.2 A student who discontinues enrolment during the first year of enrolment for the degree may not re-enrol in the degree unless:

11.6.1.2.1 the Dean has granted prior permission for re-enrolment; or

11.6.1.2.2 the student is re-selected for admission to candidature.

11.6.1.3 No student may discontinue enrolment for the degree after the end of classes in the particular semester, unless he or she produces evidence that:
11.6.1.3.1 the discontinuation occurred at an earlier date; and
11.6.1.3.2 there was good reason why the application could not be made at the earlier time.
11.6.2 Units of study
11.6.2.1 A student who wishes to discontinue enrolment for a unit of study must apply to the head of the relevant school and will be presumed to have discontinued from the date of that application, unless evidence is produced showing that:
11.6.2.1.1 the discontinuation occurred at an earlier date; and
11.6.2.1.2 there was good reason why the application could not be made at the earlier time.
11.6.2.2 No student may discontinue enrolment for a unit of study after the end of classes in the particular semester, unless he or she produces evidence that:
11.6.2.2.1 the discontinuation occurred at an earlier date; and
11.6.2.2.2 there was good reason why the application could not be made at the earlier time.
11.7 Discontinuation
11.7.1 A discontinuation of enrolment may be recorded as
11.7.1.1 Withdrawn (W) or Discontinued – Not to count as Failure (DNF) where that discontinuation occurs within the time-frames specified by the University and published by the Faculty.
11.7.1.2 Except with the express permission of the Dean, any discontinuation occurring after the specified deadline for Discontinued – Not to count as Failure will be recorded as Discontinued Fail (DF).
11.8 Suspension of candidature
11.8.1 A student must be enrolled in each semester in which he or she is actively completing the requirements for the degree.
11.8.2 A student who wishes to suspend candidature must first obtain written approval from the Dean.
11.8.3 A student who enrols after suspending candidature shall complete the requirements for the degree under such conditions as may be determined by the Dean.
11.8.4 The candidature of a student who has not re-enrolled and who has not obtained written approval from the Dean for suspension will be deemed to have lapsed.
11.8.5 A student whose candidature has lapsed must apply for re-admission in accordance with procedures determined by the Dean.
11.8.6 Any student whose candidature has lapsed and who is permitted to re-enrol shall complete the requirements for the degree under such conditions as may be determined by the Dean.
11.9 Satisfactory progress
11.9.1 The Faculty requires students to demonstrate satisfactory progress with their studies.
11.9.2 Satisfactory progress cannot be defined in all cases in advance, but, generally, a student may be deemed not to have made satisfactory progress in any semester if the student:
11.9.2.1 fails to complete at least half the credit points in which he/she is enrolled, or
11.9.2.2 obtains a WAM of less than 50 based on units of study for a given semester, or
11.9.2.3 fails a unit of study for the second time, or
11.9.2.4 has an unsatisfactory attendance record, or
11.9.2.5 is unable to complete the degree in the maximum time permitted.
11.9.3 A student who fails to demonstrate satisfactory progress in any semester of enrolment may be considered to fall into the "Students at Risk" category and will be subject to the procedures of University policy on Identifying and Supporting Students at Risk of Exclusion.
11.9.4 A student who is considered to be at risk of exclusion will,
11.9.4.1 in the first instance (Stage 1):
11.9.4.1.1 be sent a warning letter that gives details of the reasons that have triggered the "at risk" flag,
11.9.4.1.2 be required to complete a "Staying on Track" survey,
11.9.4.1.3 be advised to attend a "Staying on Track" Information Session and
11.9.4.1.4 be advised to consult a year advisor to plan for improved progression;
11.9.4.2 in the second instance (Stage 2):
11.9.4.2.1 be sent a warning letter that gives details of the reasons that have triggered the "at risk" flag and clearly explains the consequences of continued lack of progression,
11.9.4.2.2 be required to complete a "Staying on Track (Stage 2) survey,
11.9.4.2.3 be required to attend a "Staying on Track" Information Session if they have not already done so,
11.9.4.2.4 be required to consult an academic advisor in regard to their lack of progression;
11.9.4.3 in the third instance (Stage 3):
11.9.4.3.1 be asked to show cause as to why they should not be excluded from their degree;
11.9.4.4 in the fourth instance (Stage 4):
11.9.4.4.1 a student who has been permitted to re-enrol after having been asked to show good cause and is identified as being at risk for the fourth time will be automatically excluded from their degree.
11.10 Requirement to show good cause
11.10.1 A student who has been identified as being at risk on three consecutive instances will normally be called upon to show good cause why he or she should be allowed to re-enrol in the degree course.
11.10.2 'Good cause' means circumstances beyond the reasonable control of a student, which may include serious ill-health or misadventure, but does not include demands of employers, pressure of employment or time devoted to non-University activities, unless these are relevant to serious ill-health or misadventure.
11.10.3 In all cases the onus is on the student to provide the University with satisfactory evidence to establish good cause.
11.10.4 The University may take into account relevant aspects of a student's record in other courses or units of study within the University and relevant aspects of academic studies at other institutions provided that the student presents this information to the University.
11.10.5 The Dean will permit a student who has shown good cause to re-enrol.
11.10.6 Where the Dean permits a student to re-enrol, certain conditions may be imposed.
11.10.7 These conditions may include, but are not limited to:
11.10.7.1 the specification of a maximum and/or minimum number of credit points to be attempted; and successful completion of one or more specific units of study.
11.10.8 A student who fails to meet the conditions placed on his or her enrolment may again be called upon to show good cause why he or she should be permitted to re-enrol or may be excluded under clause 11.9.4.4.
11.11 Exclusion for failure to show good cause
11.11.1 Where a student fails to show good cause why he or she should be allowed to re-enrol, the Dean may exclude the student from re-enrolment in the degree.
11.11.2 The failure to show good cause may be based on the student either having:
11.11.2.1 submitted an inadequate statement; or
11.11.2.2 no statement at all.
11.12 Re-admission after exclusion
11.12.1 Re-admission after exclusion is not automatic.
11.12.2 A student who has been excluded from the degree may apply to the Dean for readmission after at least four semesters.
11.12.3 Except with the express written approval of the Dean, a student who has been excluded may not be given credit for any work completed elsewhere in the University or in another institution during a period of exclusion.
11.13 Appeals against exclusion
11.13.1 A student who:
11.13.1.1 has been excluded in accordance with these Resolutions, or
11.13.1.2 has applied for readmission to the degree after a period of exclusion and who has been refused readmission,
11.13.1.3 will be entitled to appeal against the decision of the Faculty in accordance with the Resolutions of the Academic Board:
11.13.1.3.1 Student appeals against academic decisions; Principles for student appeals against academic decisions;
11.13.1.3.2 Procedures for student appeals against academic decisions for undergraduate coursework.
11.13.2 Students will be entitled to appeal to the Student Appeals Body in accordance with the University of Sydney (Student Appeals against Academic Decisions) Rule 2006.

12. Academic Honesty

12.1 Pursuant to the Resolutions of the Academic Board relating to Academic Honesty in coursework, the relevant school(s) may invoke penalties for plagiarism or any other forms of academic dishonesty.
12.2 Plagiarism means knowingly presenting another person's ideas, findings or work as one's own by copying or reproducing them without due acknowledgement of the source.
12.3 Other forms of academic dishonesty include, but are not limited to:
12.3.1 forgery of official documents and/or signatures;
12.3.2 the engagement of another person to complete an assessment or examination for a student, whether for payment or otherwise;
12.3.3 bringing into an examination forbidden material such as textbooks, notes, calculators or computers;
12.3.4 communication with other candidates during an examination, whether by speaking or some other means;
12.3.5 attempts to read other students' work during an examination;
12.3.6 writing an examination or test paper, or consulting with another person about the examination or test, outside the confines of the examination room without permission;
12.3.7 fabrication of data; and/or
12.3.8 recycling (that is, submitting one's own work that has previously counted towards the completion of another unit and been credited towards a university degree, where the examiner has not been informed that the student has already received credit for the work).
12.4 Penalties may be invoked through:
12.4.1 the determination of academic results in part of the work, or the final result, for a unit of study, where a result of Fail may be awarded; and/or
12.4.2 disciplinary proceedings under Chapter 8 of the University of Sydney By-laws.

13. Variation of course requirements in exceptional circumstances

13.1 As provided in the University of Sydney (Coursework) Rule 2000 (as amended), the Dean may vary any of the above requirements for a particular student enrolled for the degree where, in the opinion of the Dean, exceptional circumstances exist.

14. Minimum enrolment requirements

14.1 All students, notwithstanding any credit transfer, must complete at least 48 credit points of units from Faculty of Engineering and Information Technologies stream requirements tables for degrees offered by the Faculty.

15. Stream or degree transfer

15.1 A student who is a candidate for a degree in any stream in the Faculty may apply:
15.1.1 to the Dean for permission to transfer candidature to any other stream for the same degree where that stream is offered by an Engineering and Information Technologies Faculty school; or
15.1.2 to the head of the relevant school for permission to transfer candidature to any other stream for a degree where the two streams are offered by the same school.
15.2 A student enrolled in a BSc at the University of Sydney may apply:
15.2.1 to the Dean for permission to transfer candidature to a BIT, BCST or BCST (Advanced) degree providing the student:
15.2.1.1 has completed 1000 level units in Mathematics and Computer Science units relevant to the IT degree;
15.2.1.2 has met entry WAM requirements for the BIT or BCST(Advanced) degree; or
15.2.1.3 is requesting transfer to the BCST degree, for which there is no WAM requirement.
15.3 Transfer to degrees outside the Faculty or transfer to combined degrees require submission of an application to the Universities Admissions Centre, unless otherwise permitted by the Dean.

16. Transitional provisions

16.1 The provisions of these Resolutions came into force on 1 January 2008.
16.2 All students who commenced candidature prior to this date may complete the degree requirements either in accordance with these Resolutions or with those that were in force at the time of their commencement of candidature.

Resolutions for bachelor's degrees

Bachelor of Engineering (BE)

1. Levels of award

1.1 The Engineering degree shall be awarded in one of two grades of Pass or Honours.
1.2 Requirements for the Engineering degree at Pass level
1.2.1 Single degree course
1.2.1.1 To qualify for the award of the degree at Pass level, a student must complete units of study that total at least 192 credit points and comprise:
1.2.1.1.1 the core units of study set out in the stream requirements tables, relating to the stream that the student is pursuing; and
1.2.1.1.2 recommended units of study, to the credit point value specified in the relevant stream requirements tables; and
1.2.1.1.3 such additional free elective units of study as may be necessary to gain credit for a total of not less than 192 credit points.
1.2.2 Combined degree course
1.2.2.1 To qualify for the award of the BE degree in a combined degree course, a student must complete:
1.2.2.1.1 the requirements set out in the stream requirements table, relating to the BE stream that the student is pursuing; and
1.2.2.1.2 such other requirements as are prescribed in the Joint Faculty Resolutions of the Faculty of Engineering and the Faculty of Arts, Economics and Business, Law or Science, as the case may be.
1.3 Requirements for the Engineering degree with Honours
1.3.1 To qualify for the award of the degree with Honours, both in the single degree and the combined degree courses, a student must:
1.3.1.1 gain entry to the Honours program in a nominated stream of Engineering;
1.3.1.1.1 The entry requirement is an ISWAM obtained over 2nd and 3rd year units of 65% or above.
1.3.1.2 complete the requirements for the pass degree; and achieve a level of performance as defined by the HWAM (Honours Weighted Average Mark);
1.3.1.3 complete a research thesis of 12 cp or its equivalent;
1.3.1.4 complete all requirements within a specified period of time for the degrees as indicated:
1.3.1.4.1 5 years for the BE degree
1.3.1.4.2 6 years for BE/BSc, BE/BCom, BE/BA, BE/BMedSc
1.3.2 The HWAM used for honours assessment includes all attempts at all 2000,3000 and 4000 level units of study completed while a student is enrolled in an Engineering or Combined Engineering degree at the University.
1.3.2.1 Junior or 1000 level units are not included in the calculation.
1.3.2.2 Units offered by other faculties as part of a single BE or a combined BE are included.
1.3.2.3 Units at a level higher than 4000 are treated as level 4000 units.
1.3.2.4 Research thesis units of study are given double weighting.
1.3.3 The various classes of honours are awarded on the basis of a student's HWAM as follows:
1.3.3.1 First Class: HWAM greater than or equal to 75
1.3.3.2 Second Class/ Division 1: HWAM greater than or equal to 70 and less than 75
1.3.3.3 Second Class/Division 2: HWAM greater than or equal to 65 and less than 70
1.3.4 Any student who is elligible for Honours Class I and has achieved outstanding performance in their degree may be considered for a University medal.
1.3.4.1 Outstanding performance is defined as,
1.3.4.1.1 a minimum HWAM of 85;

1.3.4.1.2 top ranking in their stream or specialisation.
1.3.4.1.3 where the top ranking is not clearly determined by at least 1 HWAM point, students may be considered equal and more than one medal awarded for that stream.
1.3.4.1.4 Final determination of the award in individual cases will be made by a Faculty Honours committee.
1.3.5 In exceptional circumstances the head of the relevant school may recommend to the Dean that the above conditions for the award of Honours be varied.

$$\text{HWAM} = \frac{\sum \text{(Year x Credit points x Mark)}}{\sum \text{(Year x Credit points)}}$$

This formula is used to calculate the Honours WAM for BE and BE combined degrees only.

Bachelor of Information Technology (BIT)

1. Requirements for the Pass degree

1.1 To qualify for the award of the Pass degree of Bachelor of Information Technology, a student shall complete units of study having a total value of at least 192 credit points such that:
1.1.1 at least 144 credit points are from the core and selected core units as specified in the BIT Table, including all the core units, and at least 72 credit points which are at 3000-level and above; and
1.1.2 the core units at 1000-level and 2000-level have average results of Credit or better; and
1.1.3 the requirements for a stream in either Computer Science or Information Systems, is completed as specified in the BIT Table; and
1.1.4 at least 18 credit points are from the Science subject areas of Mathematics and/or Statistics, as described in the BIT Table;
1.1.5 at most 72 credit points are from 1000-level units; and
1.1.6 at least 84 credit points are from units at 3000-level or above.
1.2 Candidates who fail to maintain the required credit average in 1000 and 2000 level core units will be transferred to candidature for the Bachelor of Computer Science and Technology degree in their next year of enrolment with full credit for the units of study completed as Bachelor of Information Technology candidates.

2. Requirements for the Honours degree

2.1 There shall be Honours courses in Computer Science and Information Systems. With the permission of the Dean, candidates may be allowed to complete an Honours course available in the Faculties of Science or Engineering and Information Technologies, provided that the candidate's plan of study is appropriate for the degree.
2.2 Entry into the Honours degree is only by transfer from the BIT degree.
2.3 To qualify to transfer into the Bachelor of Information Technology (Honours) degree, students shall:
2.3.1 have completed at least 144 credit points from the Bachelor of Information Technology degree or equivalent at another institution;
2.3.2 have completed the requirements of a stream in either Computer Science or Information Systems associated with the degree of Bachelor of Information Technology or the equivalent at another institution;
2.3.3 have achieved either a credit average in the relevant units of study used to satisfy 2.3.2 above, or a ISWAM of at least 65; and
2.3.4 satisfy any additional criteria set by the head of school concerned.
2.4 Once enrolled in the BIT (Honours) course, students shall complete the requirements for the honours course full-time, over two consecutive semesters.
2.5 If the Faculty is satisfied that a student is unable to attempt the honours course on a full-time basis and if the head of school concerned so recommends, permission may be granted to undertake honours half-time over four consecutive semesters.
2.6 To qualify for the award of the Bachelor of Information Technology (Honours) degree, students shall complete 192 credit points as outlined in clause 1.1, including 48 credit points of units of study at the 4000 or 5000 level, of which at least 42 credit points must be from 4000 and 5000 level core and selected core units listed in the BIT table, including INFO4991, INFO4992 and INFO4999, with a result of at least 65 in INFO4999.
2.7 The degree of Bachelor of Information Technology (Honours) shall recognise the same streams as the BIT.
2.8 The grade of Honours and the Honours mark are determined by performance in all 4000 and 5000 level units attempted from the BIT table.
2.9 Honours in the Bachelor of Information Technology may be awarded in four classes as follows:
2.9.1 Class I (Honours mark range: 80 and above)
2.9.2 Class II(1) (Honours mark range: 75–79)
2.9.3 Class II(2) (Honours mark range: 70–74)
2.9.4 Class III (Honours mark range: 65–69)
2.10 A student with an Honours mark of 90 or greater and a minimum ISWAM of 80 shall, if deemed to be of sufficient merit by the Dean, be awarded a University Medal.
2.11 A student may not re-attempt the Bachelor of Information Technology (Honours) course. However, students who fail to meet the requirements for the award of honours and who have not already satisfied the requirements of the BIT may elect to transfer back to the BIT. A student who does not meet the requirements for the award of honours and who has completed the requirements of the BIT shall graduate with the BIT Pass degree.
2.12 A student who is qualified to enrol in two Honours courses may either:
2.12.1 complete the Honours courses in the two subject areas separately and in succession; or
2.12.2 complete a joint Honours course, equivalent to an Honours course in a single subject area, in the two subject areas.
2.12.3 A joint Honours course shall comprise such parts of the two Honours courses as may be decided by the Dean.

3. Units of study

3.1 The units of study for the Bachelor Information Technology are described in the BIT table of these Resolutions.
3.2 A candidate for the degree shall proceed by completing units of study as prescribed by the Faculty.
3.3 All students, not withstanding any credit transfer, must complete at least 24 credit points from 3000-level core and selected core units at the University of Sydney.

4. Transfer between the BIT and other degrees

4.1 Students who have completed at least 48 credit points may be permitted to transfer to the Bachelor of Information Technology degree from other Engineering and Information Technologies or Science degree programs, if their mark averaged over all attempted units of study is 70 or greater.
4.2 A quota may apply to the number of students allowed to transfer into the BIT in a given calendar year.
4.3 The amount of credit awarded toward the BIT for previous study will be subject to the approval of the head of the relevant school.
4.4 Students enrolled in the Bachelor of Information Technology who have satisfied the requirements of the BSc, BSc (Adv), BCST or BCST (Adv) degrees, and with the permission of the relevant faculty Dean, may elect to discontinue their enrolment in the Bachelor of Information Technology degree and graduate with the BSc, BSc (Adv), BCST or BCST (Adv) degree, as appropriate.

5. Transition arrangements

5.1 These Resolutions apply to all candidates for the BIT degree enrolling after 1 January 2008.
5.2 With the permission of the Dean of the Faculty of Science, candidates who first enrolled for the degree prior to 2008, and who have not had a period of suspension or exclusion, may choose to qualify for the degree under the Resolutions of the Faculty of Science for the BIT degree at the time of their commencement.

Bachelor of Computer Science and Technology (BCST)

1. Requirements for the Pass degree

1.1 To qualify for the award of the Pass degree of Bachelor of Computer Science and Technology, a student shall complete units of study having a total value of at least 144 credit points such that:

1.1.1 at least 108 credit points are from the core and selected core units as specified in the BCST table, including all the core units, and at least 36 credit points which are at 3000-level and above;

1.1.2 a stream is completed in either Computer Science or Information Systems, as specified in the BCST table;

1.1.3 at least 18 credit points are from the Science subject areas of Mathematics and/or Statistics, as described in the BCST table;

1.1.4 at most 72 credit points are from 1000 level units.

2. Requirement for the award of Honours

2.1 There shall be an Honours degree associated with the Bachelor of Computer Science and Technology.

2.2 To qualify to enrol in an honours course, students shall:

2.2.1 have qualified for the award of the BCST degree; or

2.2.2 be a Pass graduate of the Faculty of Science; or

2.2.3 be a Pass graduate holding a degree equivalent to the BCST from another institution;

2.2.4 have completed the requirements of a major in either Computer Science or Information Systems associated with the degree of Bachelor of Computer Science and Technology, or the equivalent at another institution;

2.2.5 have achieved either a credit average in the relevant units of study used to satisfy clause 2.2.4 above, or an ISWAM of at least 65; and

2.2.6 satisfy any additional criteria set by the head of school concerned.

2.3 Students shall complete the requirements for the Honours course full-time over two consecutive semesters.

2.4 If the Faculty is satisfied that a student is unable to attempt the honours course on a full-time basis and if the head of school concerned so recommends, permission may be granted to undertake Honours half-time over four consecutive semesters.

2.5 To qualify for the award of an Honours degree, students shall complete while enrolled in an honours course, 48 credit points of units of study at the 4000 or 5000 level, of which at least 42 credit points must be from core and selected core 4000 and 5000 level units listed in the BIT table, including INF04991, INF04992, INF04999 and INFO5993.

2.6 The grade of Honours and the honours mark are determined by performance in the Honours course.

2.7 Honours in the Bachelor of Computer Science and Technology may be awarded in four classes as follows:

2.7.1 Class I (Honours mark range: 80 and above)

2.7.2 Class II(1) (Honours mark range: 75–79)

2.7.3 Class II(2) (Honours mark range: 70–74)

2.7.4 Class III (Honours mark range: 65–69)

2.8 A student with an Honours mark of 90 or greater in an honours subject area and a minimum ISWAM of 80 shall, if deemed to be of sufficient merit by the Dean, receive a University Medal.

2.9 A student may not re-attempt an Honours course in a single subject area.

2.10 A student who does not meet the requirements for the award of honours, and who entered the honours course under clause 2.2, shall graduate with the BCST Pass degree.

2.11 A student who is qualified to enrol in two Honours courses may either:

2.11.1 complete the Honours courses in the two subject areas separately and in succession; or

2.11.2 complete a joint Honours course, equivalent to an honours course in a single subject area, in the two subject areas.

2.11.3 A joint Honours course shall comprise such parts of the two honours courses as may be decided by the Dean.

3. Units of study

3.1 The units of study for the Bachelor of Computer Science and Technology are described in the BCST table of these Resolutions.

3.2 A candidate for the course shall proceed by completing units of study as prescribed by the Faculty.

3.3 All students, not withstanding any credit transfer, must complete at least 24 credit points from 3000-level core and selected core units at the University of Sydney.

4. Degree transfer

4.1 Students who have completed at least 48 credit points may be permitted to transfer to the BCST (Advanced) degree from the BCST if:

4.1.1 their mark averaged over all attempted units of study is 70 or greater; and

4.1.2 they are able to enrol in the required number of advanced level units.

4.2 A candidate for the BCST (Advanced) degree or the BIT degree may apply to the Dean for permission to transfer candidature to the BCST.

4.2.1 There is no WAM requirement for students wishing to transfer to the standard BCST stream.

5. Transition arrangements

5.1 These Resolutions apply to all candidates for the BCST degree enrolling after 1 January 2008.

5.2 With the permission of the Dean of the Faculty of Science, candidates who first enrolled for the degree prior to 2008, and who have not had a period of suspension or exclusion, may choose to qualify for the degree under the Resolutions of the Faculty of Science for the BCST degree at the time of their commencement.

Bachelor of Computer Science and Technology (Advanced) (BCST(Adv))

1. Requirements for the Pass degree

1.1 To qualify for the award of the Pass degree in the Advanced stream, Bachelor of Computer Science and Technology (Advanced), a student shall complete units of study having a total value of at least 144 credit points such that:

1.1.1 at least 108 credit points are from the core and selected core units as specified in the BCST(Adv) table, including all the core units, and at least 36 credit points which are at 3000-level and above; and the core units at 1000-level and 2000-level have average results of Credit or better; and

1.1.2 at least 12 credit points of 2000-level core and recommended elective units are at the Advanced level; and at least 12 credit points of 3000-level core, selected core and recommended units are at the Advanced level;

1.1.3 a stream is completed in either Computer Science or Information Systems, as specified in the BCST(Adv) table;

1.1.4 at least 18 credit points are from the Science subject areas of Mathematics and/or Statistics, as described in the BCST(Adv) table; and

1.1.5 at most 72 credit points are from 1000 level units.

1.2 Candidates who fail to maintain the required credit average in core units will be transferred to candidature for the Bachelor of Computer Science and Technology degree in their next year of enrolment with full credit for the units of study completed as Bachelor of Computer Science and Technology (Advanced) candidates.

1.3 Candidates who fail to achieve a credit average in core units of study attempted in the year in which they have otherwise completed the requirements for the degree will be awarded the Bachelor of Computer Science and Technology.

2. Requirements for the Honours degree

2.1 There shall be Honours courses in Computer Science and Information Systems. With the permission of the Dean, candidates may be allowed to complete an Honours course available in the Faculties of Science or Engineering and Information Technologies, provided that the candidate's plan of study is appropriate for the degree.

2.2 To qualify to enrol in an Honours course, students shall:

2.2.1 have qualified for the award of the BCST (Advanced) degree; or

2.2.2 be a pass graduate of the Faculty of Science in an Advanced Science degree; or

2.2.3 be a Pass graduate holding a degree equivalent to the BCST (Advanced) from another institution;

2.2.4 have completed the requirements of a stream in either Computer Science or Information Systems associated with the degree of Bachelor of Computer Science and Technology (Advanced), or the equivalent at another institution;

2.2.5 have achieved either a credit average in the relevant units of study used to satisfy clause 2.2.4 above, or an ISWAM of at least 65; and

2.2.6 satisfy any additional criteria set by the head of school concerned.

2.3 Students shall complete the requirements for the Honours course full-time over two consecutive semesters.

2.4 If the Faculty is satisfied that a student is unable to attempt the Honours course on a full-time basis and if the head of school concerned so recommends, permission may be granted to undertake Honours half-time over four consecutive semesters.

2.5 To qualify for the award of an Honours degree, students shall complete while enrolled in an honours course, 48 credit points of units of study at the 4000 or 5000 level, of which at least 42 credit points must be from core and recommended electives at 4000 and 5000 level units listed in the BIT table, including INF04991, INF04992 and INF04999.

2.6 The grade of Honours and the Honours mark are determined by performance in the Honours course.

2.7 Honours in the Bachelor of Computer Science and Technology (Advanced) degree may be awarded in four classes as follows:

2.7.1 Class I (Honours mark range: 80 and above)

2.7.2 Class II(1) (Honours mark range: 75–79)

2.7.3 Class II(2) (Honours mark range: 70–74)

2.7.4 Class III (Honours mark range: 65–69)

2.8 A student with an Honours mark of 90 or greater in an Honours subject area and a minimum ISWAM of 80 shall, if deemed to be of sufficient merit by the Dean, receive a University Medal.

2.9 A student may not re-attempt an Honours course in a single subject area.

2.10 A student who does not meet the requirements for the award of honours, and who entered the Honours course under clause 2.2, shall graduate with the BCST (Advanced) degree.

2.11 A student who is qualified to enrol in two Honours courses may either:

2.11.1 complete the Honours courses in the two subject areas separately and in succession; or

2.11.2 complete a joint Honours course, equivalent to an Honours course in a single subject area, in the two subject areas.

2.11.3 A joint Honours course shall comprise such parts of the two Honours courses as may be decided by the Dean.

3. Units of study

3.1 The units of study for the Bachelor of Computer Science and Technology (Advanced) are described in BCST(Adv) table of these Resolutions.

3.2 A candidate for the course shall proceed by completing units of study as prescribed by the Faculty.

3.3 All students, not withstanding any credit transfer, must complete at least 24 credit points from 3000-level core and selected core units at the University of Sydney.

4. Degree transfer

4.1 Students who have completed at least 48 credit points may be permitted to transfer to the BCST (Advanced) stream from the BCST if:

4.1.1 their mark averaged over all attempted units of study is 70 or greater; and

4.1.2 they are able to enrol in the required number of Advanced level units.

4.2 A candidate for the BCST (Advanced) degree or the BIT may apply to the Dean for permission to transfer candidature to the BCST.

4.2.1 There is no WAM requirement for students wishing to transfer to the standard BCST degree.

5. Transition arrangements

5.1 These Resolutions apply to all candidates for the BCST (Advanced) degree enrolling after 1 January 2008.

5.2 With the permission of the Dean of the Faculty of Science, candidates who first enrolled for the degree prior to 2008, and who have not had a period of suspension or exclusion, may choose to qualify for the degree under the Resolutions of the Faculty of Science for the BCST (Advanced) degree at the time of their commencement.

Resolutions for combined degrees

Bachelor of Engineering and Bachelor of Arts

Combined degree course rules

1. Requirements for the Pass BE and BA awards

1.1 Candidature for this combined degree program is a minimum of 5 years of full-time study.

1.2 Candidates qualify for the two awards from the combined degree program (a separate testamur being awarded for both the BE and the BA) by completing the following:

1.2.1 The units of study prescribed for the BE specialisation undertaken. These units of study are set out in the tables appended to the Resolutions relating to the BE degree.

1.2.2 BA units of study totalling at least 84 credit points, of which at least 54 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.

1.3 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).

2. Requirements for the BE and BA awards with Honours

2.1 *BE with Honours*

2.1.1 On completion of the requirements for the combined degrees, a student may qualify for the award of BE with Honours in accordance with the requirements set out in the Resolutions of the Faculty of Engineering relating to the BE degree.

2.2 *BA with Honours*

2.2.1 On completion of the requirements for the combined degrees, a student may be qualified to enrol in Honours in the Bachelor of Arts. To qualify for the award of the BA with Honours, a student must complete successfully an additional year of study (the Honours year), as specified in the Faculty of Arts Handbook.

3. Units of study

3.1 The units of study, which may be taken for the combined Bachelor of Engineering and Bachelor of Arts program, are set out in the Resolutions of the Faculty of Engineering and the Faculty of Arts respectively.

3.2 The Faculty Resolutions specify:

3.2.1 credit point values;

3.2.2 corequisites/prerequisites and assumed learning/ assumed knowledge; and

3.2.3 any special conditions.

4. Supervision of the degrees

4.1 Students will be under the general supervision of the Faculty of Engineering for enrolment and administrative matters.

4.2 Students will be under the supervision of the Faculty of Arts in relation to progression and eligibility of award of the BA component and will be under the supervision of the Faculty of Engineering in relation to the BE component.

4.3 The Deans of the Faculty of Arts and the Faculty of Engineering shall jointly exercise authority in any matter concerning the combined course not otherwise dealt with in these resolutions.

5. Transfer arrangements

5.1 A student may abandon the combined BE/BA course and elect to complete either the BE or BA degree in accordance with the resolutions governing that degree.

Bachelor of Engineering and Bachelor of Commerce

Combined degree course rules

1. **Cross-faculty management of the combined award course**

1.1 Participating faculties: Faculty of Engineering and Information Technologies and Faculty of Economics and Business.

1.2 Students will be under the general supervision of the Faculty of Engineering and Information Technologies for administrative matters.

1.3 Students will be under the supervision of the Faculty of Economics and Business in relation to the Bachelor of Commerce component and will be under the supervision of the Faculty of Engineering and Information Technologies in relation to the Bachelor of Engineering component.

1.4 Students will be subject to conditions on admission, stream requirements, enrolment restrictions, assessment, advanced standing, progression, academic honesty, degree completion times and transition arrangements as shown in the resolutions published in the Faculty of Engineering and Information Technologies Handbook for the Bachelor of Engineering degree.

1.5 The Faculty of Economics and Business and the Faculty of Engineering and Information Technologies shall jointly exercise authority in any matter concerning the combined course not otherwise dealt with in these resolutions.

2. **Requirement for the Pass degrees of Bachelor of Engineering and Bachelor of Commerce**

2.1 To qualify for the award of the Pass degrees of Bachelor of Engineering and Bachelor of Commerce a student must complete successfully units of study that total at least 240 credit points and include:

2.1.1 in the Faculty of Engineering and Information Technologies

2.1.1.1 the program of units of study set out in the BE stream requirement table, relating to the Bachelor of Engineering stream that the student is pursuing; and

2.1.2 in the Faculty of Economics and Business

2.1.2.1 at least 96 credit points in units of study taught by the Faculty of Economics and Business (including at least 48 credit points of 2000 and/or 3000 level units), which cannot be counted towards the award of the Bachelor of Engineering;

2.1.2.2 7 core units of study in Economics and Business comprising 36 junior and 6 senior credit points : ECON1001, ECON1002, ACCT1001. ACCT1002, ECMT1020, FINS1000 and ECOF3001(as specified in the Faculty of Economics and Business Handbooks); and

2.1.2.3 either a major (minimum of 36 senior credit points) or an extended major (minimum of 48 credit points), comprising units of study specified in the Faculty of Economics and Business Handbook, from one of the following subject areas:

2.1.2.3.1 Accounting
2.1.2.3.2 Business Information Systems
2.1.2.3.3 Commercial Law
2.1.2.3.4 Econometrics
2.1.2.3.5 Economics
2.1.2.3.6 Finance
2.1.2.3.7 Industrial Relations and Human Resource Management
2.1.2.3.8 International Business
2.1.2.3.9 Management
2.1.2.3.10 Operations Management and Decision Sciences
2.1.2.3.11 Marketing

3. **Requirements for the Bachelor of Engineering and Bachelor of Commerce degrees with Honours**

3.1 Bachelor of Engineering with Honours

3.1.1 On completion of the requirements for the combined degree, a student may qualify for the award of the Bachelor of Engineering degree with Honours in accordance with the requirements set out in the resolutions of the Faculty of Engineering and Information Technologies relating to the Bachelor of Engineering degree.

3.2 Bachelor of Commerce with Honours

3.2.1 On completion of the requirements for the combined degree, a student may qualify to enrol in Honours in the Bachelor of Commerce.

3.2.2 To qualify for the award of the Bachelor of Commerce with Honours, a student must complete successfully an additional year of study (the Honours year), as specified in the Faculty of Economics and Business Handbook

4. **Units of study**

4.1 The units of study, which may be taken for the degrees of Bachelor of Engineering and Bachelor of Commerce, are set out in the resolutions of the Faculty of Engineering and Information Technologies and the Faculty of Economics and Business respectively.

4.2 The faculty Resolutions (which are reproduced in the Engineering and Information Technologies and Economics and Business Handbooks, as the case may be) specify:

4.2.1 credit point values;

4.2.2 corequisites/prerequisites/assumed-learning/assumed knowledge; and

4.2.3 any special conditions.

5. **Award of the degrees**

5.1 A student who completes the requirements for the Bachelor of Engineering and Bachelor of Commerce degrees shall receive at graduation a separate testamur for each of the degrees.

5.2 A student may abandon the combined Bachelor of Engineering and Bachelor of Commerce degree to elect to complete either the Bachelor of Engineering or Bachelor of Commerce degree in accordance with the resolutions governing that degree.

Bachelor of Engineering and Bachelor of Science

Combined degree course rules

1. **Cross-faculty management of the combined award course**

1.1 A student may proceed concurrently to the degrees of Bachelor of Science, Bachelor of Science (Advanced) or Bachelor of Science (Advanced Mathematics) and Bachelor of Engineering. Admission, progression and assessment criteria apply and are described in the resolutions for the BE specialisations shown above.

1.2 Students will be under the general supervision of the Faculty of Engineering and Information Technologies for administrative matters.

1.3 The Faculty of Science and the Faculty of Engineering and Information Technologies shall jointly exercise authority in any academic matter concerning the combined course not otherwise dealt with in these resolutions.

2. **Units of study**

2.1 Units of study must be selected as shown in the Engineering specialisation tables for the core components of the chosen Engineering specialisation. Units from the Science Faculty must be chosen as shown in the Science Faculty Handbook to meet requirements of a Science major.

2.2 The faculty Resolutions (which are reproduced in the Engineering and Information Technologies and Science Handbooks, as the case may be) specify:

2.2.1 credit point values;

2.2.2 corequisites/prerequisites and assumed learning/ assumed knowledge; and

2.2.3 any special conditions.

3. **Requirements for the BE/BSc Pass degree**

3.1 To qualify for the award of the pass degrees a student shall complete units of study having a total value of at least 240 credit points including:

3.1.1 96 credit points of units from Science subject areas,

3.1.2 a major in a Science area, and

3.1.3 Units of study as prescribed in the tables of BE specialisation requirements for the specialisation that the student is pursuing.

3.2 To qualify for the award of the pass degree in the Advanced or Advanced Mathematics stream of the BSc a student shall in addition to the requirements of resolution 3.1:

3.2.1 complete at least 54 credit points of intermediate/senior Science units of study of which at least 36 shall be completed at the Advanced level or as TSP units;

3.2.2 complete at least 24 credit points of senior Science units of study at the Advanced level or as TSP units in a single Science subject area; and

3.2.3 maintain in intermediate and senior Science units of study an average mark of 65 or greater in each year of enrolment.

4. **Requirement for Honours degrees**

4.1 BE with Honours

4.1.1 On completion of the requirements for the combined degrees, a student may qualify for the award of BE degree with Honours in accordance with the requirements set out in the Resolutions of the Faculty of Engineering and Information Technologies relating to the BE degree.

4.2 BSc with Honours

4.2.1 On completion of the requirements for the combined degrees, a student may be qualified to enrol in Honours in the Bachelor of Science.

4.2.2 To qualify for the award of the BSc with Honours, a student must complete successfully an additional year of study (the Honours year), as specified in the Faculty of Science Handbook.

5. **Award of the degrees**

5.1 A student who completes the requirements for the Bachelor of Engineering and Bachelor of Science degrees shall receive at graduation a separate testamur for each of the degrees.

5.2 Students may at any stage abandon the combined degree course and elect to complete either a BSc or a BE in accordance with the resolutions governing those degrees.

5.3 Resolutions covering admission, enrolment restrictions, progression requirements, satisfactory progress, cross-institutional study and assessment criteria for the combined degree are equivalent to those for the BE degree and specialisations, as shown in the Faculty of Engineering and Information Technologies Handbook.

6. The Deans of the Faculties of Engineering and Information Technologies and Science shall jointly exercise authority in any matter concerning the combined degrees not otherwise dealt with in these resolutions.

Bachelor of Engineering and Bachelor of Science double degree

Double degree course rules

1. **Transfer to Science requirements**

1.1 A student enrolled for a Bachelor of Engineering degree may be permitted to transfer to the Faculty of Science to complete a BSc degree at the end of Second Year or Third Year in the BE degree if:

1.1.1 all units of study attempted in the BE degree have been completed with a grade of Pass or better;

1.1.2 at least 96 credit points from units of study in the BE degree have been completed, of which no more than 12 credit points are from units of study with the grade of Pass (Concessional);

1.1.3 the student is qualified to enrol in a major in a Science area; and

1.1.4 for admission to the Advanced streams, the student satisfies the requirements in Section 3.2 or 3.3 of the Resolutions of the Faculty of Science relating to the BSc degree.

2. Students will be under the supervision of the Faculty of Engineering and Information Technologies for the period of BE degree enrolment and under the supervision of the Faculty of Science for the BSc enrolment and completion.

3. **Units of study**

3.1 Units of study must be selected as shown in the Engineering specialisation tables for the core components of the chosen Engineering specialisation.

3.2 Units from the Science Faculty must be chosen as shown in the Science Faculty Handbook to meet requirements of a Science major.

3.3 The faculty Resolutions (which are reproduced in the Engineering and Information Technologies and Science Handbooks, as the case may be) specify:

3.3.1 credit point values;

3.3.2 corequisites/prerequisites/assumed-learning/assumed knowledge; and

3.3.3 any special conditions.

4. **Award of Pass degree in Science**

4.1 To qualify for the award of the pass BSc degree a student shall complete units of study to a value of at least 48 credit points including:

4.1.1 42 credit points of intermediate/senior units of study in Science subject areas; and

4.1.2 a major in a Science area.

4.2 To qualify for the award of the pass degree in the Advanced or Advanced Mathematics stream of the BSc a student shall in addition to the requirements of Section 4.1:

4.2.1 include at least 72 credit points of intermediate/senior Science units of study;

4.2.2 include at least 24 credit points of senior Science units of study at the Advanced level or as TSP units in a single Science subject area; and

4.2.3 maintain in intermediate and senior Science units of study an average mark of 65 or greater in each year of enrolment.

4.3 The requirements of sections 4.1 or 4.2 must be completed in one year of full-time study or two years of part-time study.

4.4 Students who complete at least 42 but less than 48 credit points in the prescribed time limits may in the following year of enrolment in the BE complete the remaining units to satisfy the requirements of the Faculty of Science.

4.5 Students who complete less than 42 credit points may apply to be readmitted to the degree, subject to sections 92–95 of the Resolutions of the Faculty of Science relating to the BSc degree.

5. **Award of Honours in Science**

5.1 Students who are so qualified may undertake an Honours course in the BSc in accordance with sections 12–20 of the Resolutions of the Faculty of Science relating to the BSc degree.

6. On completion of the requirements of the BSc degree or BSc Honours course, students will be eligible to resume their enrolment toward the BE degree according the Faculty of Engineering and Information Technologies Resolutions for that degree.

7. Students may abandon the BSc degree enrolment at any stage and resume their enrolment in the BE degree.

8. Resolutions covering admission, enrolment restrictions, progression requirements, satisfactory progress, cross-institutional study and assessment criteria for the Engineering component of the double degree are equivalent to those for the BE degree and specialisations, as shown in the Faculty Handbook.

9. The Deans of the Faculties of Engineering and Information Technologies and Science shall jointly exercise authority in any matter concerning the double degree not otherwise dealt with in these resolutions.

Bachelor of Engineering and Bachelor of Medical Science

Combined degree course rules

1. **Requirements of the BE/BMedSc**

1.1 A student may proceed concurrently to the degrees of Bachelor of Medical Science, and Bachelor of Engineering.

1.1 To qualify for the award of the BE/BMedSc combined degree a student must:

1.1.1 complete successfully units of study giving credit for a total of 240 credit points; and

1.1.2 satisfy the requirements of all other relevant By-laws, Rules and Resolutions of the University.

1.2 Admission, progression and assessment criteria apply and are described in the resolutions for the BE specialisations shown in the relevant section of the faculty handbook.

1.3 Students will be under the general supervision of the Faculty of Engineering and Information Technologies for administrative matters.

1.4 The Faculty of Science and the Faculty of Engineering and Information Technologies shall jointly exercise authority in any academic matter concerning the combined course not otherwise dealt with in these Resolutions.

2. **Specialisations, streams and majors**

2.1 The combined award course, BE/BMedSc, will be awarded in all of the Engineering specialisations that are available for the BE degree and all majors as are applicable under the resolutions of the Faculty of Science.

3. **Requirements for the BE/BMedSc Pass degree**

3.1 To qualify for the award of the Pass degrees a student shall complete units of study having a total value of at least 240 credit points including:

3.1.1 Units of study as prescribed in the tables of BE specialisation requirements for the specialisation that the student is pursuing;
3.1.2 at least 24 credit points from junior Science units of study (which may be common with those of 3.1.1, but including 12 credit points of Junior Chemistry, MBLG1001 Introductory Molecular Biology & Genetics and 12 credit points of Mathematics);
3.1.3 48 credit points of Intermediate core units of study as listed in Table IV of the Science Faculty Handbook of units of study for the BMedSc;
3.1.4 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;

4. **Requirements for the Honours degree**

4.1 BE with Honours
4.1.2 On completion of the requirements for the combined degrees, a student may qualify for the award of BE degree with Honours in accordance with the requirements set out in the Resolutions of the Faculty of Engineering and Information Technologies relating to the BE degree.
4.2 BMedSc with Honours
4.2.1 On completion of the requirements for the combined degrees, a student may be qualified to enrol in Honours in the Bachelor of Medical Science.
4.2.2 To qualify for the award of the BMedSc with Honours, a student must complete successfully an additional year of study (the Honours year), as specified in the Faculty of Science Handbook.

5. **Units of study**

5.1 Units of study must be selected as shown in the Engineering specialisation tables for the core components of the chosen Engineering specialisation and as specified for the MedSc component in clause 3.1 above.
5.2 Units from the Science Faculty must be chosen as shown in the Science Faculty Handbook to meet requirements of a Science major.
5.3 The faculty Resolutions (which are reproduced in the Engineering and Information Technologies and Science Handbooks, as the case may be) specify:
5.3.1 credit point values;
5.3.2 corequisites/prerequisites/assumed learning/ assumed knowledge; and
5.3.3 any special conditions.

6. Students may at any stage abandon the combined degree course and elect to complete either a BMedSc or a BE in accordance with the resolutions governing those degrees.
7. Resolutions covering admission, enrolment restrictions, progression requirements, satisfactory progress, cross-institutional study and assessment criteria for the combined degree are equivalent to those for the BE degree and specialisations, as shown in the faculty handbook.
8. The Deans of the Faculties of Engineering and Information Technologies and Science shall jointly exercise authority in any matter concerning the combined degrees not otherwise dealt with in these resolutions.

Bachelor of Engineering and Bachelor of Laws (BE/LLB)

1. **Cross-faculty management of combined degree course**

1.1 Candidates in a combined BE/LLB program are under the general supervision of the Engineering Faculty in which they are enrolled until the end of the semester in which they complete the requirements of the Engineering degree.
1.1.1 While enrolled in the Bachelor of Engineering (BE) degree students will be subject to the Faculty of Engineering and Information Technologies resolutions covering admission, enrolment restrictions, progression requirements, satisfactory progress, cross-institutional study, examination and assessment criteria as shown in the Faculty Handbook.
1.2 After that, they will be under the general supervision of the Faculty of Law.
1.3 The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Law shall jointly exercise authority in any matter concerning the combined award course not otherwise dealt with in these Resolutions.

2. **Units of study**

2.1.1 The units of study which may be taken for each of the specialisations and the flexible first year program in the Bachelor of Engineering (BE) are set out in the Bachelor of Engineering Specialisation Requirements in the Faculty of Engineering and Information Technologies Handbook.
2.1.2 The specialisation requirements indicate:
2.1.2.1 the core units of study prescribed, and the recommended units available, for each specialisation;
2.1.2.2 the credit point values of the units;
2.1.2.3 any assumed knowledge, prerequisite or corequisite requirements; and
2.1.2.4 any prohibitions placed on units of study.
2.1.3 A unit of study shall comprise such lectures, tutorial instruction, assignments and practical work as the Faculty may prescribe.
2.1.4 In order to complete a unit of study a student shall, except as provided in the section entitled Progression in the Resolutions of the Faculty of Engineering and Information Technologies, in the Faculty Handbook:
2.1.4.1 attend the lectures and laboratory/tutorial classes;
2.1.4.2 complete satisfactorily any assignments and practical work; and
2.1.4.3 pass any examinations prescribed for that unit.
2.1.5 A student may enrol in units of study only in accordance with these Resolutions and subject to the constraints of the timetable, unless approval is given by the head of the relevant school.
2.2 The units of study which may be taken for the Bachelor of Laws (LLB) are set out in the *Undergraduate units of study table* in the Faculty of Law Handbook, together with:
2.2.1 designation as compulsory or elective;
2.2.2 credit point value;
2.2.3 the units of study with which they are mutually exclusive;
2.2.4 assumed knowledge/prerequisites/corequisites/ prohibition; and
2.2.5 any special conditions.

3. **Requirements for the Bachelor of Engineering (BE) and the Bachelor of Laws (LLB)**

3.1 To qualify for the award of the pass degrees a student shall complete a minimum of 288 credit points.
3.2 To qualify for the award of the Bachelor of Engineering (BE) in the Bachelor of Engineering and Bachelor of Laws (BE/LLB) combined degree program a student must complete:
3.2.1 48 credit points of LAWS units of study as listed below in 3.5.1, and
3.2.2 units of study as prescribed in the BE Specialisation Requirements for the specialisation that the student is pursuing.
3.3 To qualify for the degree of Bachelor of Laws (LLB), in the Bachelor of Engineering and Bachelor of Laws (BE/LLB) combined degree program a student must complete units of study to the value of 144 credit points, made up of the following:
3.3.1 96 credit points of the compulsory units of study, which includes the 48 credit points of LAWS units of study listed below in 3.5.1 and counted towards the Bachelor of Engineering (BE);
3.3.2 48 credit points of the elective units of study in the Faculty of Law Handbook that must include:
3.3.2.1 a maximum of 42 credit points from the units of study listed in Part 1 of the *Undergraduate units of study table*, and
3.3.2.2 a minimum of six credit points from the units of study listed in Part 2 of the Undergraduate units of study table.
3.4 Candidates may credit the following units of study to both the Bachelor of Engineering (BE) and the Bachelor of Laws (LLB):
3.4.1 Contracts
3.4.2 Criminal Law
3.4.3 Foundations of Law
3.4.4 International Law
3.4.5 Legal Research I
3.4.6 Legal Research II
3.4.7 Civil and Criminal Procedure
3.4.8 Public Law
3.4.9 Torts
3.4.10 Torts and Contracts II
3.5.1 Candidates in combined Law must complete the law units of study in the following sequence:

Year	Unit of study	Credit points
Combined Law 1	Foundations of Law	6
	Legal Research I	0
	Torts	6
Combined Law 2	Contracts	6
	Civil and Criminal Procedure	6
	Criminal Law	6
Combined Law 3	International Law	6
	Legal Research II	0
	Public Law	6
	Torts and Contracts II	6
Combined Law 4	The 4th year of enrolment is entirely in Engineering units of study	

3.5.2 On completion of the requirements for the degree of Bachelor of Engineering (BE) a student must then complete the following compulsory units of study towards the degree.

Year	Unit of study	Credit points
Combined Law 5	Administrative Law	6
	Corporations Law	6
	Equity	6
	Evidence	6
	Federal Constitutional Law	6
	Introducation to Property and Commercial Law	6
	Real Property	6
	The Legal Profession	6
Combined Law 6	Elective units of study selected from Part 1 and Part 2	48

3.6 Except with the permission of the Dean or Associate Dean (Undergraduate), candidates in a combined Law program must successfully complete *Foundations of Law* before enrolling in any other Bachelor of Laws (LLB) units of study.

3.7 Students must complete the requirements for the Bachelor of Engineering (BE) before proceeding to the Bachelor of Laws (LLB) (unless they have permission from the Faculty of Law stating otherwise).

4. **Requirements for award of Honours**

4.1 Both the Bachelor of Engineering (BE) and the Bachelor of Laws (LLB) may be awarded with Honours.

4.2 To qualify for the award of the Bachelor of Engineering (BE) (Honours) degree, a student in the combined Bachelor of Engineering (BE) and Bachelor of Laws (LLB) degree program must:

4.2.1 complete the requirements for the Pass degree in the Bachelor of Engineering (BE) and achieve a level of performance as defined by the HWAM (Honours Weighted Average Mark).

4.2.2.1 The HWAM used for honours assessment includes all attempts at all level 2000, 3000 and 4000 units of study completed while a student is enrolled at the University in the Engineering degree.

4.2.2.2 Units at a level higher than 4000 are treated as level 4000 units.

4.2.1.3 Junior or level 1000 units are not included in the Honours calculation.

4.2.1.4 Research thesis units are weighted double in the assessment.

4.2.1.5 Details of the HWAM calculation are given in the Glossary of the Faculty of Engineering and Information Technologies Handbook.

4.2.1.6 The various classes of Honours are awarded on the basis of a student's HWAM, as follows:

4.2.1.6.1 First Class: HWAM >=75

4.2.1.6.2 Second Class/Division 1: 70<= HWAM <75

4.2.1.6.3 Second Class/Division 2: 65<= HWAM <70

4.2.1.7 Any student with a HWAM greater than or equal to 85 will be considered eligible for the award of a University Medal.

4.2.1.8 In exceptional circumstances the head of the relevant department may recommend to the Dean of Engineering and Information Technologies that the above conditions for the award of Honours be varied.

4.3.1 To qualify to enrol in the honours program candidates shall:

4.3.1.1 Be selected in the penultimate year of the Bachelor of Law degree;

4.3.1.2 Have a weighted average mark (WAM) of at least 75, averaged out across all law compulsories with the exception of Foundations of Law.

4.3.1.2.1 Results in elective subjects will not be included in the calculation.

4.3.1.2.2 Entry to the Honours program is competitive and the number of places in the Honours program each year is limited and dependant on available resources. The exact WAM will be determined by the Honours Committee on an annual basis.

4.3.2 The honours program will be assessed by an honours dissertation, completed under the supervision of an academic member of staff or adjunct staff.

4.3.2.1 Candidates will enrol in two specified 6 credit point Honours research units as listed in the "Table of undergraduate units of study" in Part 2 of the Bachelor of Laws resolutions.

4.3.2.2 These units will be included in the 48 credit points of elective subjects that are part of the pass requirements for the Bachelor of Laws.

4.3.3 The Faculty Honours Committee will determine the class of honours, based on a student's final Honours WAM (HWAM).

4.3.3.1 The HWAM will be drawn from a minimum of 90 credit points, and will include all compulsories and elective units undertaken at the University of Sydney, with the exception of Foundations of Law.

4.3.3.2 The weighting of the Honours research units will be double that of the non-Honours units.

4.3.4 Honours in the Bachelor of Laws may be awarded in two classes: Class I and Class II.

4.3.4.1 The honours degree of the Bachelor of Laws may be awarded on the following basis:

4.3.4.1.1 Honours class 1: those students with an HWAM of at least 80;

4.3.4.1.2 Honours class 2/ Division 1: those students with an HWAM of at least 75;

4.3.4.1.3 The Faculty Honours Committee will have the discretion to vary the required HWAM in exceptional circumstances.

4.3.4.2 To be awarded honours, a student must pass the honours dissertation.

4.3.4.3 A candidate for the Honours program who does not meet the requirements for the award of honours may be awarded the Bachelor of Laws pass degree.

4.3.4.4 All pass and honours students will be ranked together for graduation purposes to achieve a final graduation ranking.

4.3.4.5 Students who qualify for the award of first class honours, and whose work is of outstanding merit in the opinion of the faculty, may be considered for the award of a Univeristy medal.

4.3.5 These resolutions will apply to all students who complete their degree in the July semester 2013 or later.

4.3.5.1 Students who complete the requirements of their degree by 31 July 2013 will have honours awarded in accordance with the faculty resolutions in force at the time of commencement.

Bachelor of Information Technology and Bachelor of Arts (BIT/BA)

Combined degree rules

1. **Requirement for the Pass degrees of Bachelor of Information Technology and Bachelor of Arts**

1.1 Candidature for this combined degree program is a minimum of 5 years of full-time study.

1.2 Candidates qualify for the two awards from the combined degree program (a separate testamur being awarded for both the Bachelor of Information Technology and the Bachelor of Arts) by completing the following:

1.2.1 A total of at least 240 credit points that include:

1.2.1.1 The units of study prescribed for the BIT stream undertaken (Computer Science or Information Systems.) These units of study are set out in the tables appended to the Resolutions relating to the BIT degree.

1.2.2 Bachelor of Arts units of study totalling at least 84 credit points, of which at least 54 must be Second or Third Year credit points from Part A of the Table of units of study for the Bachelor of Arts degree, including a major as defined in the resolutions relating to the Bachelor of Arts degree.

2. Requirements for the Bachelor of Information Technology and Bachelor of Arts degrees with Honours

2.1 Bachelor of Information Technology with Honours

2.1.1 On completion of the requirements for the combined degrees, a student may qualify for the award of Bachelor of Information Technology with Honours in accordance with the requirements set out in the Resolutions of the Faculty of Engineering and Information Technologies relating to the Bachelor of Information Technology degree.

2.2 Bachelor of Arts with Honours

2.2.1 On completion of the requirements for the combined degrees, a student may be qualified to enrol in Honours in the Bachelor of Arts. To qualify for the award of the Bachelor of Arts with Honours, a student must complete successfully an additional year of study (the Honours year), as specified in the Faculty of Arts Handbook.

3. Units of study

3.1 The units of study, which may be taken for the combined Bachelor of Information Technology and Bachelor of Arts program, are set out in the Resolutions of the Faculty of Engineering and Information Technologies and the Faculty of Arts respectively.

3.2 The Faculty Resolutions specify:

3.2.1 credit point values;

3.2.2 corequisites / prerequisites / assumed learning / assumed knowledge; and

3.2.3 any special conditions.

3.3 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. Supervision of the degrees

4.1 Students will be under the general supervision of the Faculty of Engineering and Information Technologies for enrolment and administrative matters.

4.2 Students will be under the supervision of the Faculty of Arts in relation to progression and eligibility of award of the Bachelor of Arts component and will be under the supervision of the Faculty of Engineering and Information Technologies in relation to the Bachelor of Information Technology component.

4.3 The Deans of the Faculty of Arts and the Faculty of Engineering and Information Technologies shall jointly exercise authority in any matter concerning the combined degree not otherwise dealt with in these resolutions.

5. Transfer arrangements

5.1 A student may abandon the combined Bachelor of Information Technology and Bachelor of Arts degree and elect to complete either the Bachelor of Information Technology or Bachelor of Arts degree in accordance with the resolutions governing that degree.

Bachelor of Information Technology and Bachelor of Commerce (BIT/BCom)

Combined degree course rules

1. Cross-faculty management of the combined award course

1.1 Participating faculties: Faculty of Engineering and Information Technologies and Faculty of Economics and Business.

1.2 Students will be under the general supervision of the Faculty of Engineering and Information Technologies for administrative matters.

1.3 Students will be under the supervision of the Faculty of Economics and Business in relation to the Bachelor of Commerce component and will be under the supervision of the Faculty of Engineering and Information Technologies in relation to the Bachelor of Information Technology component.

1.4 Students will be subject to conditions on admission, stream requirements, enrolment restrictions, assessment, advanced standing, progression, academic honesty, degree completion times and transition arrangements as shown in the resolutions for Bachelor of Information Technology published in the Faculty of Engineering and Information Technologies Handbook.

1.5 The Faculty of Economics and Business and the Faculty of Engineering and Information Technologies shall jointly exercise authority in any matter concerning the combined course not otherwise dealt with in these resolutions.

2. Requirement for the Pass degrees of Bachelor of Information Technology and Bachelor of Commerce

2.1 To qualify for the award of the pass degrees of Bachelor of Information Technology and Bachelor of Commerce a student must complete successfully units of study that total at least 240 credit points and include:

2.1.1 in the Faculty of Engineering and Information Technologies

2.1.1.1 the program of units of study set out in the BIT table, relating to the Bachelor of Information Technology Stream (Computer Science or Information Systems) that the student is pursuing; and

2.1.2 in the Faculty of Economics and Business

2.1.2.1 at least 96 credit points in units of study taught by the Faculty of Economics and Business (including at least 48 credit points of 2000 and/or 3000 level units), which cannot be counted towards the award of the Bachelor of Information Technology;

2.1.2.2 7 core units of study in Economics and Business, comprising 36 junior and 6 senior credit points : ACCT1001, ACCT1002, ECON1001, ECON1002, ECMT1020, FINS1000 and ECOF3001 (as specified in the Faculty of Economics and Business Handbook); and

2.1.2.3 either a major (minimum of 36 senior credit points) or an extended major (minimum of 48 credit points), comprising units of study specified in the Faculty of Economics and Business Handbook, from one of the following subject areas:

2.1.2.3.1 Accounting

2.1.2.3.2 Business Information Systems

2.1.2.3.3 Commercial Law

2.1.2.3.4 Econometrics

2.1.2.3.5 Economics

2.1.2.3.6 Finance

2.1.2.3.7 Industrial Relations and Human Resource Management

2.1.2.3.8 International Business

2.1.2.3.9 Management

2.1.2.3.10 Operations Management and Decision Sciences

2.1.2.3.11 Marketing

3. Requirements for the Bachelor of Information Technology and Bachelor of Commerce degrees with Honours

3.1 Bachelor of Information Technology with Honours

3.1.1 On completion of the requirements for the combined degree, a student may qualify for the award of the Bachelor of Information Technology degree with Honours in accordance with the requirements set out in the resolutions of the Faculty of Engineering and Information Technologies relating to the Bachelor of Information Technology degree as shown in the faculty handbook.

3.2 Bachelor of Commerce with Honours

3.2.1 On completion of the requirements for the combined degree, a student may qualify to enrol in Honours in the Bachelor of Commerce.

3.2.2 To qualify for the award of the Bachelor of Commerce with Honours, a student must complete successfully an additional year of study (the honours year), as specified in the Faculty of Economics and Business Handbook.

4. Units of study

4.1 The units of study, which may be taken for the degrees of Bachelor of Information Technology and Bachelor of Commerce, are set out in the resolutions of the Faculty of Engineering and Information Technologies and the Faculty of Economics and Business respectively.

4.2 The faculty Resolutions (which are reproduced in the Engineering and Information Technologies and Economics and Business Handbooks, as the case may be) specify:
4.2.1 credit point values;
4.2.2 corequisites / perquisites / assumed learning / assumed knowledge; and
4.2.3 any special conditions.

5. Award of the degrees

5.1 A student who completes the requirements for the Bachelor of Information Technology and Bachelor of Commerce degrees shall receive at graduation a separate testamur for each of the degrees.
5.2 A student may abandon the combined Bachelor of Information Technology and Bachelor of Commerce degree to elect to complete either the Bachelor of Information Technology or Bachelor of Commerce degree in accordance with the Resolutions governing that degree.

Bachelor of Information Technology and Bachelor of Law (BIT/LLB)

Bachelor of Information Technology and Bachelor of Law (BIT/LLB)

1. Cross-faculty management of combined degree course

1.1 Candidates in a combined BIT/LLB program are under the general supervision of the Engineering and Information Technologies Faculty in which they are enrolled until the end of the semester in which they complete the requirements of the Information Technology degree.
1.1.1 While enrolled in the Bachelor of Information Technology (BIT) degree students will be subject to the Faculty of Engineering and Information Techologies resolutions covering admission, enrolment restrictions, progression requirements, satisfactory progress, cross-institutional study, examination and assessment criteria as shown in the Faculty Handbook.
1.2 After that, they will be under the general supervision of the Faculty of Law.
1.3 The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Law shall jointly exercise authority in any matter concerning the combined award course not otherwise dealt with in these Resolutions.

2. Units of Study

2.1.1 The units of study which may be taken for the IT streams and the flexible first year program in the Bachelor of Information Technology (BIT) are set out in the Bachelor of Information Technology Stream Tables in the Faculty of Engineering and Information Technologies Handbook.
2.1.2 These stream requirements indicate:
2.1.2.1 the core units of study prescribed, and the recommended units available, for each stream;
2.1.2.2 the credit point values of the units;
2.1.2.3 any assumed knowledge, prerequisite or corequisite requirements; and
2.1.2.4 any prohibitions placed on units of study.
2.1.3 A unit of study shall comprise such lectures, tutorial instruction, assignments and practical work as the Faculty may prescribe.
2.1.4 In order to complete a unit of study a student shall, except as provide in the section entitled Progression in the Resolutions of the Faculty of Engineering and Information Technologies, in the Faculty Handbook:
2.1.4.1 attend the lectures and laboratory/ tutorial classes;
2.1.4.2 complete satisfactorily any assignments and practical work; and
2.1.4.3 pass any examinations prescribed for that unit.
2.1.5 A student may enrol in units of study only in accordance with these Resolutions and subject to the contstraints of the timetable, unless approval is given by the head of the relevant school.
2.2 The units of study which may be taken for the Bachelor of Laws (LLB) are set out in the *Undergraduate units of study table* in the Faculty of Law Handbook, together with:
2.2.1 designation as compulsory or elective:
2.2.2 credit point value;
2.2.3 the units of study with which they are mutually exclusive;
2.2.4 assumed knowledge/ prerequisites/ corequisites/ prohibition; and
2.2.5 any special conditions.

3. Requirements of the Bachelor of Information Technology (BIT) and the Bachelor of Laws (LLB)

3.1 To qualify for the award of the pass degrees a student shall complete a minimum of 288 credit points.
3.2 To qualify for the award of the Bachelor of Information Technology (BIT) in the Bachelor of Information Technology and Bachelor of Laws (BIT/LLB) combined degree program a student must complete:
3.2.1 48 credit points of LAWS units of study as listed below in 3.5.1, and
3.2.2 units of study as prescribed in the BIT stream tables.
3.3 To qualify for the degree of Bachelor of Laws (LLB), in the Bachelor of Information Technology and Bachelor of Laws (BIT/LLB) combed degree program a student must complete units of study to the value of 144 credit points, made up of the following
3.3.1 96 credit points of compulsory units of study, which includes the 48 credit points of LAWS units of study listed below in 3.5.1 and counted towards the Bachelor of Information Technology (BIT);
3.3.2 48 credit points of the elective units of study in the Faculty of Law Handbook that must include
3.3.2.1 a maximum of 42 credit points from the units of study listed in Part 1 of the *Undergraduate units of study table*, and
3.3.2.2 a minimum of 6 credit points from the units of study listed in Part 2 of the *Undergraduate units of study table*.
3.4 Candidates may credit the following units of study to both the Bachelor of Information Technology (BIT) and the Bachelor of Laws (LLB):
3.4.1 Civil and Criminal Procedure
3.4.2 Contracts
3.4.3 Criminal Law
3.4.4 Foundations of Law
3.4.5 International Law
3.4.6 Legal Research I
3.4.7 Legal Research II
3.4.8 Public Law
3.4.9 Torts
3.4.10 Torts and Contracts II
3.5.1 Candidates in combined law must complete the law units of study in the following sequence:

Year	Units of Study	Credit Points
Combined Law 1	Foundations of Law	6
	Legal Research I	0
	Torts	6
Combined Law 2	Contracts	6
	Civil and Criminal Procedure	6
	Criminal Law	6
Combine Law 3	International Law	6
	Legal Research II	0
	Public Law	6
	Torts and Contracts II	6
Combined Law 4	The 4th year of enrolment is entirely in Information Technology units of study	

3.5.2 On completion of the requirements for the degree of Bachelor of Information Technology (BIT) a student must then complete the following compulsory units of study towards the degree.

Year	Unit of Study	Credit Points
Combined Law 5	Administrative Law	6
	Corporations Law	6
	Equity	6
	Evidence	6
	Federal Constitutional Law	6
	Introduction to Property and Commercial Law	6
	Real Property	6
	The Legal Profession	6

Year	Unit of Study	Credit Points
Combined Law 6	Elective units of study selected from Part 1 and Part 2	48

3.6 Except with permission of the Dean or Associate Dean (Undergraduate), candidates in a combined law program must successfully complete *Foundations of Law* before enrolling in any other Bachelor of Laws (LLB) units of study.
3.7 Students must complete the requirements for the Bachelor of Information Technology (BIT) before proceeding to the Bachelor of Laws (LLB) (unless they have permission from the Faculty of Law stating otherwise).

4. Requirements for award of Honours

4.1 Both the Bachelor of Information Technology (BIT) and the Bachelor of Laws (LLB) may be awarded with Honours.
4.2 To qualify for the award of the Bachelor of Information Technology (BIT) (Honours) degree students must:
4.2.1 Qualify to transfer into the Bachelor of Information Technology (Honours) degree. To qualify for entry students shall:
4.2.1.1 have completed at least 144 credit points from the Bachelor of Information Technology degree;
4.2.1.2 have completed the requirements of a stream in either Computer Science or Information Systems associated with the degree of Bachelor of Information Technology;
4.2.1.3 have achieved either a credit average in the relevant units of study used to satisy an ISWAM of at least 65;
4.2.1.4 satisfy any additional criteria set by the head of school concerned; and
4.2.1.5 with the permission of the Faculty of Law, either suspend their candidature for the Bachelor of Laws (LLB) degree while undertaking the honours course, or undertake the honours course after completion of both degrees in the combined degree program.
4.2.2 Once enrolled in the BIT (Honours) course, students shall complete the requirements for the honours course full-time, over two consecutive semesters.
4.2.3 To qualify for the award of Bachelor of Information Technology (Honours) degree, students shall complete 192 credit points, including 48 credit points of units of study at the 4000 or 5000 level, of which at least 42 credit points must be from 4000 and 5000 level core and selected core units listed in the BIT table, including INFO4991, INFO4992, INFO4999, with a result of at least 65 in INFO4999.
4.2.4 The grade of Honours and the Honours mark are determined by performance in all 4000 and 5000 level units attempted from the BIT table.
4.2.5 Honours in the Bachelor of Information Technology may be awarded in four classes as follows:
4.2.5.1 Class I (Honours mark range: 80 and above)
4.2.5.2 Class II (1) (Honours mark range: 75-79)
4.2.5.3 Class II (2) (Honours mark range: 70-74)
4.2.5.4 Class III (Honours mark range: 65-69)
4.2.6 A student with an Honours mark of 90 or greater and a minimum ISWAM of 80 shall, if deemed to be of sufficient merit by the Dean, be awarded a University Medal.
4.2.7 A student may not re-attempt the Bachelor of Information Technology (Honours) course. However, students who fail to meet the requirements for the award of honours and who have not already satisfied the requirements for the award of the BIT may elect to transfer back to the BIT. A student who does not meet the requirments for the award of honours and who has completed the requirements of the BIT shall graduate with the BIT Pass degree.
4.3.1 To qualify to enrol in the Bachelor of Laws (LLB) (Honours) program candidates shall:
4.3.1.1 Be selected in the penultimate year of the Bachelor of Law degree;
4.3.1.2 Have a weighted average mark (WAM) of at least 75, averaged out across all law compulsories with the exception of Foundations of Law.
4.3.1.2.1 Results in elective subjects will not be included in the calculation.
4.3.1.2.2 Entry to the Honours program is competitive and the number of places in the Honours program each year is limited and dependant on available resources. The exact WAM will be determined by the Honours Committee on an annual basis.
4.3.2 The honours program will be assessed by an honours dissertation, completed under the supervision of an academic member of staff or adjunct staff.
4.3.2.1 Candidates will enrol in two specified 6 credit point Honours research units as listed in the *Table of undergraduate units of study* in Part 2 of the Bachelor of Laws resolutions.
4.3.2.2 These units will be included in the 48 credit points of elective subjects that are part of the pass requirements of the Bachelor of Laws.
4.3.3 The Faculty Honours Committee will determine the class of honours, based on a student's final Honours WAM (HWAM).
4.3.3.1 The HWAM will be drawn from a minimum of 90 credit points, and will include all compulsories and elective units undertaken at the University of Sydney, with exception of Foundations of Laws.
4.3.3.2 The weighting of the Honours research units will be double that of the non-Honours units.
4.3.4 Honours in the Bachelor of Laws may be awarded in two classes: Class I and Class II.
4.3.4.1 The honours degree of the Bachelor of Laws may be awarded on the following basis:
4.3.4.1.1 Honours Class I: those students with a HWAM of at lease 80;
4.3.4.1.2 Honours Class II/ Division 1: those students with an HWAM of at least 75;
4.3.4.1.3 The Faculty Honours Committee will have the discretion to vary the required HWAM in exceptional circumstances.
4.3.4.2 To be awarded honours, a student must pass the honours dissertation.
4.3.4.3 A candidate for the Honours program who does not meet the requirements for the award of honours may be awarded the Bachelor of Laws pass degree.
4.3.4.4 All pass and honours students will be ranked together for graduation purposes to achieve a final graduation ranking.
4.3.4.5 Students who qualify for the award of first class honours, and whose work is of outstanding merit in the opinion of the faculty, may be considered for the award of a University Medal.
4.3.5 These resolutions will apply to all students who complete their degree in the July semester 2013 or later.
4.3.5.1 Students who complete the requirements of their degree by 31 July 2013 will have honours awarded in accordance with the Faculty resolutions in force at the time of commencement.

Bachelor of Information Technology and Bachelor of Medical Science (BIT/BMedSci)

Combined degree rules

1. Requirement for the Pass degrees of Bachelor of Information Technology and Bachelor of Medical Science

1.1 Candidature for this combined degree program is a minimum of 5 years of full-time study.
1.2 Candidates qualify for the two awards from the combined degree program (a separate testamur being awarded for both the Bachelor of Information Technology and the Bachelor of Medical Science) by completing the following:
1.2.1 a total of at least 240 credit points that include:
1.2.1.1 The program of units of study prescribed in the BIT Table relating to the Bachelor of Information Technology Stream that the student is pursuing; available streams are:
1.2.1.1.1 Computer Science and
1.2.1.1.2 Information Systems;
1.2.1.2 including at least 18 credit points from the Science subject areas of Mathematics and/or Statistics, as prescribed in the BIT Table;
1.2.1.3 up to 12 credit points of Senior units of study listed in Table IV of the Faculty of Science handbook of units of study for the Bachelor of Medical Science can be approved towards the Bachelor of Information Technology's selected core units at level 3000 and above;

1.2.1.4 at least 48 credit points from Junior Science / Information Technology units of study, which may be common with those of 1.2.1.2, comprising MBLG1001/MBLG1901 Molecular Biology and Genetics, and 12 credit points each from Chemistry, Mathematics and Physics or Computational Science and 6 credit points of Biology;
1.2.1.5 48 credit points of Intermediate core units of study listed in Table IV of the Faculty of Science handbook of units of study for the Bachelor of Medical Science;
1.2.1.6 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, Virology, Pharmacology and Physiology.

2. Requirements for the Bachelor of Information Technology and Bachelor of Medical Science degrees with Honours

2.1 Bachelor of Information Technology with Honours
2.1.1 On completion of a total of 192 credit points, a student may apply to enrol for the Honours option of the Bachelor of Information Technology degree in accordance with the requirements set out in the resolutions of the Faculty of Engineering and Information Technologies relating to the Bachelor of Information Technology degree.
2.2 Bachelor of Medical Science with Honours
2.2.1 On completion of the requirements for the combined degrees, a student may be qualified to enrol in Honours in the Bachelor of Medical Science. To qualify for the award of Bachelor of Medical Science with Honours, a student must complete successfully an additional year of study (the Honours year), as specified in the Faculty of Science Handbook.

3. Units of study

3.1 The units of study, which may be taken for the combined Bachelor of Information Technology and Bachelor of Medical Science program, are set out in the Resolutions of the Faculty of Engineering and Information Technologies and the Faculty of Science respectively.
3.2 The Faculty Resolutions specify:
3.2.1 credit point values;
3.2.2 corequisites / prerequisites / assumed learning / assumed knowledge; and
3.2.3 any special conditions.
3.3 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. Supervision of the degrees

4.1 Students will be under the general supervision of the Faculty of Engineering and Information Technologies for enrolment and administrative matters.
4.2 Students will be under the supervision of the Faculty of Science in relation to progression and eligibility of award of the Bachelor of Medical Science component and will be under the supervision of the Faculty of Engineering and Information Technologies in relation to the Bachelor of Information Technology component.
4.3 The Deans of the Faculty of Science and the Faculty of Engineering and Information Technologies shall jointly exercise authority in any matter concerning the combined degree not otherwise dealt with in these resolutions.

5. Transfer arrangements

5.1 A student may abandon the combined Bachelor of Information Technology and Bachelor of Medical Science degree and elect to complete either the Bachelor of Information Technology or Bachelor of Medical Science degree in accordance with the resolutions governing that degree.

Bachelor of Information Technology and Bachelor of Science (BIT/BSc)

Combined degree rules

1. Requirement for the Pass degrees Bachelor of Information Technology and Bachelor of Science

1.1 Candidature for this combined degree program is a minimum of 5 years of full-time study.
1.2 Candidates qualify for the two awards from the combined degree program (a separate testamur being awarded for both the Bachelor of Information Technology and the Bachelor of Science) by completing the following:
1.2.1 a total of at least 240 credit points that include:
1.2.1.1 The program of units of study set out in the BIT Table relating to the Bachelor of Information Technology Stream that the student is pursuing; available streams are:
1.2.1.1.1 Computer Science and
1.2.1.1.2 Information Systems;
1.2.1.2 at least 96 credit points of units from Faculty of Science subjects including at least 18 credit points of Mathematics and Statistics;
1.2.1.3 a major in a Science area excluding Computer Science and Information Systems;
1.2.1.4 at least 54 credit points from Faculty of Science second or third year subjects
1.3 To qualify for the award of the pass degree in the Advanced or Advanced Mathematics stream of the Bachelor of Science a student shall in addition to the requirements of resolution 1.2:
1.3.1 complete at least 54 credit points of intermediate/senior Science units of study of which at least 36 shall be completed at the Advanced level or as TSP units.
1.3.2 complete at least 24 credit points of senior Science units of study at the Advanced level or as TSP units in a single Science subject area, and
1.3.3 maintain in intermediate and senior Science units of study an average mark of 65 or greater in each year of enrolment.
1.3.4 at least 66 credit points from Faculty of Science second or third year subjects
1.3.5 majors in Computer Science and Information Systems are not available under the Advanced Science or Advanced Mathematics degree component of this program.
1.4 To qualify for the award of the pass degree in the Advanced Mathematics stream of the Bachelor of Science a student shall in addition to the requirements of resolutions 1.2 and 1.3;
1.4.1 complete at least 48 credit points of third year subjects in Mathematics and Statistics including at least 24 credit points of study at the Advanced level or as TSP units

2. Requirements for the Bachelor of Information Technology and Bachelor of Science with Honours

2.1 Bachelor of Information Technology with Honours
2.1.1 On completion of a total of 192 credit points, a student may apply to enrol for the Honours option of the Bachelor of Information Technology degree in accordance with the requirements set out in the resolutions of the Faculty of Engineering and Information Technologies relating to the Bachelor of Information Technology degree.
2.2 Bachelor of Science with Honours
2.2.1 On completion of the requirements for the combined degrees, a student may be qualified to enrol in Honours in the Bachelor of Science. To qualify for the award of the Bachelor of Science with Honours, a student must complete successfully an additional year of study (the Honours year), as specified in the Faculty of Science Handbook.

3. Units of study

3.1 The units of study, which may be taken for the combined Bachelor of Information Technology and Bachelor of Science program, are set out in the Resolutions of the Faculty of Engineering and Information Technologies and the Faculty of Science respectively.
3.2 The Faculty Resolutions specify:
3.2.1 credit point values;
3.2.2 corequisites / prerequisites / assumed learning / assumed knowledge; and
3.2.3 any special conditions.
3.3 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. Supervision of the degrees

4.1 Students will be under the general supervision of the Faculty of Engineering and Information Technologies for enrolment and administrative matters.
4.2 Students will be under the supervision of the Faculty of Science in relation to progression and eligibility of award of the Bachelor of Science component and will be under the supervision of the Faculty of Engineering and Information Technologies in relation to the Bachelor of Information Technology component.
4.3 The Deans of the Faculty of Science and the Faculty of Engineering and Information Technologies shall jointly exercise

authority in any matter concerning the combined degree not otherwise dealt with in these resolutions.

5. **Transfer arrangements**

5.1 A student may abandon the combined Bachelor of Information Technology and Bachelor of Science degree and elect to complete either the Bachelor of Information Technology or Bachelor of Science degree in accordance with the resolutions governing that degree.

Bachelor of Engineering/Bachelor of Design in Architecture

Resolutions of the Faculty

Combined degree course rules

1. **Cross-faculty management of combined award course**

1.1 The Faculty of Engineering and Information Technologies is the primary faculty of management of the combined award course.

1.2 The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Architecture, Design and Planning shall jointly exercise authority in any matter concerning the combined award course not otherwise dealt with in these resolutions.

1.3 Students will be subject to the resolutions in the Faculty of Engineering and Information Technologies Handbook and the Faculty of Architecture, Design and Planning Handbook.

1.4 Students will be subject to conditions on admission, stream requirements, enrolment restrictions, assessment, advanced standing, progression, academic honesty, degree completion times and transition arrangements as shown in the resolutions published in the Faculty of Engineering and Information Technologies Handbook for the Bachelor of Engineering degree.

2. **Admission**

2.1 An applicant may gain admission to the Bachelor of Engineering/Bachelor of Design in Architecture under the conditions set out in the University's Admissions policy.

2.2 An international applicant must meet the English language requirements of an IELTS score of 7, with no band less than 6.

3. **Units of study**

3.1 The units of study which may be taken for the degrees of Bachelor of Engineering and Bachelor of Design in Architecture are set out in the Civil Engineering table of the Faculty of Engineering and Information Technologies Handbook, and Table A: Bachelor of Design in Architecture of the Faculty of Architecture, Design and Planning Handbook, together with:

3.1.1 designation as junior, intermediate, senior or honours units of study;

3.1.2 credit point values;

3.1.3 assumed knowledge, corequisites and prerequisites;

3.1.4 the semesters in which they are offered;

3.1.5 the units with which they are mutually exclusive; and

3.1.6 designation as core, stream or elective.

4. **Requirements for the degrees of Bachelor of Engineering and Bachelor of Design in Architecture**

4.1 To qualify for the award of the pass degrees of Bachelor of Engineering and Bachelor of Design in Architecture a student must complete successfully units of study giving credit for a total of 240 credit points and include:

4.2 From the Faculty of Engineering and Information Technologies

4.2.1 144 credit points from core units of study as described in the table of units for the degree specialisation Bachelor of Engineering (Civil); and

4.3 From the Faculty of Architecture, Design and Planning

4.3.1 90 credit points from core units of study as described in Table A for the Bachelor of Design in Architecture; and

4.3.2 6 credit points from the Master of Architecture prerequisite table.

5. **Requirements for honours degrees**

5.1 Bachelor of Engineering with Honours:

5.1.1 On completion of the requirements for the combined degrees a student may qualify for the award of the degree with honours in accordance with the requirements set out in the resolutions of the Faculty of Engineering and Information Technologies relating to the Bachelor of Engineering degree.

5.2 Bachelor of Design in Architecture

5.2.1 On completion of the combined degrees a student may be qualified to enrol in Honours in the bachelor of Design in Architecture.

5.2.2 A student may qualify for the award of the degree with honours by completion of an additional 48 credit points, in accordance with the requirements set out in the resolutions of the Faculty of Architecture, Design and Planning relating to the Bachelor of Design in Architecture degree.

6. **Award of the Bachelor of Engineering and Bachelor of Design in Architecture**

6.1 A student who completes the requirements for the Bachelor of Engineering and Bachelor of Design in Architecture degrees shall receive at graduation a separate testamur for each of the degrees.

6.2 A student may abandon the combined degrees of Bachelor of Engineering and Bachelor of Design in Architecture and elect to complete either the Bachelor of Engineering or Bachelor of Design in Architecture degree in accordance with the resolutions governing that degree.

3. Bachelor of Engineering specialisation requirements

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Flexible First Year			
Students wishing to proceed to the degrees of Bachelor of Information Technology, Bachelor of Computer Science and Technology, Bachelor of Engineering or combined degrees with Science, Arts, Commerce, Law or Medical Science may choose to enrol in one of the two options of the Flexible First Year program. For details on eligibility for entry to this program and second year stream entry requirements consult the previous section on resolutions pertaining to Flexible First Year. Students will not need to decide their choice of Engineering or IT specialisation until the end of Semester 1 or the end of the year depending on their stream of choice.			
Core units of study for Stream A specialisations			
Core units of study for Stream A specialisations in the Engineering areas of Aeronautical, Aeronautical(Space), Biomedical, Chemical, Civil, Mechanical, Mechanical(Space) or Project Management can elect to choose this option.			
First year			
ENGG1800 **Engineering Disciplines (Intro) Stream A**	6		Semester 1
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
ENGG1802 **Engineering Mechanics**	6		Semester 2
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1
Students wishing to proceed into the stream of Chemical should replace PHYS1001 with CHEM1101 Chemistry 1A as an alternate core unit. Students wishing to proceed into the stream of Mechanical(Biomedical) Engineering should replace PHYS1001 with BIOL1001 as an alternate core unit.			
Alternate 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 school before enrolling.			
Elective unit of study			
In addition, a 6 credit point junior level unit of study must be choosen to complete the second semester enrolment. This is a free choice elective unit subject only to enrolment restrictions imposed by faculties on some specific junior level units.			
Notes			
1. Students wishing to proceed to the degree of Bachelor of Engineering in Chemical Engineering should complete the first semester of this program and enrol in their chosen specialisation in Semester 2. 2. It is strongly advised that before choosing the second semester elective, students consult the requirements for the specialisation that they plan to enter as an appropriate choice of elective will help with core progression and prerequisite requirements for many areas.			
Core units of study for Stream B specialisations			
Core units of study for Stream B specialisations in the Engineering areas of Computer, Electrical (Power), Electrical, Mechatronics, Mechatronics (Space), Software, Telecommunication and Bachelor of Information Technology or Bachelor of Computer Science and Technology can elect to choose this option.			
First year			
ENGG1805 **Professional Engineering and IT**	6		Semester 1
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
Student wishing to proceed into the Engineering stream of Mechatronics or Mechatronics(Space) should replace INFO1103 with ENGG1801 an alternate core unit.			

Alternate units of study

Most units of study offered by the Science Faculty or the School of IT shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions being met. Students considering doing advanced options should seek advice from their school before enrolling.

Notes

1. Students in this option will choose their specialisation at the end of Semester 1 and continue in the specialist program or IT degree in Semester 2.

3a. School of Aerospace, Mechanical and Mechatronic Engineering

The School of Aerospace, Mechanical and Mechatronic Engineering offers the following Bachelor of Engineering degree specialisations:

- Aeronautical
- Aeronautical Space
- Mechanical
- Mechanical Biomedical
- Mechanical Space
- Mechatronic
- Mechatronic Space
- Combined degrees with Science, Commerce, Arts, Medical Science and Law

Aeronautical Engineering units of study

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Aeronautical Engineering			
Candidates for the degree of Bachelor of Aeronautical Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary 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.			
Core units of study			
First year			
AERO1560 **Introduction to Aerospace Engineering**	6	**N** MECH1560, MTRX1701, ENGG1800	Semester 1
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
Normally taken in Semester 1, students in combined degrees are exempt from this unit.			
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ENGG1802 **Engineering Mechanics**	6		Semester 2
AERO1400 **Intro to Aircraft Construction & Design**	6	*Note: Department permission required for enrolment*	Semester 2
Students in combined degrees are exempt from this unit.			
AMME1550 **Dynamics 1**	6		Semester 2
PHYS1001 is an acceptable alternative for BE/BSC students.			
Second year			
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
Students in combined degrees take MATH2067 as alternative.			
AERO2703 **Aerospace Technology 1**	6	**A** ENGG1801 **P** AERO1560	Semester 1
AMME2301 **Mechanics of Solids**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
AMME2500 **Engineering Dynamics**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)	Semester 1
BE/BSc students can enrol in PHYS2011, PHYS2012 as acceptable alternatives or advanced equivalent.			

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
MATH2065 **Partial Differential Equations (Intro)**	6	**P** MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2005, MATH2905, MATH2965, MATH2067	Semester 2 Summer Main
MATH2067 as alternative for combined degree students.			
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
MECH2400 **Mechanical Design 1**	6	**A** ENGG1802, AMME2301	Semester 2
AMME2200 **Thermodynamics and Fluids**	6	**A** MATH1001; MATH1002; MATH1003.	Semester 2
PHYS2011, PHYS2012 or advanced equivalent, are acceptable alternatives for BE/BSc students.			
Third year			
AERO3360 **Aerospace Structures 1**	6	**P** AMME2301	Semester 1
AMME3500 **System Dynamics and Control**	6	**P** AMME2500; MATH2061 or MATH2961 or MATH2067	Semester 1
AERO3460 **Aerospace Design 1**	6	**P** AMME2301 and MECH2400	Semester 1
AERO3660 **Aerospace Management**	6		Semester 1
Students in combined degrees are exempt from this unit.			
AERO3260 **Aerodynamics 1**	6	**P** AMME2200	Semester 2
AERO3261 **Propulsion**	6	**A** Good knowledge of fluid dynamics including gas dynamics **P** AMME2200	Semester 2
AERO3560 **Flight Mechanics 1**	6	**P** AMME2500 **C** AMME3500	Semester 2
AERO3465 **Aerospace Technology 2**	6	**A** AERO1400; AMME2302 **P** AMME2301 and MECH2400	Semester 2
Students in combined degrees are exempt from this unit.			
Fourth year			
AERO4260 **Aerodynamics 2**	6	**P** AMME2200	Semester 2
Students in combined degrees are exempt from this unit.			
AERO4360 **Aerospace Structures 2**	6	**P** AERO3360 and AERO3465	Semester 1
AERO4460 **Aerospace Design 2**	6	**A** AERO1400, AERO2703 and AERO3465 **P** AERO3260, AERO3261, AERO3360 and AERO3460	Semester 1
AERO4560 **Flight Mechanics 2**	6	**A** AMME2500 **P** AERO3560 and AMME3500	Semester 1
AMME4100 **Practical Experience**		**P** 28 credit points of third year units of study.	Semester 1 Semester 2
Students must select 12cp from the following block of units.			
Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
AMME4111 **Honours Thesis A**	6	**P** 36 credit points of senior units of study and WAM 65 or over **C** AMME4112 **N** AMME4121, AMME4122, AMME4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Normally taken in Semester 1			
AMME4112 **Honours Thesis B**	6	**P** AMME4111 Honours Thesis A **N** AMME4121, AMME4122 AMME4103, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2			
AMME4121 **Engineering Project A**	6	**P** 36 credit points of senior units of study. **C** AMME4122 **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 1			
AMME4122 **Engineering Project B**	6	**P** AMME4121 Engineering Project A **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2			
Acceptable alternative units of study			
Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.			
BE/BSc students can enrol in PHYS2011, PHYS2012 or advanced equivalent, as acceptable alternative to AMME2200 & AMME2500.			
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 a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.			

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Resolutions of the Faculty of Engineering relating to this table:			
BE(Aeronautical)			
In addition to gaining credit for the units of study set out in this table, candidates are required to complete 12 credits points of free elective units of study. A minimum of 192 credit points is required to be eligible for the award of the degree of BE(Aeronautical).			
BE(Aeronautical)/BSc or BCom or BMedSc			
In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc or BE/BMedSc; or the Faculty of Economics and Business for the BE/BCom. A minimum of 240 credit points is required to be eligible for the combined degrees. 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)/BA			
In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Aeronautical Engineering. 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)/LLB			
In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.			
Recommended elective units of study			
AERO4206 **Rotary Wing Aircraft**	6	**A** Prior Learning : concepts from 3rd Year Aerodynamics and Flight Mechanics will be applied to Rotary Wing Vehicles in this unit. **P** AERO3260	Semester 2
AMME4210 **Computational Fluid Dynamics**	6	**A** Partial differental equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. **P** MECH3261 or AERO3260	Semester 1
AERO4491 **Advanced Aircraft Design**	6	**A** AERO1400, AERO2703, AERO3260, AERO3261, AERO3360, AERO3465 and AERO3560 **P** MECH2400 and AERO3460	Semester 2
AMME4500 **Guidance and Control**	6	**P** AMME3500.	Semester 2
AERO4591 **Advanced Flight Mechanics**	6	**P** AERO3560 and AMME3500 *Note: Department permission required for enrolment*	Semester 2
Notes			
1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.			
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.			

Aeronautical (Space) Engineering units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Aeronautical (Space) Engineering			
Candidates for the degree of Bachelor of Aeronautical (Space) Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary 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.			
Core units of study			
First year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
AERO1560 **Introduction to Aerospace Engineering**	6	**N** MECH1560, MTRX1701, ENGG1800	Semester 1
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
Normally taken in Semester 1. Students in combined degrees are exempt.			
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ENGG1802 **Engineering Mechanics**	6		Semester 2
AMME1550 **Dynamics 1**	6		Semester 2
PHYS1001 is an acceptable alternative for BE/BSc students.			
AERO1400 **Intro to Aircraft Construction & Design**	6	*Note: Department permission required for enrolment*	Semester 2
Students in combined degrees are exempt.			
Second year			
MATH2067 **DEs and Vector Calculus for Engineers**	6	**P** MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2005, MATH2905, MATH2061, MATH2961, MATH2065, MATH2965	Semester 1
ELEC2004 **Electrical Engineering: Foundations**	6	**N** ELEC1001 Introductory Electrical Engineering, ELEC1101 Foundations of Computer Systems, ELEC1102 Foundations of Electronic Circuits, ELEC2001 Electrical and Electronic Engineering, ELEC2003 Electrical and Electronic Engineering A, ELEC1103 Professional Electronic Engineering, ELEC1601 Professional Computer Engineering.	Semester 1
AMME2301 **Mechanics of Solids**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
AMME2500 **Engineering Dynamics**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)	Semester 1
BE/BSc students can enrol in PHYS2011, PHYS2012, or advanced equivalent, as acceptable alternative.			
AMME2200 **Thermodynamics and Fluids**	6	**A** MATH1001; MATH1002; MATH1003.	Semester 2
BE/BSc students can enrol in PHYS2011, PHYS2012, or advanced equivalent, as acceptable alternative.			
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
MECH2400 **Mechanical Design 1**	6	**A** ENGG1802, AMME2301	Semester 2
AERO2705 **Space Engineering 1**	6	**A** ENGG1801 **P** AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003 and either MATH1004 or MATH1005 (or the advanced versions of the MATH units)	Semester 2
Third year			
AERO3360 **Aerospace Structures 1**	6	**P** AMME2301	Semester 1
AERO3460 **Aerospace Design 1**	6	**P** AMME2301 and MECH2400	Semester 1
AMME3500 **System Dynamics and Control**	6	**P** AMME2500; MATH2061 or MATH2961 or MATH2067	Semester 1
AERO3560 **Flight Mechanics 1**	6	**P** AMME2500 **C** AMME3500	Semester 2
AERO3760 **Space Engineering 2**	6	**P** AERO2705	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AERO3660 **Aerospace Management**	6		Semester 1
Students in combined degrees are exempt from this unit.			
AERO3260 **Aerodynamics 1**	6	**P** AMME2200	Semester 2
Students in combined degrees are exempt from this unit.			
AERO3261 **Propulsion**	6	**A** Good knowledge of fluid dynamics including gas dynamics **P** AMME2200	Semester 2
Students in combined degrees are exempt from this unit.			
Fourth year			
AERO4360 **Aerospace Structures 2**	6	**P** AERO3360 and AERO3465	Semester 1
AERO4701 **Space Engineering 3**	6	**P** AERO3760	Semester 1
AERO4560 **Flight Mechanics 2**	6	**A** AMME2500 **P** AERO3560 and AMME3500	Semester 1
AMME4100 **Practical Experience**		**P** 28 credit points of third year units of study.	Semester 1 Semester 2
AERO4260 **Aerodynamics 2**	6	**P** AMME2200	Semester 2
Students in combined degrees are exempt.			
Students must select 12cp from the following block of units.			
Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
AMME4111 **Honours Thesis A**	6	**P** 36 credit points of senior units of study and WAM 65 or over **C** AMME4112 **N** AMME4121, AMME4122, AMME4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Normally taken in Semester 1			
AMME4112 **Honours Thesis B**	6	**P** AMME4111 Honours Thesis A **N** AMME4121, AMME4122 AMME4103, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2			
AMME4121 **Engineering Project A**	6	**P** 36 credit points of senior units of study. **C** AMME4122 **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 1.			
AMME4122 **Engineering Project B**	6	**P** AMME4121 Engineering Project A **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2			

Acceptable alternative units of study

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.

BE/BSc students can enrol in PHYS2011, PHYS2012, or advanced equivalent, as acceptable alternative to AMME2200 & AMME2500.

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 undertaking Study Abroad in a particular year of their degree must enrol in the appropriate Aerospace International Exchange Program units of study as an alternative to a semester's standard units.

Resolutions of the Faculty of Engineering relating to this table:

BE(Aeronautical Engineering)(Space)

In addition to gaining credit for the units of study set out in the above table, candidates are required to complete 12 credit points from either the table of recommended units of study for Aeronautical (Space) Engineering or from free elective units of study. A minimum of 192 credit points is required to be eligible for the award of BE(Aeronautical)(Space).

BE(Aeronautical Engineering)(Space)/BSc or BMedSc or BCom

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc or BE/BMedSc; or the Faculty of Economics and Business for the BE/BCom. A minimum of 240 credit points is required to be eligible for the combined degrees. 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 Engineering)(Space)/BA

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Aeronautical (Space) Engineering. 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 Engineering)(Space)/LLB

In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Recommended elective units of study			
AMME4210 **Computational Fluid Dynamics**	6	**A** Partial differental equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. **P** MECH3261 or AERO3260	Semester 1
AMME4500 **Guidance and Control**	6	**P** AMME3500.	Semester 2
AMME4700 **Inertial Navigation & the Kalman Filter** *This unit of study is not available in 2010*	6	**P** AERO4701 or MECH4720 or MECH4730 or MTRX4700 or AERO4560. *Note: Department permission required for enrolment*	Semester 2
AERO4591 **Advanced Flight Mechanics**	6	**P** AERO3560 and AMME3500 *Note: Department permission required for enrolment*	Semester 2

Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.

Mechanical Engineering units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Mechanical Engineering			
Candidates for the degree of Bachelor of Mechanical Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary 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.			
Core units of study			
First year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
Normally taken in Semester 1, students in combined degrees are exempt from this unit.			
MECH1560 **Introduction to Mechanical Engineering**	6	**N** AERO1560, MTRX1701, ENGG1800 *Note: Department permission required for enrolment*	Semester 1
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ENGG1802 **Engineering Mechanics**	6		Semester 2
AMME1550 **Dynamics 1**	6		Semester 2
PHYS1001, Physics 1 Regular is an acceptable alternatve for BE/BSc students.			
MECH1400 **Mechanical Construction**	6	*Note: Department permission required for enrolment*	Semester 2
Students in combined degrees are exempt from this unit.			
Second year			
ELEC2004 **Electrical Engineering: Foundations**	6	**N** ELEC1001 Introductory Electrical Engineering, ELEC1101 Foundations of Computer Systems, ELEC1102 Foundations of Electronic Circuits, ELEC2001 Electrical and Electronic Engineering, ELEC2003 Electrical and Electronic Engineering A, ELEC1103 Professional Electronic Engineering, ELEC1601 Professional Computer Engineering.	Semester 1
AMME2301 **Mechanics of Solids**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
AMME2500 **Engineering Dynamics**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)	Semester 1
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
Combined degree students take MATH2067 as alternative.			
MATH2065 **Partial Differential Equations (Intro)**	6	**P** MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2005, MATH2905, MATH2965, MATH2067	Semester 2 Summer Main
Combined degree students take MATH2067 as alternative.			
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
MECH2400 **Mechanical Design 1**	6	**A** ENGG1802, AMME2301	Semester 2
AMME2200 **Thermodynamics and Fluids**	6	**A** MATH1001; MATH1002; MATH1003.	Semester 2
Third year			
MECH3361 **Mechanics of Solids 2**	6	**P** AMME2301 and AMME 2302	Semester 1
AMME3500 **System Dynamics and Control**	6	**P** AMME2500; MATH2061 or MATH2961 or MATH2067	Semester 1
MECH3261 **Fluid Mechanics**	6	**P** AMME2200	Semester 1
MECH3660 **Manufacturing Engineering**	6	**A** AMME2200, AMME2301, AMME2302 **P** (AERO1560 or MECH1560 or MTRX1701 or ENGG1800 or ENGG1805) and (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1

Unit of study	***Credit points***	***A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition***	***Session***
MECH3661 **Engineering Management**	6	**A** It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.	Semester 2
Students in combined degrees are exempt from this unit.			
MECH3460 **Mechanical Design 2**	6	**A** Properties of engineering materials including fatigue failure theories. Statics and dynamics properties of machines. Practical use of Word and Excel including the use of the 'solver' and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory. **P** MECH2400 and AMME2301	Semester 2
MECH3362 **Materials 2**	6	**A** This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2302 Materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301 ; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements. **P** AMME2301 and AMME2302	Semester 2
MECH3260 **Thermal Engineering**	6	**A** Fundamentals of thermodynamics are needed to begin this more advanced course. **P** AMME2200	Semester 2
Fourth year			
MECH4601 **Professional Engineering 2**	6	**A** MECH3661, ENGG1803, AMME4100 **P** MECH3660	Semester 1
AMME4100 **Practical Experience**		**P** 28 credit points of third year units of study.	Semester 1 Semester 2
Students must select 12cp from the following block of units.			
Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
AMME4111 **Honours Thesis A**	6	**P** 36 credit points of senior units of study and WAM 65 or over **C** AMME4112 **N** AMME4121, AMME4122, AMME4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Normally taken in Semester 1			
AMME4112 **Honours Thesis B**	6	**P** AMME4111 Honours Thesis A **N** AMME4121, AMME4122 AMME4103, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2			
AMME4121 **Engineering Project A**	6	**P** 36 credit points of senior units of study. **C** AMME4122 **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 1			
AMME4122 **Engineering Project B**	6	**P** AMME4121 Engineering Project A **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2			

Acceptable alternative units of study

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.

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 undertaking Study Abroad in a particular year of their degree must enrol in the appropriate exchange program units of study as an alternative to a semester's standard units.

Resolutions of the Faculty of Engineering relating to this table:

BE(Mechanical Engineering)

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 18 credit points from the table of recommended elective units of study for Mechanical Engineering and 12 credit points of free elective units of study. A minimum of 192 credit points is required to be eligible for the award of the degree of BE(Mechanical).

BE(Mechanical Engineering)/BSc or BCom or BMedSci

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechanical Engineering and at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

BE(Mechanical Engineering)/BA

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Mechanical Engineering and 6 credit points of free electives. 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(Mechanical Engineering)/LLB

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechanical Engineering and at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Recommended elective units of study			
AMME4210 **Computational Fluid Dynamics**	6	**A** Partial differental equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. **P** MECH3261 or AERO3260	Semester 1
AMME4241 **Renewable Energy**	6	**P** MECH3260, MECH3261	Semester 2
AMME4660 **Management, Employees and Industrial Rel**	6		Semester 2
MECH4320 **Polymer Engineering** *This unit of study is not available in 2010*	6	**P** MECH3261 and MECH3361 *Note: Department permission required for enrolment* *4th Year elective unit of study*	Semester 1
MECH4241 **Energy and the Environment**	6	**P** 24 credit points of third year units of study	Semester 1
MECH4255 **Air Conditioning and Refrigeration**	6	**P** MECH3260; MECH3261	Semester 2
MECH4265 **Combustion**	6	**A** Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. **P** MECH3260; MECH3261	Semester 2
MECH4310 **Advanced Engineering Materials**	6	**A** This subject requires you to have a good understanding of basic knowledge and principles of various aspects for materials engineering UoS (e.g. 2nd & 3rd year Materials I and II, 2nd year Solids 1 and 3rd year Solids 2) especially those relevant to materials engineering and technology over the past 3.5 years. **P** MECH3362	Semester 2
MECH4460 **Mechanical Design 3**	6	**A** ENGG1802, AMME2301, AMME2500, MECH3361 **P** MECH2400	Semester 1
MECH4961 **Biomechanics and Biomaterials**	6	**A** MECH3300 or MECH3362 **P** MECH2300 or AMME2302; MECH2900 or MECH2901 **N** MECH4960	Semester 2

Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.

2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.

Mechanical (Space) Engineering units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Mechanical (Space) Engineering			
Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Space Engineering) are required to gain credit for the core units of study set out below. Any additional credit necessary 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.			
Core units of study			
First Year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
MECH1560 **Introduction to Mechanical Engineering**	6	**N** AERO1560, MTRX1701, ENGG1800 *Note: Department permission required for enrolment*	Semester 1
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ENGG1802 **Engineering Mechanics**	6		Semester 2
AMME1550 **Dynamics 1**	6		Semester 2
PHYS1001 is an acceptable alternative for BE/BSc students.			
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
Normally taken in Semester 2, students in combined degrees are exempt.			
MECH1400 **Mechanical Construction**	6	*Note: Department permission required for enrolment*	Semester 2
Students in combined degrees are exempt.			
Second Year			
MATH2067 **DEs and Vector Calculus for Engineers**	6	**P** MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2005, MATH2905, MATH2061, MATH2961, MATH2065, MATH2965	Semester 1
AMME2301 **Mechanics of Solids**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
AMME2500 **Engineering Dynamics**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)	Semester 1
ELEC2004 **Electrical Engineering: Foundations**	6	**N** ELEC1001 Introductory Electrical Engineering, ELEC1101 Foundations of Computer Systems, ELEC1102 Foundations of Electronic Circuits, ELEC2001 Electrical and Electronic Engineering, ELEC2003 Electrical and Electronic Engineering A, ELEC1103 Professional Electronic Engineering, ELEC1601 Professional Computer Engineering.	Semester 1
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
AERO2705 **Space Engineering 1**	6	**A** ENGG1801 **P** AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003 and either MATH1004 or MATH1005 (or the advanced versions of the MATH units)	Semester 2
MECH2400 **Mechanical Design 1**	6	**A** ENGG1802, AMME2301	Semester 2
AMME2200 **Thermodynamics and Fluids**	6	**A** MATH1001; MATH1002; MATH1003.	Semester 2
Third Year			
MECH3361 **Mechanics of Solids 2**	6	**P** AMME2301 and AMME 2302	Semester 1
AMME3500 **System Dynamics and Control**	6	**P** AMME2500; MATH2061 or MATH2961 or MATH2067	Semester 1
MECH3660 **Manufacturing Engineering**	6	**A** AMME2200, AMME2301, AMME2302 **P** (AERO1560 or MECH1560 or MTRX1701 or ENGG1800 or ENGG1805) and (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
MECH3261 **Fluid Mechanics**	6	**P** AMME2200	Semester 1
MECH3362 **Materials 2**	6	**A** This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2302 Materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301 ; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements. **P** AMME2301 and AMME2302	Semester 2

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
AERO3760 **Space Engineering 2**	6	**P** AERO2705	Semester 2
MECH3260 **Thermal Engineering**	6	**A** Fundamentals of thermodynamics are needed to begin this more advanced course. **P** AMME2200	Semester 2
MECH3661 **Engineering Management**	6	**A** It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.	Semester 2
Combined degree students are exempt from this unit.			
Fourth Year			
MECH4601 **Professional Engineering 2**	6	**A** MECH3661, ENGG1803, AMME4100 **P** MECH3660	Semester 1
AERO4701 **Space Engineering 3**	6	**P** AERO3760	Semester 1
AMME4100 **Practical Experience**		**P** 28 credit points of third year units of study.	Semester 1 Semester 2
Students must select 12cp from the following block of units.			
Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
AMME4111 **Honours Thesis A**	6	**P** 36 credit points of senior units of study and WAM 65 or over **C** AMME4112 **N** AMME4121, AMME4122, AMME4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Normally taken in Semester 1			
AMME4112 **Honours Thesis B**	6	**P** AMME4111 Honours Thesis A **N** AMME4121, AMME4122 AMME4103, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2.			
AMME4121 **Engineering Project A**	6	**P** 36 credit points of senior units of study. **C** AMME4122 **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 1.			
AMME4122 **Engineering Project B**	6	**P** AMME4121 Engineering Project A **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semster 2			

Acceptable alternative units of study

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.

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 enrolled in combined degrees are also exempt from one of the follwing core units MECH3260, MECH3261, MECH3361 or MECH3362. This choice should be based on the prereq requirements of 4th year recommended units that students plan to enrol in.

Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.

Resolutions of the Faculty of Engineering relating to this table:

BE(Mechanical Engineering)(Space)

In addition to gaining credit for the units of study set out in the above table, candidates are required to complete 12 credit points from the table of recommended elective units of study for Mechanical (Space) Engineering and 12 credit points of free elective units of study. A minimum of 192 credit points is required to be eligible for the award of BE(Aeronautical)(Space).

BE(Mechanical Engineering)(Space)/BSc or BCom or BMedSci

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

BE(Mechanical Engineering)(Space)/BA

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Mechanical (Space) Engineering. 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(Mechanical Engineering)(Space)/LLB

In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.

Recommended elective units of study

AMME4210 **Computational Fluid Dynamics**	6	**A** Partial differental equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. **P** MECH3261 or AERO3260	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
AMME4241 **Renewable Energy**	6	**P** MECH3260, MECH3261	Semester 2
AMME4660 **Management, Employees and Industrial Rel**	6		Semester 2
MECH4320 **Polymer Engineering** *This unit of study is not available in 2010*	6	**P** MECH3261 and MECH3361 *Note: Department permission required for enrolment* *4th Year elective unit of study*	Semester 1
MECH4241 **Energy and the Environment**	6	**P** 24 credit points of third year units of study	Semester 1
MECH4255 **Air Conditioning and Refrigeration**	6	**P** MECH3260; MECH3261	Semester 2
MECH4265 **Combustion**	6	**A** Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. **P** MECH3260; MECH3261	Semester 2
MECH4310 **Advanced Engineering Materials**	6	**A** This subject requires you to have a good understanding of basic knowledge and principles of various aspects for materials engineering UoS (e.g. 2nd & 3rd year Materials I and II, 2nd year Solids 1 and 3rd year Solids 2) especially those relevant to materials engineering and technology over the past 3.5 years. **P** MECH3362	Semester 2
MECH4460 **Mechanical Design 3**	6	**A** ENGG1802, AMME2301, AMME2500, MECH3361 **P** MECH2400	Semester 1
MECH4622 **Industrial Ergonomics** *This unit of study is not available in 2010*	6	**A** It is assumed that students have a sound understanding of engineering concepts within their chosen specific discipline. *Note: Department permission required for enrolment*	Semester 1
MECH4961 **Biomechanics and Biomaterials**	6	**A** MECH3300 or MECH3362 **P** MECH2300 or AMME2302; MECH2900 or MECH2901 **N** MECH4960	Semester 2

Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering

Mechatronic Engineering units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Mechatronic Engineering			
Candidates for the degree of Bachelor of Engineering in Mechatronic Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary 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.			
Core units of study			
First year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MTRX1701 **Mechatronics Engineering Introductory**	6	**N** AERO1560, MECH1560, ENGG1800	Semester 1
MTRX1702 **Mechatronics 1**	6	**N** ELEC1101.ELEC2602, COSC1902, COSC1002	Semester 2
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ENGG1802 **Engineering Mechanics**	6		Semester 2
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
INFO1103 is an acceptable alternative.			
AMME1550 **Dynamics 1**	6		Semester 2
PHYS1001 is an acceptable alternative for BSc physics majors.			
Second year			
AMME2301 **Mechanics of Solids**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
AMME2500 **Engineering Dynamics**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)	Semester 1
ELEC2104 **Electronic Devices and Circuits**	6	**A** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering. **N** ELEC2401 Introductory Electronics.	Semester 2
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
MECH2400 **Mechanical Design 1**	6	**A** ENGG1802, AMME2301	Semester 2
MTRX2700 **Mechatronics 2**	6	**P** MTRX1701 and MTRX1702 **N** ELEC2601, ELEC3607	Semester 1
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
Combined degree students take MATH2067 as alternative.			
MATH2065 **Partial Differential Equations (Intro)**	6	**P** MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2005, MATH2905, MATH2965, MATH2067	Semester 2 Summer Main
Combined degree students take MATH2067 as alternative.			
Third year			
AMME3500 **System Dynamics and Control**	6	**P** AMME2500; MATH2061 or MATH2961 or MATH2067	Semester 1
ELEC3404 **Electronic Circuit Design**	6	**A** A background in basic electronics and circuit theory is assumed. **N** ELEC3401 Electronic Devices and Circuits.	Semester 1
MECH3660 **Manufacturing Engineering**	6	**A** AMME2200, AMME2301, AMME2302 **P** (AERO1560 or MECH1560 or MTRX1701 or ENGG1800 or ENGG1805) and (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
MTRX3700 **Mechatronics 3**	6	**P** MTRX2700 **N** MECH4710	Semester 2
MECH3460 **Mechanical Design 2**	6	**A** Properties of engineering materials including fatigue failure theories. Statics and dynamics properties of machines. Practical use of Word and Excel including the use of the 'solver' and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory. **P** MECH2400 and AMME2301	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AMME2200 **Thermodynamics and Fluids**	6	**A** MATH1001; MATH1002; MATH1003.	Semester 2
Combined degree students are exempt from this unit.			
ELEC3204 **Power Electronics and Applications**	6	**A** Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc. **P** ELEC2104 **N** ELEC3202 Power Electronics and Drives.	Semester 1
Combined degree students are exempt from this unit.			
MECH3661 **Engineering Management**	6	**A** It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.	Semester 2
Combined degree students are exempt from this unit.			
Fourth year			
MECH4601 **Professional Engineering 2**	6	**A** MECH3661, ENGG1803, AMME4100 **P** MECH3660	Semester 1
AMME4100 **Practical Experience**		**P** 28 credit points of third year units of study.	Semester 1 Semester 2
Students must select 12cp from the following block of units.			
Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
AMME4111 **Honours Thesis A**	6	**P** 36 credit points of senior units of study and WAM 65 or over **C** AMME4112 **N** AMME4121, AMME4122, AMME4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Normally taken in Semester 1.			
AMME4112 **Honours Thesis B**	6	**P** AMME4111 Honours Thesis A **N** AMME4121, AMME4122 AMME4103, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2			
AMME4121 **Engineering Project A**	6	**P** 36 credit points of senior units of study. **C** AMME4122 **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 1.			
AMME4122 **Engineering Project B**	6	**P** AMME4121 Engineering Project A **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semster 2			

Acceptable alternative units of study

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.

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 a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.

Resolutions of the Faculty of Engineering relating to this table:

BE(Mechatronic Engineering)

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 18 credit points from the table of recommended elective units of study for Mechatronic Engineering. A minimum of 192 credit points is required to be eligible for the award of the degree of BE(Mechatronic).

BE(Mechatronic Engineering)/BSc or BCom or BMedSci

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechatronic Engineering and at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

BE(Mechatronic Engineering)/BA

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 18 credit points from the table of recommended elective units of study for Mechatronic Engineering and at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA. 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(Mechatronic Engineering)/LLB

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechatronic Engineering and at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

Recommended elective units of study

MECH4720 **Sensors and Signals**	6	**A** Strong Matlab skills **P** MTRX3700	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
MECH4730 **Computers in Real-Time Control and Inst**	6	**P** MTRX3700 **N** ELEC4602 Real Time Computing	Semester 1
MTRX4700 **Experimental Robotics**	6	**P** AMME3500; MTRX3700	Semester 1
AMME4500 **Guidance and Control**	6	**P** AMME3500.	Semester 2
AMME4700 **Inertial Navigation & the Kalman Filter** *This unit of study is not available in 2010*	6	**P** AERO4701 or MECH4720 or MECH4730 or MTRX4700 or AERO4560. *Note: Department permission required for enrolment*	Semester 2
AMME4710 **Computer Vision and Image Processing**	6	**A** MECH4720 or MECH4730	Semester 2
AMME4790 **Introduction to Biomechatronics**	6	**P** MTRX3700 or MECH3921	Semester 2

Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.

2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.

Mechatronic (Space) Engineering units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Mechatronic (Space) Engineering			
Candidates for the degree of Bachelor of Engineering in Mechatronic Engineering (Space Engineering) are required to gain credit for the core units of study set out below. Any additional credit necessary 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			
Core units of study			
First year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MTRX1701 **Mechatronics Engineering Introductory**	6	**N** AERO1560, MECH1560, ENGG1800	Semester 1
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
MTRX1702 **Mechatronics 1**	6	**N** ELEC1101.ELEC2602, COSC1902, COSC1002	Semester 2
ENGG1802 **Engineering Mechanics**	6		Semester 2
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
INFO 1103 is an acceptable alternate.			
AMME1550 **Dynamics 1**	6		Semester 2
PHYS1001 is an acceptable alternative for BE/BSc physics majors.			
Second year			
ELEC2104 **Electronic Devices and Circuits**	6	**A** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering. **N** ELEC2401 Introductory Electronics.	Semester 2
AMME2301 **Mechanics of Solids**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
MATH2067 **DEs and Vector Calculus for Engineers**	6	**P** MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2005, MATH2905, MATH2061, MATH2961, MATH2065, MATH2965	Semester 1
AMME2500 **Engineering Dynamics**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)	Semester 1
AERO2705 **Space Engineering 1**	6	**A** ENGG1801 **P** AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003 and either MATH1004 or MATH1005 (or the advanced versions of the MATH units)	Semester 2
MTRX2700 **Mechatronics 2**	6	**P** MTRX1701 and MTRX1702 **N** ELEC2601, ELEC3607	Semester 1
MECH2400 **Mechanical Design 1**	6	**A** ENGG1802, AMME2301	Semester 2
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
Third year			
AMME3500 **System Dynamics and Control**	6	**P** AMME2500; MATH2061 or MATH2961 or MATH2067	Semester 1
MTRX3700 **Mechatronics 3**	6	**P** MTRX2700 **N** MECH4710	Semester 2
MECH3660 **Manufacturing Engineering**	6	**A** AMME2200, AMME2301, AMME2302 **P** (AERO1560 or MECH1560 or MTRX1701 or ENGG1800 or ENGG1805) and (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
AERO3760 **Space Engineering 2**	6	**P** AERO2705	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
MECH3661 **Engineering Management**	6	**A** It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.	Semester 2
Combined degree students are exempt from this unit.			
ELEC3204 **Power Electronics and Applications**	6	**A** Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc. **P** ELEC2104 **N** ELEC3202 Power Electronics and Drives.	Semester 1
Combined degree students are exempt from this unit.			
ELEC3404 **Electronic Circuit Design**	6	**A** A background in basic electronics and circuit theory is assumed. **N** ELEC3401 Electronic Devices and Circuits.	Semester 1
Combined degree students are exempt from this unit.			
AMME2200 **Thermodynamics and Fluids**	6	**A** MATH1001; MATH1002; MATH1003.	Semester 2
Combined degree students are exempt from this unit.			
Fourth year			
AERO4701 **Space Engineering 3**	6	**P** AERO3760	Semester 1
AMME4100 **Practical Experience**		**P** 28 credit points of third year units of study.	Semester 1 Semester 2
MECH4601 **Professional Engineering 2**	6	**A** MECH3661, ENGG1803, AMME4100 **P** MECH3660	Semester 1
Students must select 12cp from the following block of units.			
Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
AMME4111 **Honours Thesis A**	6	**P** 36 credit points of senior units of study and WAM 65 or over **C** AMME4112 **N** AMME4121, AMME4122, AMME4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Normally taken in Semester 1			
AMME4112 **Honours Thesis B**	6	**P** AMME4111 Honours Thesis A **N** AMME4121, AMME4122 AMME4103, AMME4010	Semester 1 Semester 2
Normally taken in Semster 2			
AMME4121 **Engineering Project A**	6	**P** 36 credit points of senior units of study. **C** AMME4122 **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semster 1			
AMME4122 **Engineering Project B**	6	**P** AMME4121 Engineering Project A **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semster 2			

Acceptable alternative units of study

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.

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 a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.

Resolutions of the Faculty of Engineering relating to this table:

BE(Mechatronic Engineering)(Space)

In addition to gaining credit for the units of study set out in the above table, candidates are required to complete 12 credit points from the table of recommended elective units of study for Mechatronic (Space) Engineering. A minimum of 192 credit points is required to be eligible for the award of BE(Mechatronic)(Space).

BE(Mechatronic Engineering)(Space)/BSc or BCom or BMedSci

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

BE(Mechatronic Engineering)(Space)/BA

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Mechatronic Engineering. 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(Mechatronic Engineering)(Space)/LLB

In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Recommended elective units of study			
MECH4720 **Sensors and Signals**	6	**A** Strong Matlab skills **P** MTRX3700	Semester 1
MECH4730 **Computers in Real-Time Control and Inst**	6	**P** MTRX3700 **N** ELEC4602 Real Time Computing	Semester 1
MTRX4700 **Experimental Robotics**	6	**P** AMME3500; MTRX3700	Semester 1
AMME4500 **Guidance and Control**	6	**P** AMME3500.	Semester 2
AMME4710 **Computer Vision and Image Processing**	6	**A** MECH4720 or MECH4730	Semester 2
AMME4790 **Introduction to Biomechatronics**	6	**P** MTRX3700 or MECH3921	Semester 2
AMME4700 **Inertial Navigation & the Kalman Filter** *This unit of study is not available in 2010*	6	**P** AERO4701 or MECH4720 or MECH4730 or MTRX4700 or AERO4560. *Note: Department permission required for enrolment*	Semester 2
These units are also available to other Space stream students.			

Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.

Mechanical (Biomedical) Engineering units of study

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Mechanical (Biomedical) Engineering			
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 shall be gained by completing additional credit points of recommended or 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			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
ENGG1802 **Engineering Mechanics**	6		Semester 2
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
CHEM1101 **Chemistry 1A**	6	**A** HSC Chemistry and Mathematics **C** Recommended concurrent units of study: 6 credit points of Junior Mathematics **N** CHEM1001, CHEM1109, CHEM1901, CHEM1903	Semester 1 Semester 2 Summer Main
Normally taken in Semester 2.			
BIOL1003 **Human Biology**	6	**A** HSC 2-unit Biology. Students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). **N** BIOL1903, EDUH1016. *It is recommended that BIOL (1001 or 1911) be taken concurrently with this unit of study.*	Semester 1 Summer Main
BE/BMedSc students do MBLG1001 instead of BIOL1003.			
AMME1550 **Dynamics 1**	6		Semester 2
PHYS1001 is an acceptable alternate for BE/BSc students.			
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
Students enrolled in combined degrees or Advanced Engineering are exempt from this unit AND this unit is normally taken in Semester 1.			
Second year			
MATH2067 **DEs and Vector Calculus for Engineers**	6	**P** MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2005, MATH2905, MATH2061, MATH2961, MATH2065, MATH2965	Semester 1
ELEC2004 **Electrical Engineering: Foundations**	6	**N** ELEC1001 Introductory Electrical Engineering, ELEC1101 Foundations of Computer Systems, ELEC1102 Foundations of Electronic Circuits, ELEC2001 Electrical and Electronic Engineering, ELEC2003 Electrical and Electronic Engineering A, ELEC1103 Professional Electronic Engineering, ELEC1601 Professional Computer Engineering.	Semester 1
AMME2301 **Mechanics of Solids**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
AMME2500 **Engineering Dynamics**	6	**P** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)	Semester 1
AMME2200 **Thermodynamics and Fluids**	6	**A** MATH1001; MATH1002; MATH1003.	Semester 2
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
MECH2400 **Mechanical Design 1**	6	**A** ENGG1802, AMME2301	Semester 2
MECH2901 **Anatomy and Physiology for Engineers**	6	**A** A basic understanding of biology. Recommended: BIOL1003 (or equivalent)	Semester 2
Third year			
MECH3261 **Fluid Mechanics**	6	**P** AMME2200	Semester 1
MECH3361 **Mechanics of Solids 2**	6	**P** AMME2301 and AMME 2302	Semester 1
MECH3362 **Materials 2**	6	**A** This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2302 Materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301 ; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements. **P** AMME2301 and AMME2302	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
MECH3921 **Biomedical Design and Technology**	6	**A** BIOL1003; MECH2901; AMME2302; MECH2400	Semester 2
AMME3500 **System Dynamics and Control**	6	**P** AMME2500; MATH2061 or MATH2961 or MATH2067	Semester 1
Students in combined degrees are exempt from this unit.			
MECH3660 **Manufacturing Engineering**	6	**A** AMME2200, AMME2301, AMME2302 **P** (AERO1560 or MECH1560 or MTRX1701 or ENGG1800 or ENGG1805) and (ENGG1802 or PHYS1001 or PHYS1901)	Semester 1
Students enrolled in combined degrees are exempt from this unit.			
MECH3661 **Engineering Management**	6	**A** It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.	Semester 2
Students enrolled in combined degrees are exempt from this unit.			
MECH3460 **Mechanical Design 2**	6	**A** Properties of engineering materials including fatigue failure theories. Statics and dynamics properties of machines. Practical use of Word and Excel including the use of the 'solver' and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory. **P** MECH2400 and AMME2301	Semester 2
Students enrolled in combined degrees are exempt from this unit.			
Fourth year			
MECH4601 **Professional Engineering 2**	6	**A** MECH3661, ENGG1803, AMME4100 **P** MECH3660	Semester 1
MECH4961 **Biomechanics and Biomaterials**	6	**A** MECH3300 or MECH3362 **P** MECH2300 or AMME2302; MECH2900 or MECH2901 **N** MECH4960	Semester 2
AMME4100 **Practical Experience**		**P** 28 credit points of third year units of study.	Semester 1 Semester 2
ELEC3802 **Fundamentals of Biomedical Engineering**	6	**A** A knowledge of basic electrical engineering is required: Ohm's law, Thevenin and Nortons' theorems, basic circuit theory involving linear resistors, capacitors and inductors, a basic knowledge of bipolar and field effect transistor theory, simplified theoretical mechanism of operation of transformers. **N** ELEC3801 Fundamentals of Biomedical Engineering.	Semester 1
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
AMME4111 **Honours Thesis A**	6	**P** 36 credit points of senior units of study and WAM 65 or over **C** AMME4112 **N** AMME4121, AMME4122, AMME4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Normally taken in Semester 1.			
AMME4112 **Honours Thesis B**	6	**P** AMME4111 Honours Thesis A **N** AMME4121, AMME4122 AMME4103, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2.			
AMME4121 **Engineering Project A**	6	**P** 36 credit points of senior units of study. **C** AMME4122 **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 1.			
AMME4122 **Engineering Project B**	6	**P** AMME4121 Engineering Project A **N** AMME4111, AMME4112, AMME4010	Semester 1 Semester 2
Normally taken in Semester 2.			

Acceptable alternative units of study

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass Program must enrol in AMME4121 & AMME4122.

Advanced engineering 2, 3, or 4 is an acceptable alternative to MECH4601.

The elective AMME4790 Intro Biomechatronics is an acceptable alternative to ELEC3802. Students can not do both.

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 a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.

Resolutions of the Faculty of Engineering relating to this table:

BE (Mechanical Engineering Biomedical)

In addition to gaining credit for the units of study set out in this table, candidates are required to complete sufficient Biomedical Engineering electives from the table below so as to bring their total of eligible credit points to at least 192. A minimum of 192 credit points is required to be eligible for the award of the degree of BE(Mechanical)(Biomedical).

BE(Mechanical Engineering Biomedical) BSc or BCom or BMedSci or BA or LLB

In addition to gaining credit for the units of study set out in this table, candidates are required to complete sufficient Biomolecular Engineering electives from the table below so as to bring their total of eligible engineering credit points to at least 144. Further to this they are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom. In the case of the BE/BA, they are required to complete at least 84 credit points of units of study given by the Faculty of Arts, and the remaining 12 credit points will be Biomedical Engineering electives from the table below.

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
In the case of the BE/LLB, they are required to complete 96 credit points of compulsory Law units of study and a further 48 credit points of elective Law units of study. A minimum of 240 credit points is required to be eligible for the combined degrees BE/BSc, BMedSci, BE/BCom and BE/BA. A minimum of 288 credit points is required to be eligible for the combined degree BE/LLB. candidates should refer to the joint resolutions of the faculty in which they are undertaking the second degree.			
Recommended elective units of study			
AMME4981 **Applied Biomedical Engineering**	6	**A** MECH3921 or MECH3920, MECH3300 or MECH3362, MECH4960 **P** BIOL1003 or 6cp of junior biology; CHEM1101 or 6cp of junior chemistry; MECH2300 or AMME2302	Semester 1
AMME4990 **Biomedical Product Development**	6	**A** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level. **P** BIOL1003 or 6 credit points of junior biology CHEM1101 or 6 credit points of junior chemistry MECH2901 or 6 credit points of intermediate physiology or equivalent MECH3921	Semester 1
AMME4210 **Computational Fluid Dynamics**	6	**A** Partial differental equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. **P** MECH3261 or AERO3260	Semester 1
AMME4790 **Introduction to Biomechatronics**	6	**P** MTRX3700 or MECH3921	Semester 2
MECH4902 **Orthopaedic and Surgical Engineering**	6	**A** Basic concepts in engineering mechanics-statics, dynamics, and solid mechanics; Basic concepts in materials science, specifically with regard to types of materials and the relation between properties and microstructure; and A basic understanding of human biology and anatomy. **P** AMME2301, AMME2302, ENGG1802, BIOL1003, MECH2901, MECH3921 or their equivalent).	Semester 2
AMME4971 **Tissue Engineering**	6	**A** MECH3921 **P** BIOL1003 or 6cp of junior biology; CHEM1101 or 6cp of junior chemistry; MECH2901 or MECH2900	Semester 2
AMME4992 **Regulatory Affairs in Medical Industry**	6	**A** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level. **P** BIOL1003 or 6 credit points of junior biology CHEM1101 or 6 credit points of junior chemistry MECH2901 or 6 credit points of intermediate physiology or equivalent MECH3921	Semester 2

3b. School of Chemical and Biomolecular Engineering

The School of Chemical and Biomolecular Engineering offers the following Bachelor of Engineering degree specialisations:

- Chemical and Biomolecular
- Combined degrees with Science, Commerce, Arts, Medical Science and Law.

Chemical and Biomolecular Engineering units of study

Unit of study	***Credit points***	***A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition***	***Session***
Chemical and Biomolecular Engineering			
Chemical and Biomolecular Engineering is a broad area that seeks to use a detailed knowledge of chemistry, mathematics and biology to convert raw materials into valuable products as economically and safely as possible. Our undergraduate program trains students so that on graduation they can analyse, design and operate a wide variety of processes and to solve industrially relevant problems. To this end, we have a curriculum structure which emphasises the multidisciplinary and varied nature of our discipline. Candidates for the degree of Bachelor of Engineering in Chemical and Biomolecular Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary 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			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
CHEM1101 **Chemistry 1A**	6	**A** HSC Chemistry and Mathematics **C** Recommended concurrent units of study: 6 credit points of Junior Mathematics **N** CHEM1001, CHEM1109, CHEM1901, CHEM1903	Semester 1 Semester 2 Summer Main
CHEM1102 **Chemistry 1B**	6	**P** CHEM (1101 or 1901) or a Distinction in CHEM1001 or equivalent **C** Recommended concurrent units of study: 6 credit points of Junior Mathematics **N** CHEM1002, CHEM1108, CHEM1902, CHEM1904	Semester 1 Semester 2 Summer Main
CHNG1103 **Material & Energy Transformations Intro**	6	**A** Mathematics Extension 1; 2 unit Physics; 2 unit Chemistry.	Semester 2
ENGG1800 **Engineering Disciplines (Intro) Stream A**	6		Semester 1
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
Second year			
CHEM2403 **Chemistry of Biological Molecules**	6	**P** 12 credit points of Junior Chemistry, 6 credit points of Junior Mathematics. **N** CHEM2001, CHEM2901, CHEM2311, CHEM2903, CHEM2913. *To enrol in Senior Chemistry, students are required to have completed CHEM (2401 or 2911 or 2915) and CHEM (2402 or 2912 or 2916). Students are advised that combinations of Intermediate Chemistry units that do not meet this requirement will generally not allow progression to Senior Chemistry.*	Semester 2
CHEM2404 **Forensic and Environmental Chemistry**	6	**P** 12 credit points of Junior Chemistry; 6 credit points of Junior Mathematics **N** CHEM3107, CHEM3197 *To enrol in Senior Chemistry students are required to have completed CHEM (2401 or 2911 or 2915) and CHEM (2402 or 2912 or 2916). Students are advised that combinations of Intermediate Chemistry units that do not meet this requirement will generally not allow progression to Senior Chemistry.*	Semester 1
CHNG2801 **Conservation and Transport Processes**	6	**A** Calculus Computations (Matlab, Excel) Mass and Energy Balances **P** All core 1st year engineering units of study.	Semester 1
CHNG2802 **Applied Maths for Chemical Engineers**	6	**P** All core 1st year engineering units of study. **C** CHNG 2803 (Analysis Practice 1) CHNG 2801 (Conservation and Transport Processes) CHEM 2404 (Forensic and Environmental Chemistry)	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
CHNG2803 **Energy and Fluid Systems Practice**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information. **P** All core engineering 1st year units of study. **C** CHNG 2801 (Conservation and Transport Processes) CHNG 2802 (Applied Mathematics for Chemical Engineers) CHEM 2404 (Forensic and Environmental Chemistry)	Semester 1
CHNG2804 **Chemical & Biological Systems Behaviour**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. **P** All core 1st year engineering units of study. **C** CHNG 2805 (Industrial Systems and Sustainability) CHNG 2806 (Analysis Practice 2 - Treatment, Purification and Recovery Systems) CHEM 2403 (Chemistry of Biological Molecules)	Semester 2
CHNG2805 **Industrial Systems and Sustainability**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **P** All core 1st year engineering units of study. **C** CHNG 2804 (Chemical and Biological Systems Behaviour) CHNG 2806 (Analysis Practice 2 - Treatment, Purification & Recovery Systems) CHEM 2403 (Chemistry of Biological Molecules)	Semester 2
CHNG2806 **Materials Purification and Recovery**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative and quantitative information **P** All core 1st year engineering units of study. **C** CHNG2804 (Chemical and Biological Systems Behaviour) CHNG2805 (Industrial Systems and Sustainability) CHEM2403 (Chemistry of Biological Molecules)	Semester 2
Third year			
CHNG3801 **Process Design**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed. **P** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **C** CHNG3803, CHNG3802	Semester 1
CHNG3802 **Operating/Improving Industrial Systems**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed. **P** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **C** CHNG3801 (Process Design) CHNG3803 (Design Practice 1 - Chemical & Biological Processes)	Semester 1
CHNG3803 **Chemical/Biological Process Design**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information. **P** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **C** CHNG3801 (Process Design) CHNG3802 (Operation, Analysis and Improvement of Industrial Systems)	Semester 1
CHNG3805 **Product Formulation and Design**	6	**A** Mass and Energy Balances Conservation and Transport Phenomena Applied Mathematics (for Chemical Engineering) Process Design Concepts Process Control and Optimisation Concepts **P** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **C** CHNG3806 (Management of Industrial Systems) CHNG3807 (Design Practice 2 - Products and Value Chains)	Semester 2
CHNG3806 **Management of Industrial Systems**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **P** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **C** CHNG3805 (Product Formulation and Design) CHNG3807 (Design Practice 2 - Products and Value Chains)	Semester 2
CHNG3807 **Products and Value Chains**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information. **P** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **C** CHNG3805 (Product Formulation and Design) CHNG3806 (Management of Industrial Systems)	Semester 2
Fourth year			
CHNG4001 **Practical Experience**		**A** Advisory prerequisite: 28 credit points of 3rd year units	Semester 1 Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
CHNG4802 **Chemical Engineering Design A**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering unit of study in third year have been successfully completed. **P** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains *This unit of study is part of an integrated (two semester) fourth year program in chemical engineering design whose overarching aim is to complete the 'vertical integration' of knowledge.*	Semester 1
CHNG4806 **Chemical Engineering Design B**	6	**A** Enrolment in this unit of study assumes that all core chemical engineering units of study in third-year have been successfully completed, as well as the related first semester unit of study Chemical Engineering Design A. **P** CHNG4802 Chemical Engineering Design A or CHNG4203 MIPPS *This unit of study is part of an integrated (two semester) fourth year program in chemical engineering design whose overarching aim is to complete 'vertical integration' of knowledge - one of the pillars on which this degree program is based.*	Semester 2
Students must select 12cp from the following block of units.			
Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
CHNG4811 **Honours Thesis A**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. **P** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains. This unit is available to only those students who have gained an entry to the Honours degree. **N** CHNG4801 Chemical Engineering Thesis A, CHNG4813 Engineering Project A *Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.*	Semester 1
CHNG4812 **Honours Thesis B**	6	**A** Enrolment in this unit of study assumes that Honours Thesis A and all (six) core chemical engineering units of study in third year have been successfully completed. **P** CHNG4811 Honours Thesis A **N** CHNG4805 Chemical Engineering Thesis B, CHNG4814 Engineering Project B *Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.*	Semester 2
CHNG4813 **Engineering Project A**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. **P** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains. **N** CHNG4805 Chemical Engineering Thesis B, CHNG4811 Honours Thesis A *Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.*	Semester 1
CHNG4814 **Engineering Project B**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. **P** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains. CHNG4813 Engineering Project A **N** CHNG4805 Chemical Engineering Thesis B, CHNG4812 Honours Thesis B *Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.*	Semester 2

Notes

1. Students in the Honours program must enrol in CHNG4811 & CHNG4812, students in the Pass program must enrol in CHNG4813 & CHNG4814.

2. 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.

3. Students doing any of the combined degree options BE/BA, BE/BCom, BE/BSc, BE/BMedSc and BE/LLB will be exempt from a First Year core unit of study and from Second Year Chemistry.

4. Students undertaking study overseas as part of an exchange program will enrol in CHNG3041,CHNG3042 in place of 3rd year core or CHNG4041,CHNG4042 in place of 4th year core.

Resolutions of the Faculty of Engineering relating to Chemical Engineering

Bachelor of Engineering in Chemical Engineering

Candidates for this degree are required to complete all the core units of study (total 156 credit points). They are also required to gain at least 24 credit points from the Third and Fourth Year electives listed in the table of recommended elective units of study for BE (Chem) as shown below.

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 except where specific exemptions are noted. 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. This total of 144 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 except where specific exemptions are noted. 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. This total of 144 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.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Recommended elective units of study			
Third year			
CHNG3804 **Biochemical Engineering**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering units of study in second year have been successfully completed. **P** CHEM1101; CHEM1102; CHNG1103; CHNG2801; CHNG2802, CHNG2803; CHNG2804; CHNG2805; CHNG2806;	Semester 2
CHNG3808 **Polymer Engineering**	6	**A** Completion of CHNG3801; CHNG3802; CHNG3803 and currently enrolled in CHNG3805, CHNG3806, CHNG3807. **P** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **C** CHNG3801	Semester 1
Fourth year			
CHNG4003 **Advances in Chemical Engineering A**	4	**A** Knowledge of modern chemical engineering principles and practice. *Note: Department permission required for enrolment*	Semester 1 Semester 2
CHNG4006 **Professional Option**	2	**A** Passed at least 144 credit points. *Note: Department permission required for enrolment* *Student must be in the final semester of their degree program.*	Semester 1 Semester 2
CHNG4203 **Major Industrial Project**	24	**P** Passed at least 144 credit points and have a WAM greater than credit average Students wishing to do this unit of study are required to discuss the matter with the Head of School prior to enrolment. *Note: Department permission required for enrolment* *Department permission required*	Semester 1
CHNG5001 **Process Systems Engineering**	6	**A** Enrolment in this unit of study assumes that the equivalent to all (six) core chemical engineering UoS in third year have been successfully completed. **P** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains *This UoS is an advanced elective in chemical engineering. The concepts and enabling technologies taught in this course are relevant to the real world practice of chemical engineering across a range of industries.*	Semester 2
CHNG5003 **Green Engineering**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed.	Semester 2
CHNG5004 **Particles and Surfaces**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year and all unit operations have been successfully completed.	Semester 1
CHNG5005 **Wastewater Eng - Systems and Practice**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.	Semester 2
CHNG5601 **Membrane Science**	6		Semester 1
CHNG5602 **Cellular Biophysics**	6		Semester 1
CHNG5603 **Analysis, Modelling, Control: BioPhy Sys**	6	**A** It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus MATH 1003 Integral Calculus and Modeling	Semester 1
CHNG5604 **Membrane Science Laboratory**	6		Semester 2
CHNG5605 **Bio-Products: Laboratory to Marketplace**	6		Semester 2

3c. School of Civil Engineering

The School of Civil Engineering offers the following Bachelor of Engineering degree specialisations:

- Civil Engineering
- Civil Structural
- Civil Environmental
- Civil Geotechnical
- Civil Construction Engineering and Management
- Project Engineering and Management, and
- Combined degrees with Science, Commerce, Arts, Medical Science, Design in Architecture and Law.

Civil Engineering units of study

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Civil Engineering			
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 the degree requirement of not less than 192 credit points shall be gained by completing additional elective units of study, as recommended by the School (as set out below).			
Core units of study (all streams except Project Management)			
First year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
ENGG1800 **Engineering Disciplines (Intro) Stream A**	6		Semester 1
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ENGG1802 **Engineering Mechanics**	6		Semester 2
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
GEOL1501 **Engineering Geology 1**	6	**A** No previous knowledge of Geology assumed **N** GEOL1002, GEOL1902, GEOS1003, GEOS1903	Semester 2
Second year			
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
CIVL2110 **Materials**	6		Semester 1
CIVL2810 **Engineering Construction and Surveying**	6	**A** MATH1001, MATH1002, MATH1003, MATH1005	Semester 1
CIVL2201 **Structural Mechanics**	6	**P** ENGG1802 Engineering Mechanics	Semester 1
CIVL2230 **Intro to Structural Concepts and Design**	6	**A** ENGG1802 Engineering Mechanics, CIVL2110 Materials CIVL2201 Structural Mechanics	Semester 2
CIVL2410 **Soil Mechanics**	6	**A** CIVL2201 Structural Mechanics	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
CIVL2611 **Fluid Mechanics: Inviscid Flow**	6	**A** MATH1001 Differential Calculus, ENGG1802 Engineering Mechanics, CIVL2201 Structural Mechanics	Semester 2
Third year			
CIVL3205 **Concrete Structures 1**	6	**A** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design	Semester 1
CIVL3612 **Environmental & Fluids Eng: Viscous Flow**	6	**A** ENGG1802 Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2201 - Structural Mechanics, CIVL2611 - Fluid Mechanics: Inviscid Flow	Semester 1
CIVL3010 **Engineering and Society**	6	**A** ENGG1803 Professional Engineering	Semester 1
CIVL3812 **Project Appraisal**	6	**A** MATH1005 - Statistics, CIVL3805 Project Scope, Time and Cost Management	Semester 1
CIVL3206 **Steel Structures 1**	6	**A** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design	Semester 2
Fourth year			
CIVL4811 **Engineering Design and Construction**	6	**A** CIVL2810 Engineering Construction and Survey **N** CIVL3802 Engineering Construction 2	Semester 1
CIVL4903 **Civil Engineering Design**	6	**A** CIVL3205 Concrete Structures 1 and CIVL3206 Steel Structures 1.	Semester 2
CIVL4008 **Practical Experience**		**P** 30 credit points of third year units of study	Semester 1
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
CIVL4022 **Honours Thesis A**	6	**P** 30 credit points of Senior Units of Study, ISWAM 65 or over *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL4023 **Honours Thesis B**	6	**P** 30 credit points of Senior units of study and successful completion of CIVL4022 - Honours Thesis A *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
CIVL4024 **Engineering Project A**	6	**P** 30 Credit Points of Senior Units of Study *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL4025 **Engineering Project B**	6	**P** 30 Credit Points of Senior Units of Study and successful completion of CIVL4024 Engineering Project A *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2

Notes

1. Students in the Honours program must enrol in CIVL4022 & CIVL4023, students in the Pass Program must enrol in CIVL4024 & CIVL4025.

2. With special permission from the Director of Learning and Teaching, Civil Engineering, it is possible to take Honours Thesis A and Engineering Project A in semester 2 and Honours Thesis B and Engineering Project B in semester 1.

3. 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 Civil Engineering (except Project Engineering Management)

Candidates for the degree of Bachelor of Engineering in Civil Engineering are expected to complete all the core units for the study in the above specialisation requirements (144 credit points). They are also required to gain at least 18 credit points from the 3rd year Civil recommended elective units of study listed below, and 18 credit points from fourth year Civil recommended elective units of study listed below. The remaining 12 credit points can be obtained from any of the listed elective units or from units of study in other Faculties subject to approval from the Director of the Learning and Teaching Civil Engineering.

Candidates commencing one of the combined degree options from 2004 onwards (that is, Bachelor of Engineering in Civil Engineering with either a Bachelor of Arts, Bachelor of Science, Bachelor of Medical Science, Bachelor of Laws or Bachelor of Commerce) are required to complete all of the core units of study listed above (144 credit points), This total of 144 credit points (plus 12 credit points of electives from the list of electives below for combined degrees with Bachelor of Arts) 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, Law or Economics) and candidates should refer to the Joint Resolutions of the Faculty of Engineering and the relevant faculty requirements.

Candidates taking a combined degree with Science or Medical Science may count the Science subjects in the Civil Engineering core to their 96 credits points of Science subjects. Electives from the list below should be taken to complete 144 credit points of Engineering subjects.

Candidates taking a combined degree with Design in Architecture please see the separate Table of core units of study.

To meet specialisation requirements for either Construction Engineering and Management, Structural Engineering, Environmental Engineering or Geotechnical Engineering, students must enrol in at least 3 electives from the relevant stream listed below and undertake a thesis in a related topic. Students may enrol in a maximum of 4 electives from the Construction Engineering and Management stream.

Construction Engineering and Management Stream: CIVL3805, CIVL3813, CIVL4810, CIVL4814, CIVL4815.

Structural Engineering Stream: CIVL3235, CIVL5266, CIVL5269, CIVL5458

Environmental Stream: CIVL3613, CIVL4614, CIVL4615, CIVL5351

Geotechnical Engineering Stream: CIVL3411, CIVL5351, CIVL5452, CIVL5458

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 the relevant department before enrolling.

Acceptable alternative units of study

The Faculty has prescribed the following acceptable alternatives to core units of study listed in the above specialisation requirements:

GEOL1501 Engineering Geology 1 (6cps), acceptable alternative: GEOL1001 and GEOL1002

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Recommended elective units of study			
Second year			
CIVL2511 **Instrumentation and Measurement**	6	**A** CIVL2201 Structural Mechanics, ENGG1802 Engineering Mechanics	Semester 2
Third year			
CIVL3235 **Structural Analysis**	6	**A** CIVL2110, CIVL2230 and MATH2061	Semester 2
CIVL3411 **Geotechnical Engineering**	6	**A** CIVL2410 Soil Mechanics	Semester 2
CIVL3613 **Ocean and Coastal Engineering**	6	**A** CIVL2611 - Fluid Mechanics: Inviscid Flow	Semester 2
CIVL3805 **Project Scope, Time and Cost Management**	6	**A** CIVL2810 - Engineering Construction and Surveying **P** 36 Intermediate credit points	Semester 2
Fourth year			
CIVL3813 **Contracts Formulation and Management**	6	**A** CIVL3805 Project Scope, Cost & Time Management **P** 36 Senior Credit Points	Semester 2
CIVL4615 **Water Resources and Hydrology**	6	**A** ENGG1802 - Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2611 - Fluid Mechanics: Inviscid Flow, CIVL3612 - Environmental and Fluid Engineering: Viscous Flow	Semester 1
CIVL4810 **Mgmnt of People, Quality and Risk in PE**	6	**A** CIVL3805 Project Scope, Time and Cost Management	Semester 2
CIVL4814 **Project Procurement and Tendering**	6	**A** CIVL3805 Project Scope, Time and Cost Management	Semester 2
CIVL4815 **Project Formulation**	6	**P** CIVL3805 Project Scope, Time and Cost Management, CIVL3812 Project Appraisal	Semester 1
CIVL5266 **Steel Structures - Stability**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5269 **Concrete Structures - Strength & Service**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5351 **Environmental Geotechnics**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5452 **Foundation Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5458 **Numerical Methods in Civil Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1

Notes

1. Choice of electives as shown in the above table will depend upon subject availability, timetabling and prerequisite conditions.

2. For the BE (Civil) degree students must take at least 18 elective credit points of study from the recommended Civil Third Year level and 18 elective credit points from the recommended Civil Fourth Year electives. The remaining 12 credit points can be obtained from any of the listed elective units or from units of study in other Faculties subject to approval from the Director of the Learning and Teaching, Civil Engineering.

Exchange units of study

CIVL0011, CIVL0012, CIVL0013, CIVL0014, CIVL0015, CIVL0016, CIVL0017 AND CIVL0018 are available for exchange study programs.

Project Engineering and Management (Civil) units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Project Engineering and Management (Civil)			
Candidates for the degree of Bachelor of Engineering in Project Engineering and Management (Civil) are required to gain credit points for the core units of study set out below. Any additional credit necessary to satisfy the degree requirement of not less than 192 credit points shall be gained by completing additional elective units of study, as recommended by the School (as set out below).			
Core units of study			
First year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
ACCT1003 **Financial Accounting Concepts**	6	**N** ACCT1001, ACCT1002 *Terminating unit.*	Semester 1
ACCT1004 **Management Accounting Concepts**	6	**N** ACCT1001, ACCT1002 *Terminating unit.*	Semester 2
ENGG1800 **Engineering Disciplines (Intro) Stream A**	6		Semester 1
ENGG1802 **Engineering Mechanics**	6		Semester 2
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1
Second year			
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
CIVL2201 **Structural Mechanics**	6	**P** ENGG1802 Engineering Mechanics	Semester 1
CIVL2810 **Engineering Construction and Surveying**	6	**A** MATH1001, MATH1002, MATH1003, MATH1005	Semester 1
CIVL2230 **Intro to Structural Concepts and Design**	6	**A** ENGG1802 Engineering Mechanics, CIVL2110 Materials CIVL2201 Structural Mechanics	Semester 2
CIVL2410 **Soil Mechanics**	6	**A** CIVL2201 Structural Mechanics	Semester 2
CIVL2611 **Fluid Mechanics: Inviscid Flow**	6	**A** MATH1001 Differential Calculus, ENGG1802 Engineering Mechanics, CIVL2201 Structural Mechanics	Semester 2
CIVL3805 **Project Scope, Time and Cost Management**	6	**A** CIVL2810 - Engineering Construction and Surveying **P** 36 Intermediate credit points	Semester 2
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
Third year			
CIVL3010 **Engineering and Society**	6	**A** ENGG1803 Professional Engineering	Semester 1
CIVL2110 **Materials**	6		Semester 1
CIVL3812 **Project Appraisal**	6	**A** MATH1005 - Statistics, CIVL3805 Project Scope, Time and Cost Management	Semester 1
CIVL3813 **Contracts Formulation and Management**	6	**A** CIVL3805 Project Scope, Cost & Time Management **P** 36 Senior Credit Points	Semester 2
CIVL4810 **Mgmnt of People, Quality and Risk in PE**	6	**A** CIVL3805 Project Scope, Time and Cost Management	Semester 2

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Fourth year			
CIVL4008 **Practical Experience**		**P** 30 credit points of third year units of study	Semester 1
CIVL4811 **Engineering Design and Construction**	6	**A** CIVL2810 Engineering Construction and Survey **N** CIVL3802 Engineering Construction 2	Semester 1
CIVL4814 **Project Procurement and Tendering**	6	**A** CIVL3805 Project Scope, Time and Cost Management	Semester 2
CIVL4815 **Project Formulation**	6	**P** CIVL3805 Project Scope, Time and Cost Management, CIVL3812 Project Appraisal	Semester 1
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
CIVL4022 **Honours Thesis A**	6	**P** 30 credit points of Senior Units of Study, ISWAM 65 or over *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL4023 **Honours Thesis B**	6	**P** 30 credit points of Senior units of study and successful completion of CIVL4022 - Honours Thesis A *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
CIVL4024 **Engineering Project A**	6	**P** 30 Credit Points of Senior Units of Study *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL4025 **Engineering Project B**	6	**P** 30 Credit Points of Senior Units of Study and successful completion of CIVL4024 Engineering Project A *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2

Notes.

1. Students in the Honours program must enrol in CIVL4022 & CIVL4023, students in the Pass Program must enrol in CIVL4024 & CIVL4025.

2. With special permission from the Director of the Learning and Teaching, Civil Engineering, it is possible to take Honours Thesis A or Engineering Project A in Semester 2 and Honours Thesis B or Engineering Project B in Semester 1.

3. 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.

4. Candidates for the degree of Bachelor of Engineering in Project Engineering and Management (Civil) are expected to complete all the core units of study (156 credit points). They are also required to gain at least 24 credit points from the third and fourth year table of electives listed below. The remaining 12 credit points required for the degree can be obtained from the list of electives below or from other units of study offered by the University of Sydney subject to approval by the Director of the Learning and Teaching of Civil Engineering.

5. Candidates commencing a combined degree program that is a Bachelor of Engineering in Project Engineering and Management (Civil) with Bachelor of Commerce are required to complete all of the core units of study in the above specialisation requirements except for ACCT1003, ACCT1004, which are not required, therefore only 144 credit points are needed. This total of 144 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 96 credit points for the combined degree will be taken in the Faculty of Economics and Business. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the Faculty of Economics and Business.

6. Candidates commencing a combined degree program that is a Bachelor of Engineering in Project Engineering and Management (Civil) with Bachelor of Arts, Bachelor of Science, or Bachelor of Medical Science are required to complete all of the core units of study in the above specialisation requirements. This remaining 84 credit points should be taken from the relevant faculty unit of study subject to the Joint Resolutions of the Faculty of Engineering and the relevant faculty.

7. Candidates commencing a combined degree program that is a Bachelor of Engineering in Project Engineering and Management (Civil) with Bachelor of Laws are required to complete all of the core units of study in the above specialisation requirements except CIVL3010 and CIVL3813. The remaining 144 credit points for the combined degree will be taken in the Faculty of Laws. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the Faculty of Laws.

8. Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by 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 the relevant department before enrolling.

Recommended elective units of study

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Third year			
CIVL3205 **Concrete Structures 1**	6	**A** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design	Semester 1
CIVL3612 **Environmental & Fluids Eng: Viscous Flow**	6	**A** ENGG1802 Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2201 - Structural Mechanics, CIVL2611 - Fluid Mechanics: Inviscid Flow	Semester 1
CIVL3206 **Steel Structures 1**	6	**A** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design	Semester 2
CIVL3235 **Structural Analysis**	6	**A** CIVL2110, CIVL2230 and MATH2061	Semester 2
CIVL3411 **Geotechnical Engineering**	6	**A** CIVL2410 Soil Mechanics	Semester 2
CIVL3613 **Ocean and Coastal Engineering**	6	**A** CIVL2611 - Fluid Mechanics: Inviscid Flow	Semester 2
CIVL2511 **Instrumentation and Measurement**	6	**A** CIVL2201 Structural Mechanics, ENGG1802 Engineering Mechanics	Semester 2
Fourth year			
CIVL4614 **Flow-Induced Vibrations**	6	**A** CIVL2611 Fluid Mechanics: Inviscid Flow, CIVL3612 Environmental Fluids Engineering: Viscous Flow, CIVL2230 Introduction to Structural Concepts and Design, CIVL3235 Structural Analysis *Note: Department permission required for enrolment*	Semester 1
CIVL4615 **Water Resources and Hydrology**	6	**A** ENGG1802 - Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2611 - Fluid Mechanics: Inviscid Flow, CIVL3612 - Environmental and Fluid Engineering: Viscous Flow	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
CIVL4903 **Civil Engineering Design**	6	**A** CIVL3205 Concrete Structures 1 and CIVL3206 Steel Structures 1.	Semester 2
CIVL5266 **Steel Structures - Stability**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5269 **Concrete Structures - Strength & Service**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5351 **Environmental Geotechnics**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5458 **Numerical Methods in Civil Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1

Notes

1. Choice of electives as shown in the above table will depend upon subject availability, timetabling and prerequisite conditions.

3. At least one of CIVL3205 and CIVL3612 must be taken.

Exchange units of study

CIVL0011, CIVL0012, CIVL0013, CIVL0014, CIVL0015, CIVL0016, CIVL0017 AND CIVL0018 are available for exchange study programs.

Civil Engineering Combined with Design in Architecture - units of study

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Civil Engineering combined with Design in Architecture			
Candidates for the degree of Bachelor of Engineering in Civil Engineering and Design in Architecture are required to gain credit for the core units of study set out below. To satisfy the degree requirement of the combined degree a candidate must study not less than 144 credit points of the core civil engineering units of study and 96 credit points of units of study of the core design in architecture untis of study.			
Core units of study			
First year			
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
DESA1001 **Design Practice 1A**	12	**A** HSC Mathematics, HSC English Standard **C** DESA1101 *Note: Department permission required for enrolment* *Progresion to DESA1002 requires successful completion of this unit. Students may incur materials costs in this unit.*	Semester 1
DESA1101 **Design Studies 1A**	6	**A** HSC Mathematics and HSC English Standard or equivalent. **C** DESA1001 *Note: Department permission required for enrolment*	Semester 1
DESA1002 **Design Practice 1B**	12	**A** DESA1101 **P** DESA1001 **C** DESA1102 *Note: Department permission required for enrolment* *Progression to DESA1002 requires successful completion of DESA1001. Students may incur materials costs in this unit.*	Semester 2
DESA1102 **Design Studies 1B**	6	**A** DESA(1001 and 1101) **C** DESA1002 *Note: Department permission required for enrolment*	Semester 2
Second year			
ENGG1800 **Engineering Disciplines (Intro) Stream A**	6		Semester 1
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
ENGG1802 **Engineering Mechanics**	6		Semester 2
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1
AMME2302 **Materials 1**	6	**N** CIVL2110	Semester 2
GEOL1501 **Engineering Geology 1**	6	**A** No previous knowledge of Geology assumed **N** GEOL1002, GEOL1902, GEOS1003, GEOS1903	Semester 2
Third year			
CIVL2201 **Structural Mechanics**	6	**P** ENGG1802 Engineering Mechanics	Semester 1
CIVL2410 **Soil Mechanics**	6	**A** CIVL2201 Structural Mechanics	Semester 2
CIVL2611 **Fluid Mechanics: Inviscid Flow**	6	**A** MATH1001 Differential Calculus, ENGG1802 Engineering Mechanics, CIVL2201 Structural Mechanics	Semester 2
DESA2001 **Design Practice 2A**	12	**A** DESA1101 and DESA1102 **P** DESA1002 **C** DESA 2111 *Note: Department permission required for enrolment* *Progression to DESA2001 requires successful completion of DESA1002. Students may incur materials costs in this unit.*	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
DESA2002 **Design Practice 2B**	12	**A** DESA2111 **P** DESA2001 *Note: Department permission required for enrolment* *Progression to DESA2002 requires successful completion of DESA2001. Progression to DESA3001 requires completion of all preceding Design Practice and Design Studies units. Students may incur materials costs in this unit.*	Semester 2
DESA2111 **Design Studies 2**	6	**A** DESA(1101 and 1102) **C** DESA2001 *Note: Department permission required for enrolment* *Progression to DESA3001 requires successful completion of all preceding Design Studies and Design Practice units.*	Semester 1
Fourth year			
CIVL2810 **Engineering Construction and Surveying**	6	**A** MATH1001, MATH1002, MATH1003, MATH1005	Semester 1
CIVL3812 **Project Appraisal**	6	**A** MATH1005 - Statistics, CIVL3805 Project Scope, Time and Cost Management	Semester 1
CIVL3206 **Steel Structures 1**	6	**A** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design	Semester 2
CIVL3235 **Structural Analysis**	6	**A** CIVL2110, CIVL2230 and MATH2061	Semester 2
DESA3001 **Design Practice 3A**	12	**P** DESA1101, DESA1102, DESA2111 and DESA2002 *Note: Department permission required for enrolment* *Students may incur materials costs in this unit.*	Semester 1
DESA3002 **Design Practice 3B**	12	**P** DESA3001 *Note: Department permission required for enrolment* *Students may incur materials costs in this unit.*	Semester 2
Fifth Year			
CIVL3205 **Concrete Structures 1**	6	**A** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design	Semester 1
CIVL3612 **Environmental & Fluids Eng: Viscous Flow**	6	**A** ENGG1802 Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2201 - Structural Mechanics, CIVL2611 - Fluid Mechanics: Inviscid Flow	Semester 1
CIVL4811 **Engineering Design and Construction**	6	**A** CIVL2810 Engineering Construction and Survey **N** CIVL3802 Engineering Construction 2	Semester 1
CIVL4903 **Civil Engineering Design**	6	**A** CIVL3205 Concrete Structures 1 and CIVL3206 Steel Structures 1.	Semester 2
DAAP3002 **Architectural Technologies**	6	**P** DESA3001 **C** DESA3002 *Note: Department permission required for enrolment*	Semester 2
An additional 6 credit point core unit of study in structural design, CIVL4860, will become available in fifth year in 2010.			
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
CIVL4022 **Honours Thesis A**	6	**P** 30 credit points of Senior Units of Study, ISWAM 65 or over *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL4023 **Honours Thesis B**	6	**P** 30 credit points of Senior units of study and successful completion of CIVL4022 - Honours Thesis A *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
CIVL4024 **Engineering Project A**	6	**P** 30 Credit Points of Senior Units of Study *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL4025 **Engineering Project B**	6	**P** 30 Credit Points of Senior Units of Study and successful completion of CIVL4024 Engineering Project A *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2

Resolutions of the Faculty of Engineering and IT relating to the combined Civil Engineering/Design in Architecture program.

1. Candidates for the degrees of Bachelor of Engineering in Civil Engineering and Bachelor of Design in Architecture must complete all the core units of the study as listed in the above table and complete a minimum of 240 credit points.

2. 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.

3. An elective may be substituted for DAAP3002 with approval from the Head of School Civil Engineering

4. Students considering doing Advanced Engineering options should seek advice from the relevant school adviser before enrolling.

3d. School of Electrical and Information Engineering

The School of Electrical and Information Engineering offers the following Bachelor of Engineering degree specialisations:

- Computer
- Electrical (Power)
- Electrical
- Software
- Telecommunications, and
- Combined degrees with Science, Commerce, Arts, Medical Science and Law.

Candidates for the degree of Bachelor of Engineering in Computer Engineering, Electrical Engineering, Electrical (Power) Engineering, Software Engineering and Telecommunications Engineering are required to gain credit for a prescribed number of credit points of core and recommended units of study. The core units of study are set out in the tables below pertaining to each specialisation. The recommended units of study are as defined for each specialisation.

Note: Not all recommended units of study shall be available each year.

Computer Engineering units of study

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Computer Engineering			
All candidates for the Bachelor of Engineering in Computer Engineering degree (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study.			
Candidates will also need to choose a number of recommended units of study for Electronic Commerce Engineering, which consist of:			
– all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and			
– such other units of study as may be so designated by the Head of School.			
Bachelor of Computer Engineering			
Candidates for the four-year Bachelor of Engineering in Computer Engineering degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.			
Bachelor of Engineering in Computer Engineering in a combined degree course			
Candidates in the combined degree course of Bachelor of Engineering in Computer Engineering with the Bachelor of Commerce or Bachelor of Law are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study.			
Candidates in the combined degree course of Bachelor of Engineering in Computer Engineering with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study.			
Candidates in the combined degree course of Bachelor of Engineering in Computer Engineering with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology.			
Candidates in all combined degree courses shall also satisfy such other requirements as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.			
Computer Engineering core units of study			
First year			
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
ENGG1805 **Professional Engineering and IT**	6		Semester 1
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
PHYS1003 **Physics 1 (Technological)**	6	**A** HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent. **C** Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905). **N** PHYS1004, PHYS1902 *It is recommended that PHYS (1001 or 1002 or 1901) be completed before this unit*	Semester 2
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Second year			
ELEC2103 **Simulation & Numerical Solutions in Eng**	6	**A** ELEC1103 Fundamentals of Electrical and Electronic Engineering, ELEC1601 Foundations of Computer Systems. **N** COSC1001 Computational Science in Matlab, COSC1901 Computational Science in Matlab (Advanced)	Semester 2
ELEC2104 **Electronic Devices and Circuits**	6	**A** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering. **N** ELEC2401 Introductory Electronics.	Semester 2
ELEC2302 **Signals and Systems**	6	**A** MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling. **N** ELEC2301 Signals & Systems, MATH3019 Signal Processing, MATH3919 Signal Processing (Adv).	Semester 2
ELEC2602 **Digital System Design**	6	**A** ELEC1103 **N** ELEC3601 Digital Systems Design, ELEC3608 Digital Systems Design.	Semester 1
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1
PHYS2213 **Physics 2EE**	6	**A** MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful **P** PHYS (1001 or 1901) and PHYS (1003 or 1902) **N** PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912	Semester 2
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
Third year			
ELEC3506 **Data Communications and the Internet**	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
At least 3 of the following 6 units of study:			
ELEC3104 **Engineering Electromagnetics**	6	**A** Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields. **N** ELEC3102 Engineering Electromagnetics.	Semester 1
ELEC3304 **Control**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. **P** MATH2061 and ELEC2302 **N** ELEC3302 Fundamentals of Feedback Control, AMME3500 System Dynamics and Control.	Semester 2
ELEC3305 **Digital Signal Processing**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals. **P** ELEC2302 **N** ELEC3303 Digital Signal Processing.	Semester 1
ELEC3404 **Electronic Circuit Design**	6	**A** A background in basic electronics and circuit theory is assumed. **N** ELEC3401 Electronic Devices and Circuits.	Semester 1
ELEC3702 **Management for Engineers**	6	**N** ELEC3701 Management for Engineers, ENGG3005 Engineering & Industrial Management Fundamentals, MECH3661 Engineering Management	Semester 2
COMP3520 **Operating Systems Internals**	6	**A** COMP2129, INFO1105 **N** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909)	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Fourth year			
ELEC4605 **Computer Architecture**	6	**A** Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks, microprocessors and their use, the architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications. **P** ELEC1601, ELEC 2602 and ELEC3607 **N** ELEC4601 Computer Design.	Semester 1
ELEC4702 **Practical Experience**		**P** 24 credit points of level 3 or 4 units of study.	Semester 1 Semester 2
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
ELEC4710 **Engineering Project A**	6	**P** 36 credit points of units of study from level 3 and above. **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4711 **Engineering Project B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4710 Engineering Project A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ELEC4712 **Honours Thesis A**	6	**P** 36 credit points of units of study from level 3 and above **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4713 **Honours Thesis B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4712 Honours Thesis A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Notes 1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met. 2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.			

Electrical (Power) units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Electrical (Power) Engineering			
All candidates for the Bachelor of Engineering in Electrical Engineering (Power) degree (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study. Candidates will also need to choose a number of recommended units of study for Power Engineering, which consist of: – all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and – such other units of study as may be so designated by the Head of School.			
Bachelor of Engineering in Electrical Engineering (Power)			
Candidates for the 4-year Bachelor of Engineering in Electrical Engineering (Power) degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.			
Bachelor of Engineering in Electrical Engineering (Power) in a combined degree course			
Candidates in the combined degree course of Bachelor of Electrical Engineering (Power) with the Bachelor of Commerce or Bachelor of Law are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study. Candidates in the combined degree course of Bachelor of Electrical Engineering (Power) with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study. Candidates in the combined degree course of Bachelor of Electrical (Power) with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology. Candidates in all combined degree courses shall also satisfy such other requirements as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.			
Electrical Engineering (Power) core units of study			
First year			
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
ENGG1805 **Professional Engineering and IT**	6		Semester 1
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
PHYS1003 **Physics 1 (Technological)**	6	**A** HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent. **C** Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905). **N** PHYS1004, PHYS1902 *It is recommended that PHYS (1001 or 1002 or 1901) be completed before this unit*	Semester 2
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Second year			
ELEC2103 **Simulation & Numerical Solutions in Eng**	6	**A** ELEC1103 Fundamentals of Electrical and Electronic Engineering, ELEC1601 Foundations of Computer Systems. **N** COSC1001 Computational Science in Matlab, COSC1901 Computational Science in Matlab (Advanced)	Semester 2
ELEC2104 **Electronic Devices and Circuits**	6	**A** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering. **N** ELEC2401 Introductory Electronics.	Semester 2
ELEC2302 **Signals and Systems**	6	**A** MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling. **N** ELEC2301 Signals & Systems, MATH3019 Signal Processing, MATH3919 Signal Processing (Adv).	Semester 2
ELEC2602 **Digital System Design**	6	**A** ELEC1103 **N** ELEC3601 Digital Systems Design, ELEC3608 Digital Systems Design.	Semester 1
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
PHYS2213 **Physics 2EE**	6	**A** MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful **P** PHYS (1001 or 1901) and PHYS (1003 or 1902) **N** PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912	Semester 2
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
Third year			
ELEC3203 **Electricity Networks**	6	**A** This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics. **N** ELEC3201 Electrical Energy Systems.	Semester 2
ELEC3204 **Power Electronics and Applications**	6	**A** Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc. **P** ELEC2104 **N** ELEC3202 Power Electronics and Drives.	Semester 1
ELEC3206 **Electrical Energy Conversion Systems**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. **P** ELEC2104	Semester 1
ELEC3304 **Control**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. **P** MATH2061 and ELEC2302 **N** ELEC3302 Fundamentals of Feedback Control, AMME3500 System Dynamics and Control.	Semester 2
Fourth year			
ELEC4702 **Practical Experience**		**P** 24 credit points of level 3 or 4 units of study.	Semester 1 Semester 2
ELEC5205 **High Voltage Engineering**	6	**A** The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals. **P** ELEC3105 or equivalent *Recommended: ELEC5204 Power Systems*	Semester 2
ELEC5204 **Power Systems Analysis and Protection**	6	**A** The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment. **N** ELEC4201 Electrical Power Systems.	Semester 1
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
ELEC4710 **Engineering Project A**	6	**P** 36 credit points of units of study from level 3 and above. **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4711 **Engineering Project B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4710 Engineering Project A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ELEC4712 **Honours Thesis A**	6	**P** 36 credit points of units of study from level 3 and above **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4713 **Honours Thesis B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4712 Honours Thesis A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Notes 1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met. 2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.			

Electrical Engineering units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Electrical Engineering			
All candidates for the Bachelor of Engineering in Electrical Engineering degree (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study. Candidates will also need to choose a number of recommended units of study for Electrical Engineering, which consist of: – all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and – such other units of study as may be so designated by the Head of School.			
Bachelor of Engineering in Electrical Engineering			
Candidates for the 4-year Bachelor of Engineering in Electrical Engineering degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.			
Bachelor of Engineering in Electrical Engineering in a combined degree course			
Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering with the Bachelor of Commerce or Bachelor of Laws are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study. Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study. Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology. Candidates in all combined degree courses shall also satisfy such other requirements for the combined course as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.			
Electrical Engineering core units of study			
First year			
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ENGG1805 **Professional Engineering and IT**	6		Semester 1
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
PHYS1003 **Physics 1 (Technological)**	6	**A** HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent. **C** Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905). **N** PHYS1004, PHYS1902 *It is recommended that PHYS (1001 or 1002 or 1901) be completed before this unit*	Semester 2
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Second year			
ELEC2103 **Simulation & Numerical Solutions in Eng**	6	**A** ELEC1103 Fundamentals of Electrical and Electronic Engineering, ELEC1601 Foundations of Computer Systems. **N** COSC1001 Computational Science in Matlab, COSC1901 Computational Science in Matlab (Advanced)	Semester 2
ELEC2104 **Electronic Devices and Circuits**	6	**A** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering. **N** ELEC2401 Introductory Electronics.	Semester 2
ELEC2302 **Signals and Systems**	6	**A** MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling. **N** ELEC2301 Signals & Systems, MATH3019 Signal Processing, MATH3919 Signal Processing (Adv).	Semester 2
ELEC2602 **Digital System Design**	6	**A** ELEC1103 **N** ELEC3601 Digital Systems Design, ELEC3608 Digital Systems Design.	Semester 1
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
PHYS2213 **Physics 2EE**	6	**A** MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful **P** PHYS (1001 or 1901) and PHYS (1003 or 1902) **N** PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912	Semester 2
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
Third year			
At least 5 of the following 9 units of study:			
ELEC3104 **Engineering Electromagnetics**	6	**A** Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields. **N** ELEC3102 Engineering Electromagnetics.	Semester 1
ELEC3203 **Electricity Networks**	6	**A** This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics. **N** ELEC3201 Electrical Energy Systems.	Semester 2
ELEC3206 **Electrical Energy Conversion Systems**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. **P** ELEC2104	Semester 1
ELEC3304 **Control**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. **P** MATH2061 and ELEC2302 **N** ELEC3302 Fundamentals of Feedback Control, AMME3500 System Dynamics and Control.	Semester 2
ELEC3305 **Digital Signal Processing**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals. **P** ELEC2302 **N** ELEC3303 Digital Signal Processing.	Semester 1
ELEC3404 **Electronic Circuit Design**	6	**A** A background in basic electronics and circuit theory is assumed. **N** ELEC3401 Electronic Devices and Circuits.	Semester 1
ELEC3505 **Communications**	6	**A** Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. **N** ELEC3503 Introduction to Digital Communications.	Semester 1
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3702 **Management for Engineers**	6	**N** ELEC3701 Management for Engineers, ENGG3005 Engineering & Industrial Management Fundamentals, MECH3661 Engineering Management	Semester 2
Fourth year			
ELEC4702 **Practical Experience**		**P** 24 credit points of level 3 or 4 units of study.	Semester 1 Semester 2
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
ELEC4710 **Engineering Project A**	6	**P** 36 credit points of units of study from level 3 and above. **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4711 **Engineering Project B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4710 Engineering Project A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ELEC4712 **Honours Thesis A**	6	**P** 36 credit points of units of study from level 3 and above **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4713 **Honours Thesis B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4712 Honours Thesis A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Notes 1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met. 2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.			

Software Engineering units of study

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Software Engineering			
All candidates for the Bachelor of Engineering degree in Software Engineering (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study. Candidates will also need to choose a number of recommended units of study for Software Engineering, which consist of: – all level 1, 2, 3, 4 and 5 EIE and SIT units which do not appear in the table of core units; – the units of study listed in the table of additional recommended units of study; and – such other units of study as may be so designated by the Head of School.			
Bachelor of Engineering in Software Engineering			
Candidates for the 4-year Bachelor of Engineering in Software Engineering degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study with no more than 18 credit points of recommended elective units from level 1, and 2. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.			
Bachelor of Engineering in Software Engineering in a combined degree course			
Candidates in the combined degree course of Bachelor of Engineering in Software Engineering with the Bachelor of Commerce or Bachelor of Laws are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study with no more than 18 credit points of recommended elective units from level 1, and 2. Candidates in the combined degree course of Bachelor of Engineering in Software Engineering with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study with no more than 18 credit points of recommended elective units from level 1, and 2. Candidates in the combined degree course of Bachelor of Engineering in Software Engineering with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of studywith no more than 18 credit points of recommended elective units from level 1, and 2, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology. Candidates in all combined degree courses shall also satisfy such other requirements for the combined course as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.			
Software Engineering core units of study			
First year			
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
ENGG1805 **Professional Engineering and IT**	6		Semester 1
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Second year			
INFO2110 **Systems Analysis and Modelling**	6	**A** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **N** INFO (2810 or 2000 or 2900)	Semester 2
INFO2120 **Database Systems 1**	6	**A** Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1003 or INFS1000 or INFO1903 **N** INFO (2820 or 2005 or 2905)	Semester 1
INFO2315 **Introduction to IT Security**	6	**A** Computer literacy **N** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616)	Semester 2
MATH2069 **Discrete Mathematics and Graph Theory**	6	**P** 6 credit points of Junior level Mathematics **N** MATH2011, MATH2009, MATH2969	Semester 1
COMP2007 **Algorithms and Complexity**	6	**A** INFO1105, MATH1004 or MATH1904 **N** COMP (2907 or 3309 or 3609 or 3111 or 3811)	Semester 2
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
Third year			
COMP3615 **Software Development Project**	6	**P** INFO3402 **N** INFO3600 or SOFT (3300 or 3600 or 3200 or 3700)	Semester 2
ELEC3609 **Internet Software Platforms**	6	**P** INFO1103, INFO2110, INFO2120 **N** EBUS4001 E-Business Engineering	Semester 2
INFO3220 **Object Oriented Design**	6	**A** INFO2110, INFO1105 **N** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908)	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO3315 **Human-Computer Interaction**	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
INFO3402 **Management of IT Projects and Systems**	6	**A** INFO (2000 or 2110 or 2810 or 2900) **N** ISYS (3000 or 3012) or ELEC3606	Semester 1
Fourth year			
COMP5348 **Enterprise Scale Software Architecture**	6	**A** INFO3220 or COMP5028 or equivalent.	Semester 1
ELEC4702 **Practical Experience**		**P** 24 credit points of level 3 or 4 units of study.	Semester 1 Semester 2
ELEC5618 **Software Quality Engineering**	6	**N** SOFT3302 Software Quality Assurance	Semester 1
ELEC5619 **Object Oriented Application Frameworks**	6	**A** Java programming, and some web development experience are essential. Databases strongly recommended	Semester 2
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
ELEC4710 **Engineering Project A**	6	**P** 36 credit points of units of study from level 3 and above. **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4711 **Engineering Project B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4710 Engineering Project A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ELEC4712 **Honours Thesis A**	6	**P** 36 credit points of units of study from level 3 and above **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4713 **Honours Thesis B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4712 Honours Thesis A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Additional Software Engineering recommended units of study			
ACCT1003 **Financial Accounting Concepts**	6	**N** ACCT1001, ACCT1002 *Terminating unit.*	Semester 1
ACCT1004 **Management Accounting Concepts**	6	**N** ACCT1001, ACCT1002 *Terminating unit.*	Semester 2
MKTG1001 **Marketing Principles**	6	**N** MKTG2001	Semester 1 Semester 2
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1
PHYS1003 **Physics 1 (Technological)**	6	**A** HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent. **C** Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905). **N** PHYS1004, PHYS1902 *It is recommended that PHYS (1001 or 1002 or 1901) be completed before this unit*	Semester 2
PHYS2213 **Physics 2EE**	6	**A** MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful **P** PHYS (1001 or 1901) and PHYS (1003 or 1902) **N** PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912	Semester 2
Notes 1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met. 2. Students in the Honours program must enrol in ELEC4712 & ELEC4713 or the alternate IT Research units INFO4991 & INFO4992, students in the Pass Program must enrol in ELEC4710 & ELEC4711.			

Telecommunications Engineering units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session

Telecommunications Engineering

All candidates for the Bachelor of Engineering degree in Telecommunications Engineering (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study.

Candidates will also need to choose a number of recommended units of study for Telecommunications Engineering, which consist of:

– all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and

– such other units of study as may be so designated by the Head of School.

Bachelor of Engineering in Telecommunications Engineering

Candidates for the 4-year Bachelor of Engineering in Telecommunications Engineering degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.

Bachelor of Engineering in Telecommunications Engineering in a combined degree course

Candidates in the combined degree course of Bachelor of Engineering in Telecommunications Engineering with the Bachelor of Commerce or Bachelor of Law are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study.

Candidates in the combined degree course of Bachelor of Engineering in Telecommunications Engineering with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study.

Candidates in the combined degree course of Bachelor of Engineering in Telecommunications Engineering with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology.

Candidates in all combined degree courses shall also satisfy such other requirements for the combined course as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.

Telecommunications Engineering core units of study

First year

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
ENGG1805 **Professional Engineering and IT**	6		Semester 1
MATH1001 **Differential Calculus**	3	**A** HSC Mathematics Extension 1 **N** MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
MATH1002 **Linear Algebra**	3	**A** HSC Mathematics Extension 1 **N** MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
MATH1003 **Integral Calculus and Modelling**	3	**A** HSC Mathematics Extension 2 or MATH1001 or MATH1011 or MATH1111 **N** MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
MATH1005 **Statistics**	3	**A** HSC Mathematics **N** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
PHYS1003 **Physics 1 (Technological)**	6	**A** HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent. **C** Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905). **N** PHYS1004, PHYS1902 *It is recommended that PHYS (1001 or 1002 or 1901) be completed before this unit*	Semester 2
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2

Second year

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC2103 **Simulation & Numerical Solutions in Eng**	6	**A** ELEC1103 Fundamentals of Electrical and Electronic Engineering, ELEC1601 Foundations of Computer Systems. **N** COSC1001 Computational Science in Matlab, COSC1901 Computational Science in Matlab (Advanced)	Semester 2
ELEC2104 **Electronic Devices and Circuits**	6	**A** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering. **N** ELEC2401 Introductory Electronics.	Semester 2
ELEC2302 **Signals and Systems**	6	**A** MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling. **N** ELEC2301 Signals & Systems, MATH3019 Signal Processing, MATH3919 Signal Processing (Adv).	Semester 2
ELEC2602 **Digital System Design**	6	**A** ELEC1103 **N** ELEC3601 Digital Systems Design, ELEC3608 Digital Systems Design.	Semester 1
MATH2061 **Linear Mathematics and Vector Calculus**	6	**P** MATH(1111 or 1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907) **N** MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067	Semester 1 Summer Main
PHYS1001 **Physics 1 (Regular)**	6	**A** HSC Physics **C** Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) **N** PHYS1002 , PHYS1901	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
PHYS2213 **Physics 2EE**	6	**A** MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful **P** PHYS (1001 or 1901) and PHYS (1003 or 1902) **N** PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912	Semester 2
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
Third year			
ELEC3305 **Digital Signal Processing**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals. **P** ELEC2302 **N** ELEC3303 Digital Signal Processing.	Semester 1
ELEC3405 **Communications Electronics and Photonics**	6	**A** ELEC2401 Introductory Electronics or ELEC2104 Electronic Devices and Basic Circuits. **N** ELEC3402 Communications Electronics.	Semester 2
ELEC3505 **Communications**	6	**A** Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. **N** ELEC3503 Introduction to Digital Communications.	Semester 1
ELEC3506 **Data Communications and the Internet**	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
At least 1 of the following 5 units of study:			
ELEC3104 **Engineering Electromagnetics**	6	**A** Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields. **N** ELEC3102 Engineering Electromagnetics.	Semester 1
ELEC3304 **Control**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. **P** MATH2061 and ELEC2302 **N** ELEC3302 Fundamentals of Feedback Control, AMME3500 System Dynamics and Control.	Semester 2
ELEC3404 **Electronic Circuit Design**	6	**A** A background in basic electronics and circuit theory is assumed. **N** ELEC3401 Electronic Devices and Circuits.	Semester 1
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3702 **Management for Engineers**	6	**N** ELEC3701 Management for Engineers, ENGG3005 Engineering & Industrial Management Fundamentals, MECH3661 Engineering Management	Semester 2
Fourth year			
ELEC4505 **Digital Communication Systems**	6	**A** ELEC3505 Communications **N** ELEC4502 Digital Communication Systems.	Semester 1
ELEC4702 **Practical Experience**		**P** 24 credit points of level 3 or 4 units of study.	Semester 1 Semester 2
Students must select 12cp from the following block of units. Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.			
ELEC4710 **Engineering Project A**	6	**P** 36 credit points of units of study from level 3 and above. **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4711 **Engineering Project B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4710 Engineering Project A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ELEC4712 **Honours Thesis A**	6	**P** 36 credit points of units of study from level 3 and above **N** ELEC4703, ELEC4705, ELEC4707	Semester 1 Semester 2
ELEC4713 **Honours Thesis B**	6	**A** 36 credit points of units of study from level 3 and above **P** ELEC4712 Honours Thesis A **N** ELEC4703, ELEC4705, ELEC4707 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Notes 1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met 2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.			

3e. School of Information Technologies

The School of Information Technologies offers the following programs.

Degrees

The School of IT offers the following three degrees:

- The Bachelor of Computer Science and Technology (BCST). Its normal duration is three years (144 Credit Points).
- The BCST (Advanced). Its normal duration is three years (144 Credit Points).
- The Bachelor of Information Technology (BIT). Its normal duration is four years (192 Credit Points).

In addition, the school offers the following combined degrees:

- Bachelor of Information Technology and Bachelor of Arts (BIT/BA) (240 Credit Points).
- Bachelor of Information Technology and Bachelor of Commerce (BIT/BCom) (240 Credit Points).
- Bachelor of Information Technology and Bachelor of Law (BIT/LLB) (288 Credit Points).
- Bachelor of Information Technology and Bachelor of Medical Science (BIT/BMedSc) (240 Credit Points).
- Bachelor of Information Technology and Bachelor of Science (BIT/BSc) (240 Credit Points).

Streams

The School of IT offers these streams in the degrees listed above:

- Computer Science
- Information Systems

Students enrolled in BCST, BCST (Advanced) or BIT must complete at least one of the two offered streams.

Students enrolled in the BSc or BSc (Advanced) degrees offered by the Faculty of Science can select Computer Science and/or Information Systems as their major in their senior (third) year.

Honours

The School of IT offers three different honours degrees:

1. After completing the requirements for a BCST or a pass degree from the Faculty of Science or a degree equivalent to the BCST from another institution, students can apply for enrolment in the honours degree (normal duration 1 year), and upon successful completion they will be awarded a BCST(Honours).
2. After completing the requirements for a BCST(Adv) or a BSc(Adv) degree from the Faculty of Science or a degree equivalent to the BCST(Adv) from another institution, students can apply for enrolment in the honours degree (normal duration 1 year), and upon successful completion they will be awarded a BCST(Adv)(Honours).
3. In their fourth year (after completing 144 credit points) students enrolled in the BIT degree, can either pursue the coursework option or the honours option. A successful completion of the honours option will result in an award of a BIT (Honours) degree. In addition, students who have completed a pass degree of BSc, or equivalent, can apply for enrolment in the BSc(Hons) with honours in Computer Science or in Information Systems, as offered by the Faculty of Science.

Minors

The School of IT offers a *minor in IT*. A 'minor' is defined as at least 18 credit points from SIT coded units (COMP, INFO, ISYS), at the Intermediate level (second year) or above.

The school will issue a certificate to all students who have completed the requirements for a degree of the University of Sydney and who complete the requirements for an IT minor, upon application.

An application form is available at www.it.usyd.edu.au/minor.

Bachelor of Information Technology units of study

Unit of study	***Credit points***	***A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition***	***Session***
Candidates for the degree of Bachelor of Information Technology (BIT) are required to gain credit for 192 credit points from the units of study set out below. The selection of units must satisfy the degree rules in the Resolutions of the Faculty. In particular, all core units must be completed, along with an appropriate amount from the elective units of study as recommended by the Faculty. Candidates for the BIT degree must complete a stream in either Computer Science or Information Systems, or both, as described in the Tables below. Enrolment is subject to the following constraints: 1. At most 72 credit points accumulated from first year units (core and recommended electives) can be counted for degree completion. 2. At least 84 credit points must be accumulated from 3000-level and above units (including 72cp of core, selected core and recommended electives as outlined in this table). 3. Candidates in the BIT degree must maintain a credit average in each year of enrolment. If this level of result is not achieved candidates will be transferred to the BCST degree program. Through this table, candidates may substitute an advanced equivalent for a non- advanced unit mentioned. They may also substitute an appropriate unit from the Advanced Engineering program of the Faculty of Engineering, or the Talented Student Program of the Faculty of Science, if they are eligible to enrol in such units.			
(i) Stream in Computer Science			
First year core units of study for CS stream			
ENGG1805 **Professional Engineering and IT**	6		Semester 1
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to INFO1103.			
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Note: INFO1905 (advanced version) can be taken as an alternate to INFO1105.			
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			
First year recommended elective units of study for CS stream			
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
INFO1003 **Foundations of Information Technology**	6	**N** INFO1000 or INFS1000	Semester 1 Semester 2
INFO1903 **Informatics (Advanced)**	6	**A** HSC Mathematics **P** UAI (or ATAR equivalent) sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry *Note: Department permission required for enrolment*	Semester 1
Second Year core units of study for CS stream			
COMP2007 **Algorithms and Complexity**	6	**A** INFO1105, MATH1004 or MATH1904 **N** COMP (2907 or 3309 or 3609 or 3111 or 3811)	Semester 2
Note: COMP2907 (advanced version) can be taken as an alternate to COMP2007.			
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
INFO2110 **Systems Analysis and Modelling**	6	**A** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **N** INFO (2810 or 2000 or 2900)	Semester 2
INFO2120 **Database Systems 1**	6	**A** Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1003 or INFS1000 or INFO1903 **N** INFO (2820 or 2005 or 2905)	Semester 1
Note: INFO2820 (advanced version) can be taken as an alternate core unit to INFO2120.			
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			
Second year recommended elective units of study for CS stream			
INFO2315 **Introduction to IT Security**	6	**A** Computer literacy **N** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616)	Semester 2
ISYS2140 **Information Systems**	6	**A** INFO1003 or INFS1000 **N** ISYS (2006 or 2007)	Semester 1
All 2000-level ELEC units of study are recommended.			
Third year core units of study for CS stream Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended electives units of study listed here for the CS stream.			
INFO3402 **Management of IT Projects and Systems**	6	**A** INFO (2000 or 2110 or 2810 or 2900) **N** ISYS (3000 or 3012) or ELEC3606	Semester 1
INFO3600 **Major Development Project (Advanced)**	12	**P** INFO3402 **N** COMP3615 or ISYS3400 or SOFT (3300 or 3600 or 3200 or 3700) *Only available to students in BIT, BCST(Adv) or BSc(Adv)*	Semester 2
CS & IS double stream: Students enrolled in the double stream must also complete ISYS3401 Analytical Methods and Information Systems as a core unit of study from the CS stream.			
Third year selected core units of study for CS stream			
Students must complete at least 12 credit points from the following list.			
COMP3109 **Programming Languages and Paradigms**	6	**A** COMP2007	Semester 2
COMP3308 **Introduction to Artificial Intelligence**	6	**A** COMP2007 **N** COMP (3608 or 3002 or 3902)	Semester 1
COMP3608 **Intro. to Artificial Intelligence (Adv)**	6	**P** Distinction-level results in some 2nd year COMP or MATH or SOFT units. **N** COMP (3308 or 3002 or 3902)	Semester 1
COMP3419 **Graphics and Multimedia**	6	**A** COMP2007, MATH1002 **N** MULT (3306 or 3606 or 3019 or 3919 or 3004 or 3904) or COMP(3004 or 3904)	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP3456 Computational Methods for Life Sciences	6	**P** INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG	Semester 2
COMP3520 Operating Systems Internals	6	**A** COMP2129, INFO1105 **N** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909)	Semester 1
ELEC3506 Data Communications and the Internet	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
ELEC3609 Internet Software Platforms	6	**P** INFO1103, INFO2110, INFO2120 **N** EBUS4001 E-Business Engineering	Semester 2
INFO3220 Object Oriented Design	6	**A** INFO2110, INFO1105 **N** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908)	Semester 1
INFO3315 Human-Computer Interaction	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
INFO3404 Database Systems 2	6	**A** Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. **N** INFO (3504 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
INFO3504 Database Systems 2 (Adv)	6	**P** Distinction-level result in INFO (2120 or 2820) or COMP (2007 or 2907) **N** INFO (3404 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 12 cp from the list above.			
Third year recommended elective units of study for CS stream			
ELEC3607 Embedded Computing	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3610 E-Business Analysis and Design	6	**P** INFO2120 **N** EBUS3003 E-Business System Design, EBUS3001 Introduction to e-Commerce Systems	Semester 1
ISYS3401 Analytical Methods & Information Systems	6	**A** INFO2110, ISYS2140 **N** ISYS3015	Semester 1
All 3000-level and above ELEC units of study are recommended.			
Fourth year selected core units of study for CS stream Students in the BIT Pass degree must complete at least 48 credit points from this list.			
COMP5045 Computational Geometry	6	**A** Data structures, analysis of algorithms **N** COMP4045	Semester 1
COMP5046 Statistical Natural Language Processing	6	**A** Concepts of Linguistics, elementary statistics, AI techniques. **N** COMP4046	Semester 1
COMP5047 Pervasive Computing	6	**A** Networking concepts, operating system concepts, programming expertise. **N** NETS4047	Semester 2
COMP5048 Information Visualisation	6	**A** Discrete mathematics, algorithms and complexity. **N** COMP4048	Semester 2
COMP5318 Knowledge Discovery and Data Mining	6	**A** COMP5138 and familiarity with basic statistics	Semester 1
COMP5338 Advanced Data Models	6	**A** COMP5138 or equivalent	Semester 2
COMP5348 Enterprise Scale Software Architecture	6	**A** INFO3220 or COMP5028 or equivalent.	Semester 1
COMP5416 Advanced Network Technologies	6	**A** ELEC3506 or equivalent	Semester 2
COMP5424 Information Technology in Biomedicine	6	**A** Basic programming skills	Semester 1
COMP5425 Multimedia Storage, Retrieval & Delivery	6	**A** Algorithms (equivalent to COMP5211).	Semester 1
COMP5426 Parallel and Distributed Computing	6	**A** Equivalent of COMP5116	Semester 1
ELEC4605 Computer Architecture	6	**A** Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks, microprocessors and their use, the architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications. **P** ELEC1601, ELEC 2602 and ELEC3607 **N** ELEC4601 Computer Design.	Semester 1
ELEC5508 Wireless Engineering	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5514 **Networked Embedded Systems**	6	**A** ELEC3607, ELEC3305, ELEC3506 and ELEC5508	Semester 2
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
ELEC5618 **Software Quality Engineering**	6	**N** SOFT3302 Software Quality Assurance	Semester 1
ELEC5619 **Object Oriented Application Frameworks**	6	**A** Java programming, and some web development experience are essential. Databases strongly recommended	Semester 2
ELEC5620 **Model Based Software Engineering**	6	**A** A programming language, basic maths	Semester 2
INFO5991 **Services Science Management and Eng**	6	**A** INFO5990	Semester 1 Semester 2
INFO5992 **Understanding IT Innovations**	6	**A** INFO5990 **N** PMGT5875	Semester 1 Semester 2
ISYS5050 **Knowledge Management Systems**	6	**A** Information systems concepts, database concepts **N** ISYS4050 *Note: Department permission required for enrolment*	Semester 1

(ii) Stream in Information Systems

First year core units of study for IS stream

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ENGG1805 **Professional Engineering and IT**	6		Semester 1
INFO1003 **Foundations of Information Technology**	6	**N** INFO1000 or INFS1000	Semester 1 Semester 2
Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 and INFO1003.			
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 and INFO1003.			
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Note: INFO1905 (advanced version) can be taken as an alternate core unit to INFO1105.			

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

A full list of MATH and STAT units are available from Science Faculty handbook.

First year recommended elective units of study for IS stream

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
INFO1903 **Informatics (Advanced)**	6	**A** HSC Mathematics **P** UAI (or ATAR equivalent) sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry *Note: Department permission required for enrolment*	Semester 1

Second year core units of study for IS stream

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO2110 **Systems Analysis and Modelling**	6	**A** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **N** INFO (2810 or 2000 or 2900)	Semester 2
INFO2315 **Introduction to IT Security**	6	**A** Computer literacy **N** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616)	Semester 2
ISYS2140 **Information Systems**	6	**A** INFO1003 or INFS1000 **N** ISYS (2006 or 2007)	Semester 1
INFO2120 **Database Systems 1**	6	**A** Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1003 or INFS1000 or INFO1903 **N** INFO (2820 or 2005 or 2905)	Semester 1
Note: INFO2820 (advanced version) can be taken as an alternate core unit to INFO2120.			

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
A full list of MATH and STAT units are available from Science Faculty handbook.			
Second year recommended elective units of study for IS stream			
COMP2007 **Algorithms and Complexity**	6	**A** INFO1105, MATH1004 or MATH1904 **N** COMP (2907 or 3309 or 3609 or 3111 or 3811)	Semester 2
COMP2907 **Algorithms and Complexity (Advanced)**	6	**A** INFO1905, MATH1904 **P** Distinction level result in INFO (1105 or 1905) or SOFT (1002 or 1902) **N** COMP (2007 or 3309 or 3609 or 3111 or 3811)	Semester 2
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
All 2000-level ELEC units of study are recommended electives.			
Third year core units of study for IS stream			
Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended electives units of study listed here for the IS stream.			
INFO3402 **Management of IT Projects and Systems**	6	**A** INFO (2000 or 2110 or 2810 or 2900) **N** ISYS (3000 or 3012) or ELEC3606	Semester 1
INFO3600 **Major Development Project (Advanced)**	12	**P** INFO3402 **N** COMP3615 or ISYS3400 or SOFT (3300 or 3600 or 3200 or 3700) *Only available to students in BIT, BCST(Adv) or BSc(Adv)*	Semester 2
ISYS3401 **Analytical Methods & Information Systems**	6	**A** INFO2110, ISYS2140 **N** ISYS3015	Semester 1
Third year selected core units of study for IS stream			
Students must complete at least 6 credit points from the following list.			
ELEC3610 **E-Business Analysis and Design**	6	**P** INFO2120 **N** EBUS3003 E-Business System Design, EBUS3001 Introduction to e-Commerce Systems	Semester 1
INFO3315 **Human-Computer Interaction**	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
INFO3404 **Database Systems 2**	6	**A** Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. **N** INFO (3504 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
INFO3504 **Database Systems 2 (Adv)**	6	**P** Distinction-level result in INFO (2120 or 2820) or COMP (2007 or 2907) **N** INFO (3404 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 6 cp from the list above.			
Third year recommended elective units of study for IS stream			
COMP3109 **Programming Languages and Paradigms**	6	**A** COMP2007	Semester 2
COMP3308 **Introduction to Artificial Intelligence**	6	**A** COMP2007 **N** COMP (3608 or 3002 or 3902)	Semester 1
COMP3608 **Intro. to Artificial Intelligence (Adv)**	6	**P** Distinction-level results in some 2nd year COMP or MATH or SOFT units. **N** COMP (3308 or 3002 or 3902)	Semester 1
COMP3419 **Graphics and Multimedia**	6	**A** COMP2007, MATH1002 **N** MULT (3306 or 3606 or 3019 or 3919 or 3004 or 3904) or COMP(3004 or 3904)	Semester 1
COMP3456 **Computational Methods for Life Sciences**	6	**P** INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG	Semester 2
COMP3520 **Operating Systems Internals**	6	**A** COMP2129, INFO1105 **N** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909)	Semester 1
ELEC3506 **Data Communications and the Internet**	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3609 **Internet Software Platforms**	6	**P** INFO1103, INFO2110, INFO2120 **N** EBUS4001 E-Business Engineering	Semester 2
INFO3220 **Object Oriented Design**	6	**A** INFO2110, INFO1105 **N** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908)	Semester 1
INFO3315 **Human-Computer Interaction**	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
All 3000-level and above ELEC units of study are recommended electives.			
Fourth year selected core units of study for IS stream Students in the BIT Pass degree must complete at least 48 credit points from this list.			
COMP5045 **Computational Geometry**	6	**A** Data structures, analysis of algorithms **N** COMP4045	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5046 **Statistical Natural Language Processing**	6	**A** Concepts of Linguistics, elementary statistics, AI techniques. **N** COMP4046	Semester 1
COMP5047 **Pervasive Computing**	6	**A** Networking concepts, operating system concepts, programming expertise. **N** NETS4047	Semester 2
COMP5048 **Information Visualisation**	6	**A** Discrete mathematics, algorithms and complexity. **N** COMP4048	Semester 2
COMP5318 **Knowledge Discovery and Data Mining**	6	**A** COMP5138 and familiarity with basic statistics	Semester 1
COMP5338 **Advanced Data Models**	6	**A** COMP5138 or equivalent	Semester 2
COMP5348 **Enterprise Scale Software Architecture**	6	**A** INFO3220 or COMP5028 or equivalent.	Semester 1
COMP5416 **Advanced Network Technologies**	6	**A** ELEC3506 or equivalent	Semester 2
COMP5424 **Information Technology in Biomedicine**	6	**A** Basic programming skills	Semester 1
COMP5425 **Multimedia Storage, Retrieval & Delivery**	6	**A** Algorithms (equivalent to COMP5211).	Semester 1
COMP5426 **Parallel and Distributed Computing**	6	**A** Equivalent of COMP5116	Semester 1
ELEC4605 **Computer Architecture**	6	**A** Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks, microprocessors and their use, the architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications. **P** ELEC1601, ELEC 2602 and ELEC3607 **N** ELEC4601 Computer Design.	Semester 1
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5514 **Networked Embedded Systems**	6	**A** ELEC3607, ELEC3305, ELEC3506 and ELEC5508	Semester 2
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
ELEC5618 **Software Quality Engineering**	6	**N** SOFT3302 Software Quality Assurance	Semester 1
ELEC5619 **Object Oriented Application Frameworks**	6	**A** Java programming, and some web development experience are essential. Databases strongly recommended	Semester 2
ELEC5620 **Model Based Software Engineering**	6	**A** A programming language, basic maths	Semester 2
INFO5991 **Services Science Management and Eng**	6	**A** INFO5990	Semester 1 Semester 2
INFO5992 **Understanding IT Innovations**	6	**A** INFO5990 **N** PMGT5875	Semester 1 Semester 2
ISYS5050 **Knowledge Management Systems**	6	**A** Information systems concepts, database concepts **N** ISYS4050 *Note: Department permission required for enrolment*	Semester 1

Honours (CS and IS streams)

The BIT may be awarded as an Honours degree. Students may enrol in the Honours course after completion of 144 credit points, if they meet the specified entry conditions. Students enrolled in a BIT degree must apply for enrolment into the Honours program after completion of 144 credit points.

All students in BIT(Honours) must complete the following 24 credit points of core requirements plus 24 credit points from the fourth year selected core list of their respective stream. These units are only available to students enrolled in Honours degrees, those in Research Higher degrees, or those in the Research track in postgraduate coursework degrees. In addition to the core units students must also complete 24 credit points of elective units of study, please refer to the Fourth year selected core units listed in this table.

Honours core units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO4991 **IT Research Thesis A**	6	**P** Enrolment in Honours (BCST or BIT) **C** INFO4990 and INFO4992	Semester 1 Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO4992 **IT Research Thesis B**	12	**P** Enrolment in Honours (BCST or BIT) **C** INFO4990 and INFO4991	Semester 1 Semester 2
INFO4999 **Computer Science Honours Result**		**P** Permission of the Head of Department *Note: Department permission required for enrolment*	Semester 1 Semester 2
INFO5993 **IT Research Methods**	6	**A** Elementary statistics **N** INFO4990 *Note: Department permission required for enrolment*	Semester 1 Semester 2

Bachelor of Computer Science and Technology (BCST) units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Candidates for the degree Bachelor of Computer Science and Technology (BCST) are required to gain credit for 144 credit points from the units of study set out below. The selection of units must satisfy the degree rules in the Resolutions of the Faculty. In particular, all core units must be completed, along with an appropriate amount from the elective units of study as recommended by the Faculty. Candidates for the BCST degree must complete a stream in either Computer Science or Information Systems, or both, as described in the Tables below. Enrolment is subject to the following constraint: 1. At most 72 credit points accumulated from first year units (including core and recommended electives) can be counted for degree completion. Through this Table, candidates may substitute an advanced equivalent for a non- advanced unit mentioned. They may also substitute an appropriate unit from the Advanced Engineering program of the Faculty of Engineering, or the Talented Student Program of the Faculty of Science, if they are eligible to enrol in such units.			
(i) Stream in Computer Science			
First year core units of study for CS stream			
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
ENGG1805 **Professional Engineering and IT**	6		Semester 1
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to INFO1103.			
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Note: INFO1905 (advanced version) can be taken as an alternate core unit to INFO1105.			
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as elective units. A full list of MATH and STAT units are available from Science Faculty handbook.			
First year recommended elective units of study for CS stream			
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
INFO1003 **Foundations of Information Technology**	6	**N** INFO1000 or INFS1000	Semester 1 Semester 2
INFO1903 **Informatics (Advanced)**	6	**A** HSC Mathematics **P** UAI (or ATAR equivalent) sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry *Note: Department permission required for enrolment*	Semester 1
Second year core units of study for CS stream			
COMP2007 **Algorithms and Complexity**	6	**A** INFO1105, MATH1004 or MATH1904 **N** COMP (2907 or 3309 or 3609 or 3111 or 3811)	Semester 2
Note: COMP2907 (advanced version) can be taken as an alternate core unit to COMP2007.			
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
INFO2110 **Systems Analysis and Modelling**	6	**A** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **N** INFO (2810 or 2000 or 2900)	Semester 2
INFO2120 **Database Systems 1**	6	**A** Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1003 or INFS1000 or INFO1903 **N** INFO (2820 or 2005 or 2905)	Semester 1
Note: INFO2820 (advanced version) can be taken as an alternate core unit to INFO2120.			
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			
Second year recommended elective units of study for CS stream			
INFO2315 **Introduction to IT Security**	6	**A** Computer literacy **N** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616)	Semester 2
ISYS2140 **Information Systems**	6	**A** INFO1003 or INFS1000 **N** ISYS (2006 or 2007)	Semester 1
All 2000-level ELEC units of study are recommended electives.			
Third year core units of study for CS stream			
Students are required to complete at least 36 credit points of 3000-level units of study from the core, selected core and and recommended elective units listed here for the CS stream.			
COMP3615 **Software Development Project**	6	**P** INFO3402 **N** INFO3600 or SOFT (3300 or 3600 or 3200 or 3700)	Semester 2

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
INFO3402 **Management of IT Projects and Systems**	6	**A** INFO (2000 or 2110 or 2810 or 2900) **N** ISYS (3000 or 3012) or ELEC3606	Semester 1
CS & IS double stream: Students enrolled in the double stream must also complete ISYS3401 Analytical Methods and Information Systems as a core unit of study from the CS stream.			
Third year selected core units of study for CS stream Students must complete at least 12 credit points from the list below.			
COMP3109 **Programming Languages and Paradigms**	6	**A** COMP2007	Semester 2
COMP3308 **Introduction to Artificial Intelligence**	6	**A** COMP2007 **N** COMP (3608 or 3002 or 3902)	Semester 1
COMP3608 **Intro. to Artificial Intelligence (Adv)**	6	**P** Distinction-level results in some 2nd year COMP or MATH or SOFT units. **N** COMP (3308 or 3002 or 3902)	Semester 1
COMP3419 **Graphics and Multimedia**	6	**A** COMP2007, MATH1002 **N** MULT (3306 or 3606 or 3019 or 3919 or 3004 or 3904) or COMP(3004 or 3904)	Semester 1
COMP3456 **Computational Methods for Life Sciences**	6	**P** INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG	Semester 2
COMP3520 **Operating Systems Internals**	6	**A** COMP2129, INFO1105 **N** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909)	Semester 1
ELEC3506 **Data Communications and the Internet**	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
ELEC3610 **E-Business Analysis and Design**	6	**P** INFO2120 **N** EBUS3003 E-Business System Design, EBUS3001 Introduction to e-Commerce Systems	Semester 1
INFO3220 **Object Oriented Design**	6	**A** INFO2110, INFO1105 **N** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908)	Semester 1
INFO3315 **Human-Computer Interaction**	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
INFO3404 **Database Systems 2**	6	**A** Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. **N** INFO (3504 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
INFO3504 **Database Systems 2 (Adv)**	6	**P** Distinction-level result in INFO (2120 or 2820) or COMP (2007 or 2907) **N** INFO (3404 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 12 cp from the list above.			
Third year recommend elective units of study for CS stream			
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3609 **Internet Software Platforms**	6	**P** INFO1103, INFO2110, INFO2120 **N** EBUS4001 E-Business Engineering	Semester 2
ISYS3400 **Information Systems Project**	6	**A** INFO2120 **P** (INFO3402 or ISYS3012) and (ISYS3401 or ISYS3015) **N** INFO3600 or ISYS3207	Semester 2
ISYS3401 **Analytical Methods & Information Systems**	6	**A** INFO2110, ISYS2140 **N** ISYS3015	Semester 1
All 3000-level and above ELEC units of study are recommended electives.			
(ii) Stream in Information Systems			
First year core units of study for IS stream			
ENGG1805 **Professional Engineering and IT**	6		Semester 1
INFO1003 **Foundations of Information Technology** Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 or INFO1003.	6	**N** INFO1000 or INFS1000	Semester 1 Semester 2
INFO1103 **Introduction to Programming** Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 or INFO1003.	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
INFO1105 **Data Structures** Note: INFO1905 (advanced version) can be taken as an alternate core unit to INFO1105.	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
First year recommended elective units of study for IS stream			
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
INFO1903 **Informatics (Advanced)**	6	**A** HSC Mathematics **P** UAI (or ATAR equivalent) sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry *Note: Department permission required for enrolment*	Semester 1
Second year core units of study for IS stream			
INFO2110 **Systems Analysis and Modelling**	6	**A** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **N** INFO (2810 or 2000 or 2900)	Semester 2
INFO2120 **Database Systems 1**	6	**A** Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1003 or INFS1000 or INFO1903 **N** INFO (2820 or 2005 or 2905)	Semester 1
Note: INFO2820 (advanced version) can be taken as an alternate core unit to INFO2120.			
INFO2315 **Introduction to IT Security**	6	**A** Computer literacy **N** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616)	Semester 2
ISYS2140 **Information Systems**	6	**A** INFO1003 or INFS1000 **N** ISYS (2006 or 2007)	Semester 1
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			
Second year recommended elective units for IS stream			
COMP2007 **Algorithms and Complexity**	6	**A** INFO1105, MATH1004 or MATH1904 **N** COMP (2907 or 3309 or 3609 or 3111 or 3811)	Semester 2
COMP2907 **Algorithms and Complexity (Advanced)**	6	**A** INFO1905, MATH1904 **P** Distinction level result in INFO (1105 or 1905) or SOFT (1002 or 1902) **N** COMP (2007 or 3309 or 3609 or 3111 or 3811)	Semester 2
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
All 2000-level ELEC units of study are recommended.			
Third year core units of study for IS stream			
Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended elective units of study listed here for the IS stream.			
INFO3402 **Management of IT Projects and Systems**	6	**A** INFO (2000 or 2110 or 2810 or 2900) **N** ISYS (3000 or 3012) or ELEC3606	Semester 1
ISYS3400 **Information Systems Project**	6	**A** INFO2120 **P** (INFO3402 or ISYS3012) and (ISYS3401 or ISYS3015) **N** INFO3600 or ISYS3207	Semester 2
ISYS3401 **Analytical Methods & Information Systems**	6	**A** INFO2110, ISYS2140 **N** ISYS3015	Semester 1
Third year selected core units of study for IS stream Students must complete at least 6 credit points from the following list.			
ELEC3610 **E-Business Analysis and Design**	6	**P** INFO2120 **N** EBUS3003 E-Business System Design, EBUS3001 Introduction to e-Commerce Systems	Semester 1
INFO3315 **Human-Computer Interaction**	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
INFO3404 **Database Systems 2**	6	**A** Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. **N** INFO (3504 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
INFO3504 **Database Systems 2 (Adv)**	6	**P** Distinction-level result in INFO (2120 or 2820) or COMP (2007 or 2907) **N** INFO (3404 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
CS & IS double stream: Students must complete 24 credit points from the combination of selected core for the CS stream and the IS stream, including at least 6 cp from the list above.			
Third year recommended elective units of study for IS stream			
COMP3109 **Programming Languages and Paradigms**	6	**A** COMP2007	Semester 2
COMP3308 **Introduction to Artificial Intelligence**	6	**A** COMP2007 **N** COMP (3608 or 3002 or 3902)	Semester 1
COMP3608 **Intro. to Artificial Intelligence (Adv)**	6	**P** Distinction-level results in some 2nd year COMP or MATH or SOFT units. **N** COMP (3308 or 3002 or 3902)	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP3419 **Graphics and Multimedia**	6	**A** COMP2007, MATH1002 **N** MULT (3306 or 3606 or 3019 or 3919 or 3004 or 3904) or COMP(3004 or 3904)	Semester 1
COMP3456 **Computational Methods for Life Sciences**	6	**P** INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG	Semester 2
COMP3520 **Operating Systems Internals**	6	**A** COMP2129, INFO1105 **N** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909)	Semester 1
COMP3615 **Software Development Project**	6	**P** INFO3402 **N** INFO3600 or SOFT (3300 or 3600 or 3200 or 3700)	Semester 2
ELEC3506 **Data Communications and the Internet**	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3609 **Internet Software Platforms**	6	**P** INFO1103, INFO2110, INFO2120 **N** EBUS4001 E-Business Engineering	Semester 2
INFO3220 **Object Oriented Design**	6	**A** INFO2110, INFO1105 **N** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908)	Semester 1

All 3000-level and above ELEC units of study are recommended.

Honours

Students who have qualified for the BCST degree may apply to enter the BCST(Honours) year. Note that unlike BIT(Honours) or BE(Honours), the Honours in BCST requires an additional 48 credit points of study.

All BCST(Honours) students must complete the following 24 credit points of core units of study. These units are only available to students enrolled in Honours degrees, those in Research Higher degrees, or those in the Research track in postgraduate coursework degrees. In addition to the core units students must also complete 24 credit points of elective units of study, please refer to units listed in the BIT table Fourth Year Selected Core.

Fourth year Honours core units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO4991 **IT Research Thesis A**	6	**P** Enrolment in Honours (BCST or BIT) **C** INFO4990 and INFO4992	Semester 1 Semester 2
INFO4992 **IT Research Thesis B**	12	**P** Enrolment in Honours (BCST or BIT) **C** INFO4990 and INFO4991	Semester 1 Semester 2
INFO4999 **Computer Science Honours Result**		**P** Permission of the Head of Department *Note: Department permission required for enrolment*	Semester 1 Semester 2
INFO5993 **IT Research Methods**	6	**A** Elementary statistics **N** INFO4990 *Note: Department permission required for enrolment*	Semester 1 Semester 2

Bachelor of Computer Science and Technology (Advanced) units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Candidates for the degree of Bachelor of Computer Science and Technology (Advanced) (BCST(Adv)) are required to gain 144 credit points from the units of study set out below. The selection of units must satisfy the degree rules in the Resolutions of the Faculty. In particular, all core units must be completed, along with appropriate amount of elective units of study as recommended by the Faculty. Candidates for the BSCT(Adv) degree must complete a stream in either Computer Science or Information Systems, or both, as described in the Tables below. Candidates in the BCST(Adv) degree must maintain a credit average in each year of enrolment. If this level of result is not achieved candidates will be transferred to the BCST degree program. Candidates in the BCST(Adv) degree must complete at least 12 credit points of 2000-level core and recommended units, and at least 12 credit points of 3000-level core and recommended units at advanced level. Enrolment is subject to the following constraint: 1. At most 72 credit points accumulated from first year units (including core and recommended electives) can be counted for degree completion. Candidates may substitute an appropriate unit from an Advanced Engineering program of the Faculty of Engineering and IT, or the Talented Student Program of the Faculty of Science, if they are eligible to enrol in such units.			
(i) Stream in Computer Science			
First year core units of study for CS stream			
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
ENGG1805 **Professional Engineering and IT**	6		Semester 1
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to INFO1103.			
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Note: INFO1905 (advanced version) can be taken as an alternate core unit to INFO1105.			
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			
First year recommended elective units of study for CS stream.			
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
INFO1003 **Foundations of Information Technology**	6	**N** INFO1000 or INFS1000	Semester 1 Semester 2
INFO1903 **Informatics (Advanced)**	6	**A** HSC Mathematics **P** UAI (or ATAR equivalent) sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry *Note: Department permission required for enrolment*	Semester 1
Second year core units of study for CS stream			
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
COMP2907 **Algorithms and Complexity (Advanced)**	6	**A** INFO1905, MATH1904 **P** Distinction level result in INFO (1105 or 1905) or SOFT (1002 or 1902) **N** COMP (2007 or 3309 or 3609 or 3111 or 3811)	Semester 2
INFO2110 **Systems Analysis and Modelling**	6	**A** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **N** INFO (2810 or 2000 or 2900)	Semester 2
INFO2820 **Database Systems 1 (Advanced)**	6	**P** Distinction-level result in INFO (1003 or 1103 or 1903 or 1105 or 1905) or SOFT (1001 or 1901 or 1002 or 1902) **N** INFO (2120 or 2005 or 2905)	Semester 1
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			
Second year recommended elective units of study for CS stream			
INFO2315 **Introduction to IT Security**	6	**A** Computer literacy **N** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616)	Semester 2
ISYS2140 **Information Systems**	6	**A** INFO1003 or INFS1000 **N** ISYS (2006 or 2007)	Semester 1
All 2000-level ELEC units of study are recommended.			
Third year core units of study for CS stream Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended elective units of study listed here for the CS stream.			

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO3402 **Management of IT Projects and Systems**	6	**A** INFO (2000 or 2110 or 2810 or 2900) **N** ISYS (3000 or 3012) or ELEC3606	Semester 1
INFO3600 **Major Development Project (Advanced)**	12	**P** INFO3402 **N** COMP3615 or ISYS3400 or SOFT (3300 or 3600 or 3200 or 3700) *Only available to students in BIT, BCST(Adv) or BSc(Adv)*	Semester 2

CS & IS double stream: Students enrolled in the double stream must also complete ISYS3401 Analytical Methods and Information Systems as a core unit of study from the CS stream.

Third year selected core units of study for CS stream

Students must complete at least 12 credit points from the list below.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP3109 **Programming Languages and Paradigms**	6	**A** COMP2007	Semester 2
COMP3308 **Introduction to Artificial Intelligence**	6	**A** COMP2007 **N** COMP (3608 or 3002 or 3902)	Semester 1
COMP3608 **Intro. to Artificial Intelligence (Adv)**	6	**P** Distinction-level results in some 2nd year COMP or MATH or SOFT units. **N** COMP (3308 or 3002 or 3902)	Semester 1
COMP3419 **Graphics and Multimedia**	6	**A** COMP2007, MATH1002 **N** MULT (3306 or 3606 or 3019 or 3919 or 3004 or 3904) or COMP(3004 or 3904)	Semester 1
COMP3456 **Computational Methods for Life Sciences**	6	**P** INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG	Semester 2
COMP3520 **Operating Systems Internals**	6	**A** COMP2129, INFO1105 **N** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909)	Semester 1
ELEC3506 **Data Communications and the Internet**	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
ELEC3609 **Internet Software Platforms**	6	**P** INFO1103, INFO2110, INFO2120 **N** EBUS4001 E-Business Engineering	Semester 2
INFO3220 **Object Oriented Design**	6	**A** INFO2110, INFO1105 **N** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908)	Semester 1
INFO3315 **Human-Computer Interaction**	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
INFO3404 **Database Systems 2**	6	**A** Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. **N** INFO (3504 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
INFO3504 **Database Systems 2 (Adv)**	6	**P** Distinction-level result in INFO (2120 or 2820) or COMP (2007 or 2907) **N** INFO (3404 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2

CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 12 cp from the list above.

Third year recommended elective units of study for CS stream

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3610 **E-Business Analysis and Design**	6	**P** INFO2120 **N** EBUS3003 E-Business System Design, EBUS3001 Introduction to e-Commerce Systems	Semester 1
ISYS3401 **Analytical Methods & Information Systems**	6	**A** INFO2110, ISYS2140 **N** ISYS3015	Semester 1

All 3000-level and above ELEC units of study are recommended elective units.

Also, appropriate fourth year units of study from BIT table can be taken as recommended electives with permission of the Head of School.

(ii) Stream in Information Systems

First year core units of study for IS stream

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ENGG1805 **Professional Engineering and IT**	6		Semester 1
INFO1003 **Foundations of Information Technology**	6	**N** INFO1000 or INFS1000	Semester 1 Semester 2
Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 and INFO 1003.			
INFO1103 **Introduction to Programming**	6	**A** HSC Mathematics **N** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011	Semester 1 Semester 2
Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 and INFO 1003.			
INFO1105 **Data Structures**	6	**A** Programming, as for INFO1103 **N** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902)	Semester 2
Note: INFO1905 (advanced version) can be taken as an alternate core unit to INFO1905.			

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
A full list of MATH and STAT units are available from Science Faculty handbook.			
First year recommended elective units of study for IS stream			
ELEC1103 **Fundamentals of Elec and Electronic Eng**	6	**A** HSC Physics, HSC Mathematics extension 1 or 2 **N** ELEC1102 Foundations of Electronic Circuits.	Semester 1
ELEC1601 **Foundations of Computer Systems**	6	**A** HSC Mathematics extension 1 or 2 **N** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv).	Semester 2
INFO1903 **Informatics (Advanced)**	6	**A** HSC Mathematics **P** UAI (or ATAR equivalent) sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry *Note: Department permission required for enrolment*	Semester 1
Second year core units of study for IS stream			
COMP2907 **Algorithms and Complexity (Advanced)**	6	**A** INFO1905, MATH1904 **P** Distinction level result in INFO (1105 or 1905) or SOFT (1002 or 1902) **N** COMP (2007 or 3309 or 3609 or 3111 or 3811)	Semester 2
INFO2110 **Systems Analysis and Modelling**	6	**A** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **N** INFO (2810 or 2000 or 2900)	Semester 2
INFO2315 **Introduction to IT Security**	6	**A** Computer literacy **N** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616)	Semester 2
INFO2820 **Database Systems 1 (Advanced)**	6	**P** Distinction-level result in INFO (1003 or 1103 or 1903 or 1105 or 1905) or SOFT (1001 or 1901 or 1002 or 1902) **N** INFO (2120 or 2005 or 2905)	Semester 1
ISYS2140 **Information Systems**	6	**A** INFO1003 or INFS1000 **N** ISYS (2006 or 2007)	Semester 1
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.			
Second year recommended elective units of study for IS stream			
COMP2129 **Operating Systems and Machine Principles**	6	**A** Programming, as from INFO1103 **N** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904)	Semester 1
All 2000-level ELEC units of study are recommended elective units.			
Third year core units of study for IS stream Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended elective units of study listed here for the IS stream.			
INFO3402 **Management of IT Projects and Systems**	6	**A** INFO (2000 or 2110 or 2810 or 2900) **N** ISYS (3000 or 3012) or ELEC3606	Semester 1
INFO3600 **Major Development Project (Advanced)**	12	**P** INFO3402 **N** COMP3615 or ISYS3400 or SOFT (3300 or 3600 or 3200 or 3700) *Only available to students in BIT, BCST(Adv) or BSc(Adv)*	Semester 2
ISYS3401 **Analytical Methods & Information Systems**	6	**A** INFO2110, ISYS2140 **N** ISYS3015	Semester 1
Third year selected core units of study for IS stream Students must complete at least 6 credit points from the following list.			
ELEC3610 **E-Business Analysis and Design**	6	**P** INFO2120 **N** EBUS3003 E-Business System Design, EBUS3001 Introduction to e-Commerce Systems	Semester 1
INFO3315 **Human-Computer Interaction**	6	**A** INFO2110 **N** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802)	Semester 2
INFO3404 **Database Systems 2**	6	**A** Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. **N** INFO (3504 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
INFO3504 **Database Systems 2 (Adv)**	6	**P** Distinction-level result in INFO (2120 or 2820) or COMP (2007 or 2907) **N** INFO (3404 or 3005 or 3905) or COMP (3005 or 3905)	Semester 2
CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 6 cp from the list above.			
Third year recommended elective units of study for IS stream			
COMP3109 **Programming Languages and Paradigms**	6	**A** COMP2007	Semester 2
COMP3308 **Introduction to Artificial Intelligence**	6	**A** COMP2007 **N** COMP (3608 or 3002 or 3902)	Semester 1
COMP3608 **Intro. to Artificial Intelligence (Adv)**	6	**P** Distinction-level results in some 2nd year COMP or MATH or SOFT units. **N** COMP (3308 or 3002 or 3902)	Semester 1
COMP3419 **Graphics and Multimedia**	6	**A** COMP2007, MATH1002 **N** MULT (3306 or 3606 or 3019 or 3919 or 3004 or 3904) or COMP(3004 or 3904)	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP3456 **Computational Methods for Life Sciences**	6	**P** INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG	Semester 2
COMP3520 **Operating Systems Internals**	6	**A** COMP2129, INFO1105 **N** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909)	Semester 1
ELEC3506 **Data Communications and the Internet**	6	**N** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks.	Semester 2
ELEC3607 **Embedded Computing**	6	**A** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **P** ELEC1601 and ELEC2602 **N** ELEC2601 Microcomputer Systems.	Semester 2
ELEC3609 **Internet Software Platforms**	6	**P** INFO1103, INFO2110, INFO2120 **N** EBUS4001 E-Business Engineering	Semester 2
INFO3220 **Object Oriented Design**	6	**A** INFO2110, INFO1105 **N** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908)	Semester 1
All 3000-level and above ELEC units of study are recommended electives.			
Also, appropriate fourth year units of study from BIT table can be taken as recommended electives with permission of the Head of School.			

Honours

Students who have qualified for the BCST(Adv) degree may apply to enter the BCST(Adv)(Honours) year. Note that unlike BIT(Honours) or BE(Honours), the Honours in BCST(Adv) requires an additional 48 credit points of study.

All BCST(Adv)(Honours) students must complete the following 24 credit points of core units of study. These units are only available to students enrolled in Honours degrees, those in Research Higher degrees, or those in the Research track in postgraduate coursework degrees. In addition to the core units students must also complete 24 credit points of elective units of study, please refer to units listed in the BIT table Fourth Year Selected Core.

Fourth year Honours core units of study

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO4991 **IT Research Thesis A**	6	**P** Enrolment in Honours (BCST or BIT) **C** INFO4990 and INFO4992	Semester 1 Semester 2
INFO4992 **IT Research Thesis B**	12	**P** Enrolment in Honours (BCST or BIT) **C** INFO4990 and INFO4991	Semester 1 Semester 2
INFO4999 **Computer Science Honours Result**		**P** Permission of the Head of Department *Note: Department permission required for enrolment*	Semester 1 Semester 2
INFO5993 **IT Research Methods**	6	**A** Elementary statistics **N** INFO4990 *Note: Department permission required for enrolment*	Semester 1 Semester 2

3f. Faculty-wide electives and Advanced Engineering

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Advanced Engineering and Faculty-wide elective subjects			
Students are eligible for the award of Advanced Engineering by completing a minimum of 18 cp of advanced units as listed in the following table. Only one Advanced unit can be selected from a particular year. Entry to the Advanced Engineering program is by invitation of the Dean and is based on a UAI of 98+ in the NSW HSC or equivalent, or by obtaining a Distinction average in Years 1, 2 and 3 of their engineering course.			
Advanced Engineering units			
ENGG1061 **Advanced Engineering 1A**	6	**P** UAI (or ATAR equivalent) score of at least 98 and good performance in HSC Maths, Physics and Chemistry. *Note: Department permission required for enrolment* *1st year Interdisiplinary unit for all degree streams in Engineering.*	Semester 1
ENGG2062 **Engineering Project: Business Plan 2 Adv**	6	**P** Only students who have been named on the Dean's list at the end of Year 1 will be eligible. *Note: Department permission required for enrolment*	Semester 1
AERO2711 **Space Engineering Project 1**	6	**P** Completed the junior years (first 2 years) of Aero(Space), Mechanical(Space) or Mechatronics(Space) Engineering. A WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. *Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Main Winter Main
ENGG3062 **Technology Education (Advanced)**	6	**P** Only students who have been named on the Dean's list at the end of Year 2 will be eligible *Note: Department permission required for enrolment*	Semester 2
AERO3711 **Space Engineering Project 2**	6	**P** AERO2711 Space Engineering Project 1; a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. *Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Main Winter Main
AERO4711 **Space Engineering Project 3**	6	**P** AERO3711 Space Engineering Project 2; a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. *Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Main Winter Main
AERO4712 **Space Engineering Project 4**	6	**P** AERO4711 Space Engineering Project 3; a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. *Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Main Winter Main
ENGG4064 **Advanced Engineering Design A**	6	**P** Only students on the Dean's List at the end of Year 3 will be invited to join this interdisciplinary group *Note: Department permission required for enrolment*	Semester 2
ENGG4065 **Advanced Engineering Design B**	6	**P** This unit is an extension module for students in ENGG4064. So only students on the Dean's List at the end of Year 3 will be invited to join this interdisciplinary group *Note: Department permission required for enrolment*	Semester 2
Faculty-wide units of study			
These units of study are available as core, alternate or elective units of study as the case may be in any discipline of Engineering or Information Technology.			
ENGG1800 **Engineering Disciplines (Intro) Stream A**	6		Semester 1
ENGG1801 **Engineering Computing**	6	**N** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology	Semester 1
ENGG1802 **Engineering Mechanics**	6		Semester 2
ENGG1803 **Professional Engineering 1**	6		Semester 1 Semester 2
ENGG1805 **Professional Engineering and IT**	6		Semester 1
ENGG2004 **Engineering Studies B**	4	*Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG2005 **Engineering Studies C**	6	*Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Main
ENGG2008 **Engineering Studies A**	2	*Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG3005 **Engineering & Industrial Management Fund**	6	**N** ELEC3702, MECH3661	Semester 2
ENGG4005 **Industrial & Engineering Management Adv** *This unit of study is not available in 2010*	4	**P** ENGG3005 **N** MECH4611 *Note: Department permission required for enrolment*	Semester 1

4. Undergraduate units of study

Engineering and Information Technologies undergraduate units of study

Complete unit of study descriptions giving details of assessment, learning outcomes, graduate attribute mappings and semester schedule are published on the Faculty of Engineering and Information Technologies course information web site : http://cusp.eng.usyd.edu.au/

School of Aerospace, Mechanical and Mechatronic Engineering

AERO1400
Intro to Aircraft Construction & Design

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of workshop sessions per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The study towards BE(Aeronautical) involves learning about the Design, Analysis, Flight, and Operation of Aircraft and other Flight Platforms. This unit facilitates the training towards becoming professional aeronautical engineers through a globally-unique experiential-learning opportunity to provide a strong background familiarity with aircraft hardware. This unit is designed to educate and facilitate the learning of aircraft design, basic aircraft construction techniques, the operation of light aircraft and the registration and regulations relating to light aircraft. In addition to hands-on skills on the construction phase, this unit facilitates learning in motivations for unique aircraft design, aircraft aerodynamics, flight mechanics, structural aspects and other design-related issues. Teamwork plays a very important role in this unit; the ability to work with peers and supervising staff is an invaluable skill sought after by employers of engineers. Throughout the semester, students will be actively participating in the construction of a light aircraft. The aircraft is to be constructed under current Australian 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 organisational requirements necessary to successfully complete a complex engineering project. The aircraft construction workshop component is complemented with lectures, homework, research and assignments to further enhance the learning experience on aircraft. The final outcome will be that students gain a good foundation of: aircraft design and analyses methods; innovative methods of construction; techniques for selecting, sizing and stressing components; regulatory requirements for certification; off-design requirements; construction tolerances; and team-work requirements in undertaking complex engineering projects.

AERO1560
Introduction to Aerospace Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, 2 hours of tutorials and 3 hours of workshop practice per week **Prohibitions:** MECH1560, MTRX1701, ENGG1800 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This Unit introduces students to the role of professional aerospace engineers, along with the development of fundamental engineering knowledge and skills for aerospace vehicle design, analysis performance and operation. Students will learn through experience, to develop professional skills in research, interpretation, communication, and presentation of information relating to aerospace engineering. Expected learning includes: introduction to lateral thinking concepts; glossary of aerospace vehicle components and terminology; an introduction to the multiple disciplines related to aerospace engineering, such as aerodynamics, aircraft and spacecraft performance, mechanics of flight, aerospace structures, materials and propulsion systems; how the various disciplines are integrated into the design and development of flight platform systems; the operating characteristics of modern flight vehicles, their uses and limitations; modern developments and future trends in aerospace; the limitations of the aerospace environment; teamwork; and resource management. Significantly, professional enhancement is introduced through the development of basic hands-on workshop skills. These practical skills enable students to have a better appreciation of the hardware that they are expected to apply their engineering knowledge to, during their aerospace engineering profession. Experiential learning is facilitated working with machine tools and hand tools in a supervised workshop environment, to develop fundamentals of practical aerospace vehicle component manufacture, construction, servicing and repair.

AERO2703
Aerospace Technology 1

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** AERO1560 **Assumed knowledge:** ENGG1801 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop in students an understanding of the background technologies and processes that are involved in the design, construction and operation of Aerospace vehicles. It will cover the general areas of aircraft performance, aircraft and laboratory instrumentation and associated programming techniques.

AERO2705
Space Engineering 1

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003 and either MATH1004 or MATH1005 (or the advanced versions of the MATH units) **Assumed knowledge:** ENGG1801 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the terminology, technology and current practice in the field of Space Engineering. Course content will include a variety of topics in the area of orbital mechanics, satellite systems and launch requirements. Case studies of current systems will be the focus of this unit.

AERO2711
Space Engineering Project 1

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main, Winter Main **Classes:** 2 hours of project meeting per week. **Prerequisites:** Completed the junior years (first 2 years) of Aero(Space), Mechanical(Space) or Mechatronics(Space) Engineering. A WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit of study aims to develop deeper practical knowledge in the area of Space systems engineering. Students who take this subject would be interested in developing design skills by working on the sub-system of a real satellite or launch vehicle.

AERO3260
Aerodynamics 1

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 5 hours of laboratory sessions per semester. **Prerequisites:** AMME2200 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This UoS should prepare students to be able to undertake aerodynamic performance calculations for industry with a minimum of re-training. Aims: To develop in students a knowledge and appreciation of the complex behaviour of airflow in the case of two dimensional aerofoil sections and three dimensional wings; To encourage hands-on experimentation with wind-tunnel tests to allow an understanding of these concepts and their range of applicability.

AERO3261
Propulsion

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** AMME2200 **Assumed knowledge:** Good knowledge of fluid dynamics including gas dynamics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This UoS teaches the students the techniques used to propel aircraft and rockets. The students will learn to analyse various propulsion systems in use propellers, gas turbines, rocket motors etc. The topics covered include: Propulsion unit requirements for 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.

AERO3360
Aerospace Structures 1

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** AMME2301 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop a student's understanding of the theoretical basis of advanced aerospace structural analysis; and introduce students to the solution of real-world aircraft structural problems. This UoS will develop the following attributes: An understanding of the derivation of the fundamental equations of elasticity and their application in certain analytical problems; An understanding of plate theory and the ability to use this to obtain analytical solutions for plate bending and buckling problems; An understanding of energy-method to develop a deeper appreciation for the complexities of designing solution techniques for structural problems; An understanding of the basic principals behind stressed-skin aircraft construction and the practical analysis of typical aircraft components, including the limitations of such techniques. At the end of this unit students will have an understanding of: 2-D and 3-D elasticity: general equations and solution techniques; Energy methods in structural analysis, including the principles of virtual work and total potential and complimentary energies; Fundamental theory of plates, including in-plane and bending loads as well as buckling and shear instabilities; Solution techniques for plate problems including: Navier solutions for rectangular plates; Combined bending and in-plane loading problems; Energy methods for plate-bending; and Plate buckling for compression and shear loadings; Bending of beams with unsymmetrical cross-sections; Basic principals and theory of stressed-skin structural analysis; Determination of direct stresses and shear flows in arbitrary thin-walled beams under arbitrary loading conditions including: Unsymmetrical sections, Open and closed sections, Single and multi-cell closed sections, Tapered sections, Continuous and idealized sections; The analysis of common aircraft components including fuselages, wings, skin-panels, stringers, ribs, frames and cut-outs; The effects of end constraints and shear-lag on the solutions developed as well as an overall appreciation of the limitations of the solution methods presented

AERO3460
Aerospace Design 1

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hoours of in-class project work per week. **Prerequisites:** AMME2301 and MECH2400 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the theory and practice of aircraft structural component design. In doing so it will emphasize all the considerations, trade-offs and decisions inherent in this process and thus enable students to gain an understanding of why aircraft structures are designed in the way they are with respect to structural, manufacturing and cost considerations. At the end of this unit students will be able to understand the design process, especially as it applies to aircraft structural component design; Have a familiarity with some of the practice of aircraft component structural design; An increasing familiarity with typical aircraft structural paradigms and how they work and can be analysed along with the primary failure modes that need to be considered; An understanding of the importance of different failure modes for different components and how these relate to load-conditions and understanding of some off the legal and ethical requirements of aircraft design engineers; A basic understanding of the regulatory framework in which aircraft design is conducted.

AERO3465
Aerospace Technology 2

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of lecture/project work session per week. 2 hours of tutorials per week. **Prerequisites:** AMME2301 and MECH2400 **Assumed knowledge:** AERO1400; AMME2302 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the aerospace industry procedures for design, analysis, and testing of aircraft and aerospace vehicle components. It provides a Design-Build-Test experience by putting into practice, learning outcomes from this and other previously completed UoS, through working on a small structure which is representative of a typical light metal aircraft. Students will be introduced to typical metallic and composite materials and structures for aerospace vehicles. The unit also provides an introduction to fatigue and damaged tolerance analysis of metallic aircraft structures. Experiential learning opportunities are provided to acquire skills and knowledge in structural design, analyses, testing methods, procedures, techniques, and equipment. On satisfactory completion of this unit students will have gained practical skills relevant to working on typical modern aircraft and aerospace vehicle components. They will learn from methods, techniques, and experiences from the modern aerospace industry. Experiential learning is enhanced through verifying analyses with actual testing of fabricated component, and the experience of a full design-build-test cycle of a typical aerospace structural component. Subject areas covered will include design methods, internal loads calculations, stress analysis, design for manufacture, joints and fasteners, test procedures, fatigue and damage tolerance, composites, and the art of design.

AERO3560
Flight Mechanics 1

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 2 hours of laboratory work per semester. **Prerequisites:** AMME2500 **Corequisites:** AMME3500 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of aircraft longitudinal equilibrium, static stability, dynamic stability and response. Students will develop an understanding of the importance and significance of flight stability, will gain skills in dynamic system analysis and will learn mathematical tools used for prediction of aircraft flight behaviour. Students will gain skills in problem solving in the area of flight vehicle motion, and learn the fundamentals of flight simulation. At the end of this unit students will be able to understand: aircraft flight conditions and equilibrium; the effects of aerodynamic and propulsive controls on equilibrium conditions; the significance of flight stability and its impact of aircraft operations and pilot workload; the meaning of aerodynamic stability derivatives and their sources; the effects of aerodynamic derivatives on flight stability; the impact of flight stability and trim on all atmospheric flight vehicles, including launch and re-entry of space vehicles. Students will also be able to model aircraft flight characteristics using computational techniques and analyse the aircraft equations of rigid-body motion and to extract stability characteristics. Course content will include static longitudinal aircraft stability: origin of symmetric forces and moments; static and manoeuvring longitudinal stability, equilibrium and control of rigid aircraft; aerodynamic load effects of wings, stabilisers, fuselages and power plants; trailing edge aerodynamic controls; trimmed equilibrium condition; static margin; effect on static stability of free and reversible controls.

AERO3660
Aerospace Management

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop knowledge and understanding of the current state of aerospace design, manufacturing, and operations in the Australian aviation industry. Students will gain skills in aerospace engineering management. On satisfactory completion of this unit, students will be able to apply risk management skills to a variety of industry situations and use appropriate methodology to manage these situations. Students will also become proficient in the use of Project Management tools and learn how to apply them to industry standard problems. Subject areas covered within the Unit of Study include principles and practice of aviation and airline management; discussion and analysis of airline operations; flight safety and airworthiness standards; risk and reliability management; and management in aerospace engineering design.

AERO3711
Space Engineering Project 2

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main, Winter Main **Classes:** 2 hours of project meeting sessions per week. **Prerequisites:** AERO2711 Space Engineering Project 1; a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit of study is for those students who have completed Space Engineering Project 1, and who wish to extend their design into the prototype phase. Students who take this subject would be interested in manufacturing a sub-system for a real satellite or launch vehicle. This unit allows students to develop a deeper appreciation for the complexities of designing and building space sub-systems, and if completed successfully will allow the student to take further Space Engineering Projects towards the final development of a sub-system ready for launch.

AERO3760
Space Engineering 2

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of project work sessions per week. **Prerequisites:** AERO2705 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to provide students with a learning environment that promotes systems thinking and allows students to develop skills in systems analysis and design. In particular the UoS will focus on Aerospace systems, and students will develop both theoretical and practical skills in the area of systems engineering for this discipline. The primary objective is to develop fundamental systems engineering and systems thinking skills. At the end of this unit students will be able to: define the requirements process and be able to apply it to aerospace systems design.; conduct requirements analysis for an aerospace system and to drill down through requirements breakdown and the use of the V-diagram in this analysis; conduct functional and technical analysis and determine design drivers in a system; manage the use of a log book and its application in engineering design; develop technical skills in the design and development of satellite subsystems; conduct appropriate interaction processes between team members for the successful achievement of goals. Course content will include fundamentals of systems engineering; satellite subsystems; systems design.

AERO4206
Rotary Wing Aircraft

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per semester. **Prerequisites:** AERO3260 **Assumed knowledge:** Prior Learning : concepts from 3rd Year Aerodynamics and Flight Mechanics will be applied to Rotary Wing Vehicles in this unit. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the theory of flight, design and analysis of helicopters, auto-gyros and other rotary wing aircraft. Students will gain an appreciation of the extra difficulties involved when the vehicle flow is cyclic in nature. At the end of this unit students will be able to: Identify and predict the various flow states of a generic lift producing rotor; Use appropriate methods to determine the forces and torques associated with the rotor; Estimate values for typical stability derivatives for helicopters and be able to construct a simple set of stability analysis equations for the vehicle; become aware of the regulatory and liability requirements relating to all aspects of commercial helicopter operation and maintenance. Course content will include introduction to rotary wing aircraft; vertical flight performance; forward flight performance; blade motion and control; dynamics of rotors; rotor-craft stability; rotor blade design.

AERO4260
Aerodynamics 2

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** AMME2200 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to: elementary and advanced topics in Gasdynamics (High Speed Flows). Course content will include review of Equations of Gasdynamics, One-Dimensional Gas Flow, Isentropic Flows, Normal Shock, Flow in a Converging and a Converging-Diverging Nozzle, Steady Two-dimensional Supersonic flow, Shock waves (Normal and Oblique), Method of Characteristics, Two-dimensional Supersonic Aerofoils, Introduction to Three-dimensional Effects, Unsteady Flows, Moving Shock, Shock Tube Flow and Transonic Flow and Compressible Boundary Layers. At the end of this unit the student will be able to calculate a high speed flow about an aerofoil and compressible flow through a duct of varying cross section and will have a good appreciation of Transonic and Hypersonic Flows.

AERO4360
Aerospace Structures 2

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** AERO3360 and AERO3465 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach fundamentals of modern numerical and analytical techniques for evaluating stresses, strains, deformations and strengths of representative aerospace structures. In particular the focus is on developing an understanding of: Fundamental concepts and formulations of the finite element methods for basic structural analysis; Elements for typical aerospace structures, such as beams/frames, plates/shells, and their applications and limitations; Finite element techniques for various types of problems pertinent to aerospace structures; d)and, developing hands-on experience of using selected commercial finite element analysis program. At the end of this unit of study the following will have been covered: Introduction to Finite Element Method for modern structural and stress analysis; One-dimensional rod elements; Generalization of FEM for elasticity; Two- and three-dimensional trusses; FEA for beams and frames in 2D and 3D; Two-dimensional problems using constant strain triangular elements; The two-dimensional isoparametric elements; Plates and shells elements and their applications; FEA for axisymmetric shells and pressure vessels, shells of revolution; FEA for axisymmetric solids subjected to axi-symmetric loading; FEA for structural dynamics, eigenvalue analysis, modal response, transient response; Finite element analysis for stress stiffening and buckling of beams, plates and shells; Three-dimensional problems in stress analysis; Extensions to the element library, higher order elements, special elements; Constraints; FEA modeling strategy; FEA for heat conduction; FEA for non-linear material and geometric analysis.

AERO4460
Aerospace Design 2

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of project work in-cass per week. **Prerequisites:** AERO3260, AERO3261, AERO3360 and AERO3460 **Assumed knowledge:** AERO1400, AERO2703 and AERO3465 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims 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. Course content will include: Design requirements; Sources of information for aircraft design; Configuration design: performance, weight and balance, propulsion; Aerodynamic design: lift, drag and control; Structural design: loads, materials; Philosophies of design and analysis; System design: requirements and specification; System design procedures; systems integration.

AERO4491
Advanced Aircraft Design

Credit points: 6 **Session:** Semester 2 **Classes:** 6 hours of project work in-class per week. **Prerequisites:** MECH2400 and AERO3460 **Assumed knowledge:** AERO1400, AERO2703, AERO3260, AERO3261, AERO3360, AERO3465 and AERO3560 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the application of design to the modern aerospace context. Students will gain an overview of how to manage a project and its associated design team and will also gain skills in setting design specifications and carrying out detailed design analysis to meet some challenging requirement. Unit of Study content will include: Aircraft design methods; Methods of processing information for aircraft design: Detailed configuration design: performance, weight and balance, propulsion; Aerodynamic design: lift, drag and control; Advanced structural design, loads, materials; Weight estimation and fulfilling of relevant regulatory requirements; Advanced system design, modern aircraft requirements and specification; systems integration and validation; prototyping, benchmarking and testing.

AERO4560
Flight Mechanics 2

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hours of tutorials per week **Prerequisites:** AERO3560 and AMME3500 **Assumed knowledge:** AMME2500 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the application of flight mechanics principles to modern aircraft systems. Students will gain skills in problem solving in the areas of dynamic aircraft behaviour, aircraft sensitivity to wind gusts, control systems development and aircraft handling analysis. At the end of this unit students will be able to: Uunderstand the nature of an aircraft's response to control inputs and atmospheric disturbances, including the roles of the various modes of motion; Analyse an aircraft's response to control inputs in the frequency domain using Laplace Transforms and Transfer Function representations; Represent and model wind gust distributions using stochastic methods (Power Spectral Density); Analyse an aircraft's response to disturbances (wind gust inputs) by combining Transfer Function representations with gust PSD's; Uunderstand the principles of stability augmentation systems and autopilot control systems in aircraft operation, their functions and purposes; Understand basic feedback control systems and classical frequency domain loop analysis; Understand the characteristics of closed loop system responses; Understand the characteristics of PID, Lead, Lag and Lead-Lag compensators, and to be competent in designing suitable compensators using Bode and Root-locus design techniques; Design multi-loop control and guidance systems and understand the reasons for their structures.

AERO4591
Advanced Flight Mechanics

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of tutorials per week **Prerequisites:** AERO3560 and AMME3500 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit aims to develop an understanding of the development of modern flight control, guidance, and navigation systems. Students will gain skills in analysis, problem solving and systems design in the areas of aircraft dynamic system identification and control. At the end of this unit students will be able to: understand the principles of stability augmentation systems and autopilot control systems in aircraft operation, their functions and purposes; understand the characteristics of closed loop system responses; understand advanced feedback control systems and state-space design techniques; understand the concepts of parameter and state estimation; design observers in the state space and to implement a Kalman Filter; be comfortable with multi-loop control and guidance systems and the reasons for their structures; appreciate flight test principles and procedures and to be capable of implementing a flight test programme.

AERO4701
Space Engineering 3

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** AERO3760 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This UoS aims to teach students the fundamental principles and methods of designing solutions to estimation problems in aerospace engineering applications. Students will apply learned techniques in estimation theory to solving a wide range of different problems in engineering such as satellite positioning systems, satellite attitude determination, satellite orbit determination and remote sensing. Students will learn to recognize and appreciate the coupling between the different elements within an estimation task, such as satellite remote sensing, from a systems-theoretic perspective. Students will also use this system knowledge and basic design principles to design and test a solution to a given estimation task, with a focus on aerospace applications (such as satellite remote sensing).

AERO4711
Space Engineering Project 3

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main, Winter Main **Classes:** no formal classes **Prerequisites:** AERO3711 Space Engineering Project 2; a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit of study is for those students who have completed Space Engineering Projects 2, and who wish to formalise their design into the launch phase. Students who take this subject would be interested in manufacturing the final sub-system for a real satellite or launch vehicle. This unit allows students to develop a deeper appreciation for the complexities of designing and building space sub-systems, and provide an opportunity for the actual launch of the sub-system. Launch of the sub-system will be dependent on the current opportunities existing with international collaborators.

AERO4712
Space Engineering Project 4

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main, Winter Main **Classes:** no formal classes **Prerequisites:** AERO4711 Space Engineering Project 3; a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit of study is for those students who have completed Space Engineering Projects 3, and who wish to finalise their design by developing the interfacing and insertion phases into Satellite or Launch Vehicle system. Students who take this subject would have completed the previous three Space Engineering Projects, and have been provided with the opportunity to place their system into an actual system. Launch of the sub-system will be dependent on the current opportunities existing with international collaborators.

AMME0011
International Exchange B

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program.

AMME0012
International Exchange C

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program

AMME0013
International Exchange D

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program

AMME0014
International Exchange E

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program.

AMME0015
International Exchange F

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program

AMME0016
International Exchange G

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program.

AMME0017
International Exchange H

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program

AMME0018
International Exchange I

Credit points: 6 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program

AMME1550
Dynamics 1

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours fo lectures and 3 hours of tutorials per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the basic methods required to perform kinematics and dynamic analysis on particles.

Students will develop skills in solving problems in kinematics and dynamics of particles.

Course content will include: Newton's laws, kinematics of particles: rectilinear motion, plane curvilinear motion, rectangular coordinates, normal and tangential coordinates, polar coordinates, space curvilinear motion, relative motion, constrained motion, kinetics of particles: force, mass and acceleration; Newton's second law, equation of motion, rectilinear motion, curvilinear motion, work and energy; work and kinetic energy, potential energy, impulse and momentum; linear impulse and linear momentum, angular impulse and momentum, impact, central-force motion, relative motion, Kinetics of systems of particles: work-energy, impulse-momentum, conservation of energy and momentum, steady mass flow, variable mass. By the end of this unit of study student will be able solve complicated kinematics and dynamics problems of particles in both 2 and 3 dimensions.

AMME2200
Thermodynamics and Fluids

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** MATH1001; MATH1002; MATH1003. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach the basic laws of thermodynamics and the fundamentals of fluid statics and dynamics.

At the end of this unit students will have: an understanding of the basic laws of thermodynamics and basic equations governing the statics and dynamics of fluids; the ability to analyze the thermodynamics of a simple open or closed engineering system; the ability to analyze and determine the forces governing static fluid; the ability to evaluate the relevant flow parameters for fluid flow in internal engineering systems such as pipes and pumps (velocities, losses, etc.) and external systems such as flow over wings and airfoils (lift and drag).

Course content will include concepts of heat and work, properties of substances, first law of thermodynamics, control mass and control volume analysis, thermal efficiency, entropy, second law of thermodynamics, reversible and irreversible processes, isentropic efficiency, power and refrigeration cycles; basic concepts of pressure, force, acceleration, continuity, streamline and stream function, viscosity, non-dimensional parameters; Fluid statics: governing hydrostatic equations, buoyancy; Fluid dynamics: governing conservation equations; Potential flow, vorticity and circulation; Bernouilli and Euler equations; A brief introduction to flow measuring devices, pipe flow, flow over surfaces, lift and drag.

AMME2301
Mechanics of Solids

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Equilibrium of deformable structures; basic concept of deformation compatibility; stress and strain in bars, beams and their structures subjected to tension, compression, bending, torsion and combined loading; statically determinate and indeterminate structures; energy methods for bar and beam structures; simple buckling; simple vibration; deformation of simple frames and cell box beams; simple two-dimensional stress and Morh's circle; problem-based applications in aerospace, mechanical and biomedical engineering.

AMME2302
Materials 1

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures, 2 hours of tutorials per week. 3 hours of laboratory work per semester. **Prohibitions:** CIVL2110 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

AMME2302 is an introductory course in engineering materials. The unit aims to develop students' understanding of the structures, mechanical properties and manufacture of a range of engineering materials as well as how the mechanical properties relate to microstructure and forming and treatment methods. The unit has no prerequisite subject and is therefore intended for those with little or no previous background in engineering materials. However the unit does require students to take a significant degree of independent responsibility for developing their own background knowledge of materials and their properties. The electrical, magnetic, thermal and optical properties of materials are a critical need-to-know area where students are expected to do most of their learning by independent study.

AMME2500
Engineering Dynamics

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 6 hours of laboratory work per semester. **Prerequisites:** (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to teach: Dynamics of Rigid Bodies: Analysis of Planar mechanisms; Kinematics of rigid bodies; Kinetics of rigid bodies. Students will also develop their skills in: how to model and analyse dynamic systems and the application of theory to real systems through practical/laboratory sessions.

At the end of this unit students will have developed skills in modelling and analysing planar mechanisms and rigid body dynamic systems.

Course content will include planar mechanisms, linkages, mobility; instant centres of rotation, Kennedy's theorem; velocity and acceleration polygons; kinematics of rigid bodies, frames of reference, velocity and acceleration, rotating frame of reference, relative velocity and acceleration, gyroscopic acceleration; kinetics of rigid bodies, linear momentum and Euler's first law; angular momentum and Euler's second law; centre of mass; moments of inertia, parallel axis and parallel plane theorems, principal axes and principal moments of inertia, rotation about an axis; impulse and momentum; work and energy, kinetic and potential energies; applications to orbital and gyroscopic motion; introduction to Lagrangian methods.

AMME3110
Project A

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main, Winter Main **Classes:** no formal classes **Prohibitions:** AMME4110 Project B **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Supervised project on a relevant engineering discipline.

AMME3500
System Dynamics and Control

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hours of tutorials per week **Prerequisites:** AMME2500; MATH2061 or MATH2961 or MATH2067 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to allow students to develop an understanding of methods for modeling and controlling linear, time-invariant systems. Techniques examined will include the use of differential equations and frequency domain approaches to modeling of systems. This will allow students to examine the response of a system to changing inputs and to examine the influence of external stimuli such as disturbances on system behaviour. Students will also gain an understanding of how the responses of these mechanical systems can be altered to meet desired specifications and why this is important in many engineering problem domains. The study of control systems engineering is of fundamental importance to most engineering disciplines, including Electrical, Mechanical, Mechatronic and Aerospace Engineering. Control systems are found in a broad range of applications within these disciplines, from aircraft and spacecraft to robots, automobiles, computers and process control systems. The concepts taught in this course introduce students to the mathematical foundations behind the modelling and control of linear, time-invariant dynamic systems. In particular, topics addressed in this course will include: 1. Techniques for modelling mechanical systems and understanding their response to control inputs and disturbances. This will include the use of differential equations and frequency domain methods as well as tools such as Root Locus and Bode plots. 2. Representation of systems in a feedback control system as well as techniques for determining what desired system performance specifications are achievable, practical and important when the system is under control 3. Theoretical and practical techniques that help engineers in designing control systems, and an examination of which technique is best in solving a given problem.

AMME4010
Major Industrial Project

Credit points: 24 **Session:** Semester 1, Semester 2 **Classes:** no formal classes **Prerequisites:** (36 credits of 3rd year units of study) **Prohibitions:** AMME4111,AMME4112,AMME4121,AMME4122 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Passed at least 144 credit points. Departmental permission required for enrolment

Students spend 6 months at an industrial placement working on a major engineering project relevant to their engineering stream. This is a 24 credit point unit, which may be undertaken as an alternative to AMME4100 Practical Experience, AMME4111/4112 Honours Thesis A & B, MECH4601 Professional Engineering 2 and a recommended elective. This unit of study gives students 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. The project is carried out under joint University/industry supervision, with the student essentially being engaged fulltime on the project at the industrial site.

AMME4100
Practical Experience

Session: Semester 1, Semester 2 **Classes:** no formal classes **Prerequisites:** 28 credit points of third year units of study. **Campus:** Camperdown/Darlington **Mode of delivery:** Professional Practice

The aim of this unit is 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.

Students will have a better appreciation of the role of engineers in the workplace, the ability to present structured observations and reflections in the mode of a formal written report.

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 (60 days) of practical work experience is required and this is undertaken after the completion of some or all of the prescribed second 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.

AMME4110
Project B

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main, Winter Main **Classes:** no formal classes **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Supervised project on a relevant engineering discipline.

AMME4111
Honours Thesis A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal classes **Prerequisites:** 36 credit points of senior units of study and WAM 65 or over **Corequisites:** AMME4112 **Prohibitions:** AMME4121, AMME4122, AMME4010 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The fourth year honours thesis aims to provide students with the opportunity to carry out a defined piece of independent research in a setting and in a manner that fosters the development of engineering research skills. These skills include the capacity to define a research question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. Honours thesis is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Honours Thesis A covers first steps of thesis research starting with development of research proposal. Thesis B covers the second of stage writing up and presenting the research results. Students are asked to write a thesis based on a research project, which is very often related to 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. Direction of thesis work may be determined by the supervisor or be of an original nature, but in either case the student is responsible for the execution of the practical work and the general layout and content of the thesis itself. The final thesis must be the student's individual work, although research is sometimes conducted in the framework of a group project shared with others. Students undertaking research on this basis will need to take care in ensuring the individual quality of their own research work and the final thesis submission. The thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors as part of a seminar program. It is not expected that a thesis at this level will represent a significant contribution to new knowledge; nor is it expected that theses will resolve great intellectual problems. The timeframe available for the thesis is simply too short to permit students to tackle complex or difficult problems. Indeed, a key aim of the thesis is to specify a research topic that arouses sufficient intellectual curiosity, and presents an appropriate range and diversity of technical and conceptual challenges, while remaining manageable and allowing achievable outcomes within the time and resources available. It is important that the topic be of sufficient scope and complexity to allow a student to learn their craft and demonstrate their research skills. Equally imperative is that the task not be so demanding as to elude completion.

AMME4112
Honours Thesis B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal classes **Prerequisites:** AMME4111 Honours Thesis A **Prohibitions:** AMME4121, AMME4122 AMME4103, AMME4010 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The fourth year honours thesis aims to provide students with the opportunity to carry out a defined piece of independent research or design work in a setting and in a manner that fosters the development of engineering skills in research or design. These skills include the capacity to define a research or design question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research or design in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. Honours thesis is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Honours Thesis A covers first steps of thesis research starting with development of research proposal. Thesis B covers the second of stage writing up and presenting the research results. Students are asked to write a thesis based on a research or major design project, which is very often related to 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. Direction of thesis work may be determined by the supervisor or be of an original nature, but in either case the student is responsible for the execution of the practical work and the general layout and content of the thesis itself. The final thesis must be the student's individual work, although research is sometimes conducted in the framework of a group project shared with others. Students undertaking research on this basis will need to take care in ensuring the individual quality of their own research work and the final thesis submission. The thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors as part of a seminar program. It is not expected that a thesis at this level will represent a significant contribution to new knowledge; nor is it expected that theses will resolve great intellectual problems. The time frame available for the thesis is simply too short to permit students to tackle complex or difficult problems. Indeed, a key aim of the thesis is to specify a research or design topic that arouses sufficient intellectual curiosity, and presents an appropriate range and diversity of technical and conceptual challenges, while remaining manageable and allowing achievable outcomes within the time and resources available. It is important that the topic be of sufficient scope and complexity to allow a student to learn their craft and demonstrate their research or design skills. Equally imperative is that the task not be so demanding as to elude completion.

AMME4121
Engineering Project A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal classes **Prerequisites:** 36 credit points of senior units of study. **Corequisites:** AMME4122 **Prohibitions:** AMME4111, AMME4112, AMME4010 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To complete the research requirement for their engineering degree, students now have a choice of either completing Honours Thesis A/B (AMME 4111/AMME4112) or Project A/B (AMME 4121/AMME4122) in 2009. Project A/B is intended to be more practical in orientation while Thesis A/B demands extensive literature review and critical analysis of outcomes. Honours Thesis is a program for individuals whereas Projects can be done by groups or by an individual. Engineering Project A/B is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Engineering Project A covers first steps of project work, starting with development of project proposal. Project B covers the second of stage writing up and presenting the project results. The fourth year engineering project aims to provide students with the opportunity to carry out a defined piece of independent design work in a setting and in a manner that fosters the development of engineering design skills. These skills include the capacity to define a engineering design problem, showing how it relates to prior art, identifying appropriate tools and methods, carrying out a design in a systematic way and presenting outcomes in a report that is clear, coherent and logically structured

AMME4122
Engineering Project B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal classes **Prerequisites:** AMME4121 Engineering Project A **Prohibitions:** AMME4111, AMME4112, AMME4010 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To complete the research requirement for their engineering degree, students now have a choice of either completing Honours Thesis A/B (AMME 4111/AMME4112) or Project A/B (AMME 4121/AMME4122) in 2009. Project A/B is intended to be more practical in orientation while Thesis A/B demands extensive literature review and critical analysis of outcomes. Honours Thesis is a program for individuals whereas Projects can be done by groups or by an individual.

Engineering Project A/B is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Engineering Project A covers first steps of project work, starting with development of project proposal. Project B covers the second of stage writing up and presenting the project results. The fourth year engineering project aims to provide students with the opportunity to carry out a defined piece of independent design work in a setting and in a manner that fosters the development of engineering design skills. These skills include the capacity to define a engineering design problem, showing how it relates to prior art, identifying appropriate tools and methods, carrying out a design in a systematic way and presenting outcomes in a report that is clear, coherent and logically structured

AMME4210
Computational Fluid Dynamics

Credit points: 6 **Session:** Semester 1 **Classes:** 1 hour of lectures, 1 hour of tutorial and 2 hours of computer lab work per week **Prerequisites:** MECH3261 or AERO3260 **Assumed knowledge:** Partial differental equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The aim of this unit is to provide students with an understanding of the theoretical basis of computational fluid dynamics, the ability to write a simple Navier-Stokes solver and the skills to use a state of the art commercial computational fluid dynamics package.

At the end of this unit students will have the ability to assess fluid mechanics problems commonly encountered in industrial and environmental settings, construct and apply computational models, determine critical control parameters and relate them to desired outcomes and write reports. Knowledge skills, thinking skills, personal skills, personal attributes and practical skills.

Course content will include Navier-Stokes equations; finite difference methods; accuracy and stability for the advection and diffusion equations; direct and iterative solution techniques; solution of the full Navier-Stokes equations; turbulent flow; cartesian tensors; turbulence models.

AMME4241
Renewable Energy

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hour of tutorials per week **Prerequisites:** MECH3260, MECH3261 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop understanding of the engineering design and analysis of different devices and technologies for generating power from renewable sources including: solar, wind, wave, tidal, geothermal, hydro-electric, and biofuels;

to understand the environmental, operational and economic issues associated with each of these technologies.

At the end of this unit students will be able to perform in depth technical analysis of different types of renewable energy generation devices using the principles of fluid mechanics, thermodynamics and heat transfer. Students will be able to describe the environmental, economic and operational issues associated with these devices.

Course content will include motivations - climate change; first and second law efficiencies, exergy; solar energy - photovoltaic, solar thermal; wind energy - turbine design, choice of site, operational issues; wave and tidal energy - analysis of different wave generation devices; geothermal energy - geological considerations, choice of site, large scale plants, geothermal energy in buildings; hydro-electric power - design and function of hydro-electric power plants, operational issues; biofuels - types, applications, carbon budget analysis; general issues - variable output, integration of renewable energy sources into power grid.

AMME4500
Guidance and Control

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** AMME3500. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study will extend the concepts of control theory taught in 3rd year into the broader realm of Guidance and Control (G&C) systems for autonomous vehicles. Students will study the fundamental concepts of G&C with its specific implementation to autonomous space, air, ground and underwater vehicles. Students will also learn about navigation systems and their synergistic role with G&C systems. The unit of study will present a number of real case studies as well as experiential learning through the development of G&C algorithms.

AMME4660
Management, Employees and Industrial Rel

Credit points: 6 **Session:** Semester 2 **Classes:** 5 hours of tutorial/work group sessions per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of industrial relations issues in Australia, Government regulations, awards and agreements, and how they relate to companies, management, employers, employees, and unions. Students will develop skills and understanding of Australian regulations and awards, negotiation of workplace agreements, enterprise bargaining agreements, and working with unions. The course will be viewed from the perspective of all players in the system so that a new graduate, who will at some time fit all categories, has an understanding of employer/employee relationships in the workforce. Guest lecturers will be invited from industry (management, unions, etc.) to present their experiences in industrial relations. Role playing will be used to simulate working environments to develop skill in handling grievances, resolving conflicts, and develop negotiating skills. By the end of this unit of study students will be better prepared to enter the workforce as both an employee and as a manager.

AMME4710
Computer Vision and Image Processing

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of laboratory work per week **Assumed knowledge:** MECH4720 or MECH4730 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study introduces students to vision sensors, computer vision analysis and digital image processing. This course will cover the following areas: fundamental principles of vision sensors such as physics laws, radiometry, optical design, CMOS/CDD imager architectures, photo-detectors, colour reconstruction; the design of physics-based models for vision such as reflectance models, photometric invariants, radiometric calibration and shape from shading. This course will also present algorithms for video/image analysis, transmission and scene interpretation. Topics such as image enhancement, restoration, compression, stereo correspondence, pattern recognition and object segmentation will be covered.

AMME4790
Introduction to Biomechatronics

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** MTRX3700 or MECH3921 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Biomechatronics is the application of mechatronic engineering to human biology and as such it forms an important subset of the overall biomedical engineering discipline. It involves the following: Active and passive prosthetic limbs and joints; Active implants; Bio interfaces for diagnostics and control; Sensing & biofeedback; Bio electrical signal processing; Haptic devices; Tele surgery; Robot based surgery; Medical imaging; Mobility aids, rehabilitation devices & home care, and care of aged; The future.

AMME4971
Tissue Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures per week. Site visits and seminars during semester. **Prerequisites:** BIOL1003 or 6cp of junior biology; CHEM1101 or 6cp of junior chemistry; MECH2901 or MECH2900 **Assumed knowledge:** MECH3921 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

With the severe worldwide shortage of donor organs and the ubiquitous problem of donor organ rejection, there is a strong need for developing technologies for engineering replacement organs and other body parts using tissues from the patient. Recent developments in biochemistry and cell biology have begun to make this possible, and as a consequence, the very new field of tissue engineering has been making dramatic progress in the last few years. This UoS will provide an introduction to the principles of tissue engineering, as well as an up to date overview of recent progress in the field of tissue engineering is and where it is going. This UoS assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of tissue engineering. The objectives are: (1) to gain a basic understanding of the major areas of interest in tissue engineering, (2) to learn to apply basic engineering principles to tissue engineering systems (3) to understand the challenges and difficulties of tissue engineering.

AMME4981
Applied Biomedical Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hour workgroup sessions per week **Prerequisites:** BIOL1003 or 6cp of junior biology; CHEM1101 or 6cp of junior chemistry; MECH2300 or AMME2302 **Assumed knowledge:** MECH3921 or MECH3920, MECH3300 or MECH3362, MECH4960 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Computer simulation is a very important aspect of engineering in general, and biomedical engineering specifically. This is because it overcomes the problems of clinical, ethical, and design considerations involved in testing early prototypes on live subjects. This unit of study will take a project-based-learning approach to the topic of computer simulation and design optimization of biomedical devices through lectures and facilitated design work and group seminars. The primary focus will be on finite element modeling, and biomedical implantable devices. After some weeks of lectures on these topics, students will form into teams and use computer simulation techniques to develop and optimize their design. Projects are to be conducted in collaboration with companies in the biomedical industry, and it is anticipated that students will spend a significant amount of time with their host company. It is anticipated that students will gain detailed knowledge not only in the design topic assigned to them, but also in the topics assigned to their peers.

AMME4990
Biomedical Product Development

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** BIOL1003 or 6 credit points of junior biology CHEM1101 or 6 credit points of junior chemistry MECH2901 or 6 credit points of intermediate physiology or equivalent MECH3921 **Assumed knowledge:** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Product development in the biomedical area presents unique challenges that need to be addressed to efficiently satisfy strict regulatory requirements and to successfully advance products to approval for marketing. Biomedical engineers need a broad understanding of these challenges as the main components of product development are complex and interdependent. Development of good manufacturing and quality control processes, preclinical and clinical validation of product safety and efficacy, and regulatory filings, are each progressive and interdependent processes. This UoS will provide a broad understanding of regulatory requirements for biomedical product development, with particular emphasis on the dependence of each component on the development of processes and control systems that conform to Good Manufacturing Practice. This UoS assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of biomedical product development.

AMME4992
Regulatory Affairs in Medical Industry

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hour weekly lecture **Prerequisites:** BIOL1003 or 6 credit points of junior biology CHEM1101 or 6 credit points of junior chemistry MECH2901 or 6 credit points of intermediate physiology or equivalent MECH3921 **Assumed knowledge:** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Supply of medical devices, diagnostics and related therapeutic products is regulated in most jurisdictions, with sophisticated and complex regulatory regimes in all large economies. These regulations are applied both to manufacturers and designers and to biomedical engineers undertaking device custom manufacture or maintenance in clinical environments. This UoS will explore the different regulatory frameworks in the "Global Harmonisation Task Force" group of jurisdictions (US, EU, Canada, Japan, Australia) as well as emerging regulatory practices in Asia and South America. Emphasis will be on the commonality of the underlying technical standards and the importance of sophisticated risk management approaches to compliance.

MECH1400
Mechanical Construction

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures and 3 hours of workshop practice per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit aims to develop an understanding of: selected historical events; research methods; analysis techniques; application of theory and analysis to real machinery; use of machine and hand tools

At the end of this unit students will have: improved research techniques; improved analysis methods; an aability to connect history to mechanical engineering; an appreciation that they can engineer and build something that works; the opportunity to do real engineering.

This is a project based subject where students will: build their own designs; research historical developments in the area of the project selected; research into the necessary fields to fully understand and analyse the project; review and improve workshop skills; design their own version of the project; build the project in the workshop; test the completed machine.

MECH1560
Introduction to Mechanical Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** (1hr lec, 2hrs tut, 3hrs workshop) per week **Prohibitions:** AERO1560, MTRX1701, ENGG1800 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit aims to develop: an understanding of: the role of Mechanical or Biomedical engineers; the content of the degree structure and how the subjects are applied; a range of machining and manufacturing processes required to make mechanical components.

At the end of this unit students will be able to: work in a group; communicate effectively; recognise the engineering content of common machinery and systems; analyse simple engineering problems; demonstrate skills in machining and manufacturing methods through practical experience.

MECH2400
Mechanical Design 1

Credit points: 6 **Session:** Semester 2 **Classes:** 1hr Lectures; 4hrs tuts; 1hr lab per week **Assumed knowledge:** ENGG1802, AMME2301 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to experience a realistic design process and to develop good engineering skills. Students will also develop an understanding of: the need for and use of standard drawings in the communication and definition of parts and assemblies; creativity: the design process from initial idea to finished product; methods used to analyse designs; standard components.

At the end of this unit students will have developed 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.

MECH2901
Anatomy and Physiology for Engineers

Credit points: 6 **Session:** Semester 2 **Classes:** 2.5 hours of lectures per week. 12 hours of laboratory work per semester. **Assumed knowledge:** A basic understanding of biology. Recommended: BIOL1003 (or equivalent) **Campus:** Cumberland **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to gain familiarity with anatomical and physiological terms and understanding their meaning. Students should gain an understanding of the gross anatomy of the major systems in the human body and their importance in the design of biomedical devices. Students should gain an understanding of the major physiological principles which govern the operation of the human body.

At the end of this unit students will be able to: identify the gross anatomical features of the human body; describe the normal function of the major body systems (nervous, circulatory, respiratory, musculoskeletal, digestive and renal); determine how these functions relate to cellular function; determine how a biomedical engineering device affects the normal anatomy and function of the body.

Course content will include: Bone tissue; Skeletal system; Joints; Muscle Tissue; Bones & joints anatomy (prac); Muscle Mechanics; Nerve Tissue; Muscles & nerves prac; CVS Heart; Blood vessels; Respiratory System 1; Respiratory System 2; Homeostasis; CVS and Respiratory anatomy (prac); Physiology; Respiratory Physiology; Cardio-respiratory physiology (prac); Renal Anatomy; Renal Physiology; Abdominal Renal Digestive Anatomy; Digestive Physiology; Oral Presentation.

MECH3260
Thermal Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 6 hours of laboratory work per semester. **Prerequisites:** AMME2200 **Assumed knowledge:** Fundamentals of thermodynamics are needed to begin this more advanced course. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of: the principles of thermodynamic cycles, gas mixtures, combustion and thermochemistry applied to engineering processes, power and refrigeration systems; heat transfer equipment design. To classify heat transfer situations as conduction, convection, radiation, forced or natural convection. To determine the appropriate approach to problems, the type of solution needed, analytical or numerical. To be able to arrive at a solution and predict heat transfer rates and be able to design and size heat transfer equipment.

At the end of this unit students will be able to: apply the principles of thermodynamics and heat transfer to real engineering situations; have the Ability to tackle and solve a range of complex thermodynamics cycles, air conditioning, combustion, chemical equilibrium, problems involving gas mixtures; have the ability to tackle and solve a range of heat transfer problems including finned heat exchangers, cooling by fluids, quenching, insulation and solar radiation.

Course content will include: Thermodynamics: Exergy and entropy, Power: spark ignition, Power: diesel, Power: gas turbine, Power: stirling, Power: steam, Gas mixtures, Clausius-Clapeyron, Humidity, psychrometry, Air-conditioning, Combustion: stoichiometry, gas analysis, Combustion, thermochemistry, adiabatic flame,temperature Combustion, 2nd Law of Thermo., equilibrium, exergy, Heat Transfer: Conduction, thermal circuits, General conduction equation, cylindrical fins, Heat Exchangers, Numerical solutions, Unsteady conduction, Convection, analytical, Forced convection correlations, Natural convection, boiling, Radiation spectrum, blackbody, Radiation properties and laws, Radiation environmental, solar.

MECH3261
Fluid Mechanics

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. 3 hours of laboratory work per semester. **Prerequisites:** AMME2200 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to provide students with a detailed understanding of the theory and practice of fluid mechanics in the context of mechanical engineering.

At the end of this unit students will have the ability to critically assess and solve problems commonly found in fluid mechanics practice, such as sizing pumps and piping systems, designing channels, and determing the lift and drag characteristics of submerged bodies. Additionally, they will develop a structured and systematic approach to problem solving.

Course content will include:

Navier-Stokes equations: derivation, significance and fundamental importance.

Pipe flow: Bernoulli, shear losses, minor losses, networks.

Pumps: pump types, characteristics, applications.

Flow around a submersed bodies: lift and drag

Boundary layers: derivation of equations, laminar and turbulent, transition, momentum integral method, law of the wall, velocity profiles.

Turbulence: concept, properties of turbulent flow, eddy viscosity models , more advanced approaches.

Channel flow: flow in a channel, weir, hydraulic jump

Gas dynamics: steady one-dimensional flow including friction and heat transfer, sound waves, normal shock, nozzle flow, shock tube.

MECH3361
Mechanics of Solids 2

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 6 hours of laboratory work per semester. **Prerequisites:** AMME2301 and AMME 2302 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to: teach the fundamentals of analyzing stress and deformation in a solid under complex loading associated with the elemental structures/components in aerospace, mechanical and biomedical engineering; develop the following attributes: understand the fundamental principles of solid mechanics and basic methods for stress and deformation analysis of a solid structure/element in the above mentioned engineering areas; gain the ability to analyze problems in terms of strength and deformation in relation to the design, manufacturing and maintenance of machines, structures, devices and elements in the above mentioned engineering areas.

At the end of this unit students will have a good understanding of the following: applicability of the theories and why so; how and why to do stress analysis; why we need equations of motion/equilibrium; how and why to do strain analysis; why we need compatibility equations; why Hooke's law, why plasticity and how to do elastic and plastic analysis; how and why to do mechanics modeling; how to describe boundary conditions for complex engineering problems; why and how to solve a mechanics model based on a practical problem; why and how to use energy methods for stress and deformation analysis; why and how to introduce plates and shells and how to do analysis for plate and shell structures; why and how to do stress concentration analysis and its relation to fracture and service life of a component/structure; how and why to do fundamental plastic deformation analysis; how and why the finite element method is introduced and used for stress and deformation analysis. The ultimate outcome is that the students have the ability to solve engineering problems by comprehensively using the skills attained above.

MECH3362
Materials 2

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 3 hours of laboratory work per semester **Prerequisites:** AMME2301 and AMME2302 **Assumed knowledge:** This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2302 Materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301 ; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to understand the relationship between properties of materials and their microstructures and to improve mechanical design based on knowledge of mechanics and properties of materials.

At the end of this unit students should have the capability to select proper materials for simple engineering design.

Course content will include: 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.

MECH3460
Mechanical Design 2

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** MECH2400 and AMME2301 **Assumed knowledge:** Properties of engineering materials including fatigue failure theories. Statics and dynamics properties of machines. Practical use of Word and Excel including the use of the 'solver' and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to apply some newly acquired skills to begin to understand how stress and strain are distributed in the more common categories of machine parts. Reducing the loads in standard parts to just the most significant, leads to a range of relatively simple analyses. By using different degrees of simplification and a proportional amount of effort, the examination of components can provide results of corresponding accuracy. To lead the student to utilize and be aware of modern computer methods, to be aware of past methods and be prepared of future developments. Not all the analysis of mechanical components are covered in the course but the ones that are deal with exemplify principles that can be applied to novel items that our graduates may encounter in their professional life.

At the end of this unit students will be able to: calculate the weld thickness at a welded joint that is required to carry any combination of loads and apply fatigue life prediction in general to any component; design a bolted joint to carry tensile and or shear loads: use a numerical solver to arrive at the optimal dimensions of a component, given its loads and sufficient boundary conditions; design shafts to carry specified steady and alternating bending moments and torques; design and construct a space frame, such as that for a dune buggy, to meet requirements of strength and rigidity; be able to arrive at the principle parameters of a pair of matched spur gears, and to be able to extend this to helical gears.

Course content will include: stress and strain in engineering materials; yield and ultimate fail conditions in malleable and brittle materials; spatial, 3D frameworks; deflections due to forces, moments and torques.

MECH3660
Manufacturing Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. Site visit. **Prerequisites:** (AERO1560 or MECH1560 or MTRX1701 or ENGG1800 or ENGG1805) and (ENGG1802 or PHYS1001 or PHYS1901) **Assumed knowledge:** AMME2200, AMME2301, AMME2302 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit aims to teach the fundamentals of manufacturing processes and systems in mechanical, mechatronic and biomedical engineering, including traditional and advanced manufacturing technologies. This unit aims to develop the following attributes: to understand the fundamental principles of manufacturing technologies for the above mentioned engineering areas; to gain the ability to select existing manufacturing processes and systems for direct engineering applications; to develop ability to create innovative new manufacturing technologies for advanced industrial applications; to develop ability to invent new manufacturing systems

At the end of this unit students will have a good understanding of the following: merits and advantages of individual manufacturing processes and systems; principles of developing new technologies; comprehensive applications and strategic selection of manufacturing processes and systems.

Course content will include:

Manufacturing Processes: Common processes and their science (machining, casting, powder metallurgy, metal working, welding, polymer processing and composite manufacture); merits and limitations; NC and CAM; Introduction to advanced processes (sensor and actuator, IC, intelligent robots and biomedical and nano-technological device).

Manufacturing Systems: Economics in manufacturing; flexible manufacturing; just-in-time manufacturing; group technology; materials selection and requirements planning; quality control; introduction to new technology; introduction to e-manufacturing; human factors; plant layout.

MECH3661
Engineering Management

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to: develop an understanding of the principles and practices of industrial and engineering management; provide an understanding of the theoretical and practical issues facing an industrial organisation and the fundamental approaches to their management; understand the ethical, social, economic and environmental contexts of professional engineering within an industrial organization. The attributes that will be developed in this unit of study are consistent with the development of scholarship, global citizenship and lifelong learning.

At the end of this unit students will be able to: understand the fundamental approaches to industrial management; apply a range of these approaches in class experiences and assessment tasks; practice and appreciate the effective management of workgroups; understand the importance of effective design and management of human systems in managing organisational and professional issues; develop an ethical approach to dealing with professional issues of an economic, social or environmental nature; enhance competence and confidence in oral and written communication.

The concepts covered in this unit are from the following management areas:

Engineers and Management - including ethics , Communication and People in Organisations, Economics, Leadership, Strategic Management, Managerial Decision Analysis, Marketing, Business Planning, Legal Environment of Business, Industrial Hazard Management, Human Resource Management, Project Management, Quality Assurance and Management, Operations Management, and Financial Management.

This broad range of topics is covered so as to familarise students with the fundamental areas of managerial practice that they can be expected to become professionally proficient in.

MECH3921
Biomedical Design and Technology

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of lectures/tutorials per week. These include site visits. **Assumed knowledge:** BIOL1003; MECH2901; AMME2302; MECH2400 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to give students an understanding of the Australian and International biomedical industry and in the development, manufacture and uses of biomedical engineering products in therapeutic, rehabilitation and clinical settings. Students will gain an understanding of the process of biomedical regulation in Australia and other major international markets as well as the entire process of creating a new biomedical engineering product, from design through to marketing and monitoring of the product. Students will design a biomedical device including the preparation of a detailed design brief.

This will be done as a team project. Each team will work on a specific biomedical design project following formal design protocols, including design control, regulatory considerations, and commercialisation/IP considerations.

Course content will include:

- Biomedical Design: A team design project on a medical device.
- Intellectual Property in the biomedical industry.
- Biomedical devices and technology.
- Regulatory and clinical considerations in the biomedical industry.
- Commercialisation strategies in the biomedical industry.
- The Australian biomedical industry - an overview. Includes site visits.
- The global biomedical industry - an overview.

MECH4241
Energy and the Environment

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** 24 credit points of third year units of study **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims 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.

At the end of this unit students will be able to carry out economic and environmental impact analyses for energy systems.

Course content will include: 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; CO2 capture and sequestration; other emerging control technologies.

MECH4255
Air Conditioning and Refrigeration

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 1 hour of tutorials per week **Prerequisites:** MECH3260; MECH3261 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop a practical understanding of air conditioning and refrigeration applications.

At the completion of this unit students will be able to determine thermal loads on structures and design an airconditioning or refrigeration system with attention to air distribution and energy consumption.

Course content will include: applied psychrometrics, air conditioning systems, design principles, comfort in the built environment, 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 devices, 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.

MECH4265
Combustion

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 1 hour of tutorials per week **Prerequisites:** MECH3260; MECH3261 **Assumed knowledge:** Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to give students a basic understanding of combustion and some of its applications such as internal combustion engines, gas turbines and fires.

At the completion of this unit students will be able to perform an analysis of simple reacting systems. The theory underlying laminar and turbulent combustion will be covered for both premixed and non-premixed cases. Students will be able to perform calculations of the structure of simple flames.

Course content will include an introduction to droplet combustion, detailed chemical kinetics including the formation of pollutant, the concept of mixture fraction and combustion in engines, furnaces and gas turbines. Fire ignition, growth and spread will also be covered with respect to safety in buildings including the hazards related to the formation of smoke and toxic products.

MECH4310
Advanced Engineering Materials

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. 3 hours of laboratory work per fortnight. **Prerequisites:** MECH3362 **Assumed knowledge:** This subject requires you to have a good understanding of basic knowledge and principles of various aspects for materials engineering UoS (e.g. 2nd & 3rd year Materials I and II, 2nd year Solids 1 and 3rd year Solids 2) especially those relevant to materials engineering and technology over the past 3.5 years. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims for students to understand: how to define the relationship between properties and microstructures of advanced engineering materials; how to improve mechanical design with the knowledge of mechanics and properties of materials; how to conduct failure diagnosis of engineering structures.

At the end of this unit students should be able to: define structure-property relationships of advanced engineering materials; improve the performance of engineering structures through tailoring materials microstructure and manufacturing processes; conduct failure diagnosis of simplified failure cases of engineering structures.

Course content will include: advanced ceramics, superalloys, shape memory alloys and polymers, advanced polymer matrix composites, piezoceramic materials, thin film science and technology, advanced joining methods, processing-structure-property relationship, damage tolerance, structure integrity and reliability, toughening mechanisms.

MECH4460
Mechanical Design 3

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** MECH2400 **Assumed knowledge:** ENGG1802, AMME2301, AMME2500, MECH3361 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study teaches the student how to recognise where and how their theoretical skills can be applied to the practical situations that they may encounter in this field of design. Options may be provided in the choice of design assignments. Biomedical engineering and vehicle design problems may be provided as options to more general machine design problems.

The lectures and assignments will cover all or most of the following objectives: Calculate weld thickness for a nominated joint outline, subjected to combined loads; To apply modern fatigue life predictions in general to component parts; Design a bolted joint to carry shear loads; Use a numerical solver to arrive at optimal design dimensions and material properties, provided the invention part of the design is completed and only the size and shape of the design has to be settled; Design a space frame to carry specified loads and meet dimensional and functional requirements. Make a model of such a frame so that it may be compared with competing frames; Consider the range and evolution of CAD systems to aid in the selection of systems for particular duties, for today and in the near future; Consider the properties strengths and weaknesses of hydrodynamic bearings to lead to proper selection and maintenance; Design or select a coupling that has the appropriate attributes with respect to power and misalignments; Calculate the parameters that define a matched pair of spur gears, leading to the selection of multiple gear pairs in gearboxes; Use a modern kinematic and dynamic package that is integral with our solid modeler CAD system to simulate articulated machinery and determine joint loads between the parts;

Considerations of geometrical and practical constraints in the design of parts and assemblies.

MECH4601
Professional Engineering 2

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hours of tutorials per week **Prerequisites:** MECH3660 **Assumed knowledge:** MECH3661, ENGG1803, AMME4100 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to create an awareness of the issues surrounding management of projects and in general management in engineering plants; impart knowledge resulting in a more global approach to the practice of engineering and engineering management; provide a vehicle for improving communication skills. The course also aims, when taken together with other courses offered by the School, to substantially meet the requirement of the Institution of Engineers, Australia, for undergraduate training in management theory. On completion of this unit students should be able to: plan small projects, and contribute effectively to planning of larger projects; understand what is required of you in your role in the conduct and management of an engineering project; perform well in that role from the outset, with your performance limited only by your experience; prepare an interesting presentation on aspects of your work for your peers or senior managers; recognise the range of expertise you may need to call on in your role as an engineer working on a project (e.g in the safety and environmental fields); understand what the experts are saying, and to be able to contribute effectively to that discussion, so making effective use of that expertise.

MECH4720
Sensors and Signals

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** MTRX3700 **Assumed knowledge:** Strong Matlab skills **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit aims to provide students with a good practical knowledge of a broad range of sensor technologies, operational principles and relevant signal processing techniques. MECH4720 is the last in a series of practical Mechatronic and Electrical courses taken over three years. It takes these practical engineering concepts, along with the associated mathematical, electronic and mechanical theory and applies this knowledge to a series of practical, albeit specialized applications that will be encountered by most Mechatronic Engineers at sometime during their careers.

This unit will starts by looking at signal characteristics, modulation, filtering and convolution before examining some passive sensors. It goes on to provide an overview of the workings of typical active sensors with a strong emphasis on optical systems and image processing (Radar, Lidar and Sonar). It provides insight into basic sensing methods as well as aspects of interfacing and signal processing. It includes both background material and a number of case studies.

At the end of this unit students will have a good understanding of passive and active sensors, their outputs and applicable signal processing techniques; an appreciation of the basic sensors that are available to engineers and when they should be used.

MECH4730
Computers in Real-Time Control and Inst

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hours of laboratory work per week. **Prerequisites:** MTRX3700 **Prohibitions:** ELEC4602 Real Time Computing **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to: learn the fundamental principles and requirements of real time software design: understand the basic components of an embedded systems; learn, appreciate and understand the various stages that need to be completed in a large software system implementation; learn the capabilities of a typical high performance real time operating system.

At the end of this unit students 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 / event driven multitasking systems. The outcomes of this subject are: to be able to design, plan and implement a large real time software system.; to understand the complexity of real time programming; to be able to select appropriate software/hardware platforms for a given control/monitoring task; to understand the problematic of real time software design; to be able to select appropriate software design tool for a real time task: to be able to debug a complete real time system; to be able to organize and distribute tasks in a large software project; to be able to monitor and control the progress towards a due day working in a group; to understand the main facilities offered by professional real time operating system: Processes, Threads, Timers, interrupts, interprocess communications; to be able to present / demonstrate a real time system in time; to be able to report results in a professional manner.

Textbooks

Auslander DM & Tham CH, Real Time Software for Control, Prentice Hall, 1990. Library Classification: 629.8102, 629.8955133.

MECH4902
Orthopaedic and Surgical Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of Lectures per week **Prerequisites:** AMME2301, AMME2302, ENGG1802, BIOL1003, MECH2901, MECH3921 or their equivalent). **Assumed knowledge:** Basic concepts in engineering mechanics-statics, dynamics, and solid mechanics; Basic concepts in materials science, specifically with regard to types of materials and the relation between properties and microstructure; and A basic understanding of human biology and anatomy. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To introduce the student to the details and practice of orthopaedic engineering. To give students an overview of the diverse knowledge necessary for the design and evaluation of implants used in orthopaedic surgery. To enable students to learn the language and concepts necessary for the interaction with orthopaedic surgeons and the orthopaedic implant industry. To introduce the student to the details and practice of other engineering applications in surgery, particularly in the cardiovascular realm.

By the end of this units of study, students will: Be acquainted with the physical properties of human bones and joints; Understand how the skeleton functions as an engineerig structure. 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 or to other devices used for replacement and repair of bones and joints; Learn the language of orthopaedics and obtain a glimpse into the world of the orthopaedic surgeon; and Have an understanding of the role played by engineering technology in surgery.

MECH4961
Biomechanics and Biomaterials

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures per week **Prerequisites:** MECH2300 or AMME2302; MECH2900 or MECH2901 **Prohibitions:** MECH4960 **Assumed knowledge:** MECH3300 or MECH3362 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course is divided into two parts: biomaterials and biomechanics: Biomaterials This course will involve the study of biomaterials from two perspectives: firstly, the response of the body towards the biomaterial an immune response and foreign body reaction; secondly, the response of the biomaterial to the body corrosion, biodegradation, and mechanical failure. Our study will begin with the response of the body towards the biomaterial. We will begin by looking at the immune system itself and then move on to look at the normal inflammatory response. We will then study in detail the foreign body reaction caused by biomaterials. The final part of this section is the study of protein adsorption onto biomaterials, with a strong focus on the Vroman effect. Then we will move onto the response of the biomaterial to the body. We will begin by a review of biomaterials, their applications, and compositions, and mechanical properties. We will then look at key problems such as corrosion, stress shielding, static fatigue, and mechanical failure. Finally, we will take a practical look at the materials themselves. Beginning with ceramics (bioinert, biodegradable, and bioactive), we will then study polymers (thermoplastic, thermosetting, and biodegradable), and finally metals. Biomechanics Biomechanics is the study of the body from the point of view of it being an engineering structure. There are many aspects to this since the human body contains soft tissues, hard tissues (skeletal system), and articulating joints. We will begin with a general introduction to biomechanics, modelling the human body from the macroscopic level to the microscopic level. We will then study soft tissue mechanics, with respect to both non-linear and viscoelastic descriptions, with a significant focus on the mathematical methods used in relation to the mechanics of the system. We will then look at specific aspects of biomechanics: muscle mechanics, joint mechanics, kinematics and dynamics of human gait (gait analysis), biomechanics of cells, physiological fluid flow, biomechanics of injury, functional and mechanical response of tissues to mechanical loading.

MTRX1701
Mechatronics Engineering Introductory

Credit points: 6 **Session:** Semester 1 **Classes:** 1 hour of lectures, 1 hour of tutorials and 3 hour of workshop practice per week **Prohibitions:** AERO1560, MECH1560, ENGG1800 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to introduce students to the fundamental principals that underlie the study of Mechatronic Engineering. Students will appreciate the fundamental components that make up a Mechatronic system, including actuators, sensors, electronic and computing systems. This course lays the foundation for later studies, including advanced Mechatronic Engineering, computing, control and system design courses.

At the end of this unit students should be able to: understand the general principles involved in computer controlled machinery; apply a systematic approach to the design process for Mechatronic systems; analyze and formulate requirements for a Mechatronic system based on a specification; demonstrate a basic understanding of system modelling and approaches to control; understand the practical application of mechatronic systems in applications such as manufacturing, automobile systems and robotics; develop the capacity to think creatively and independently about new design problems; undertake independent research and analysis and to think creatively about engineering problems.

Course content will include introduction to; system modelling and control; design process; actuators; sensors; computers - hardware; computers - software; advanced topics.

MTRX1702
Mechatronics 1

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of labs per week. **Prohibitions:** ELEC1101.ELEC2602, COSC1902, COSC1002 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to provide: an introduction to the analysis and design of digital logic circuits; a foundation for the study of systems and embedded programming for the degree in Mechatronic Engineering.

Course content will include: Introductory Digital Systems 3 CR: Number systems and codes; Logic gates and Boolean algebra, universal (nand) logic gates; Digital arithmetic: operations and circuits, Two's complement addition and subtraction, overflow; Combinational logic circuits; Flip-flops and related devices; Counters and registers, shift register applications; sequential circuits, designs of synchronous, cascadable counters (BCD and binary). Integrated circuit logic families and interfacing; practical issues including, fan out, pull-up/down, grounds, power supplies and decoupling; timing issues, race conditions. Tri-state signals and buses; MSI logic circuits, multiplexers, demultiplexers, decoders, magnitude comparators; Introduction to programmable logic devices. The unit of study will include a practical component where students design and implement logic circuits. Purchase of a basic laboratory kit as described in classes will be required. Introductory Software Engineering (3 Cr): This unit of study provides an introduction to software design, implementation, debugging and testing in the context of C programming language. Problem definition and decomposition; the design process; designing for testing and defensive coding methods; modular code structure and abstract data types; best practice in programming. Preprocessor, tokens, storage classes and types. Arithmetic, relational and bit manipulation operators. Constructs for control flow: if, switch, for, do and while. Arrays. Pointers and character strings. Dynamic memory. Functions and parameter passing. Derived storage classes: structures and unions. File I/O.

Textbooks

Wakerly, Introduction to Digital Design, 3ed., Prentice-Hall, 2000.
Library Classification: 621.3819, 621.39
Reference Books
Kernighan & Ritchie The C Programming Language 2nd ed (Prentice Hall, 1988)
Deitel & Deitel, C How to Program, 3ed, Prentice-Hall, 2001

MTRX2700
Mechatronics 2

Credit points: 6 **Session:** Semester 1 **Classes:** 1 hour of lectures and 3 hours of laboratory work per week. **Prerequisites:** MTRX1701 and MTRX1702 **Prohibitions:** ELEC2601, ELEC3607 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach the fundamental principles of microcontroller system design. This involves a thorough understanding of the interaction between hardware and software at the assembly language level, and of interfacing to external devices. The course will focus each year on a particular microcontroller which is widely used in industry. TThe unit will introduce students to microprocessor and microcomputer systems, emphasizing assembly language programming and building on the digital logic foundations from first year. In particular, the following subjects are addressed: Introduction to microprocessors, stored-program computer architecture, instruction codes and addressing modes, instruction execution cycle; Memory devices; Computer architecture and assembly language programming; Microprocessor and microcontroller systems, memory and IO interfacing, interrupts and interrupt handling; Serial and parallel communications; Systems design, documentation, implementation, debugging and testing.

At the end of this unit students should achieve the following aims: Gain an intimate understanding of the way in which microcontrollers operate; Understand the relationship between the software and hardware used in a Mechatronic sytem; Learn concepts useful in the design and implementation of simple Mechatronic systems; Apply their knowledge to implement a simple Mechatronic system given a design specification.

MTRX3700
Mechatronics 3

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of lab work per week. **Prerequisites:** MTRX2700 **Prohibitions:** MECH4710 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to provide experience, confidence and 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; and to provide experience of working in a project team to prototype a realistic product to meet a specification.

At the end of this unit students will understand microprocessor system organization, and the organization of multiple and distributed processor systems, special purpose architectures (DSPs etc) and their application. 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.

Course content will include single processor systems, multiple and distributed processing systems, special purpose architectures (DSPs etc) and their application; standard interfacing of sensor and actuation systems; ADC/DAC, SSI, parallel, CAN bus etc.; specific requirements for microprocessor-based products; problem definition and system design; tools for design, development and testing of prototype systems; the unit of study will include a project, where groups of students design, develop and commission a microprocessor-based product.

MTRX4700
Experimental Robotics

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hours of lab work per week **Prerequisites:** AMME3500; MTRX3700 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to present a broad overview of the technologies associated with industrial and mobile robots. Major topics covered are sensing, mapping, navigation and control of mobile robots and kinematics and control of industrial robots. The subject consists of a series of lectures on robot fundamentals and case studies on practical robot systems. Material covered in lectures is illustrated through experimental laboratory assignments. The objective of the course is to provide students with the essential skills necessary to be able to develop robotic systems for practical applications.

At the end of this unit students will: be familiar with sensor technologies relevant to robotic systems; understand conventions used in robot kinematics and dynamics; understand the dynamics of mobile robotic systems and how they are modeled; have implemented navigation, sensing and control algorithms on a practical robotic system; apply a systematic approach to the design process for robotic systems; understand the practical application of robotic systems in applications such as manufacturing, automobile systems and assembly systems; develop the capacity to think creatively and independently about new design problems; undertake independent research and analysis and to think creatively about engineering problems.

Course content will include: history and philosophy of robotics; hardware components and subsystems; robot kinematics and dynamics; sensors, measurements and perception; robotic architectures, multiple robot systems; localization, navigation and obstacle avoidance, robot planning; robot learning; robot vision and vision processing.

School of Chemical and Biomolecular Engineering

CHNG1103
Material & Energy Transformations Intro

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorilas per week. **Assumed knowledge:** Mathematics Extension 1; 2 unit Physics; 2 unit Chemistry. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The students should develop an understanding of and competence in the formulation and solution of material and energy balance problems in engineering; develop competence in using basic flowsheet analysis and appropriate computational tools; improve their group work and problem solving skills; gain an ability to extract a simplified version of a problem from a complex situation. Material Transformation related topics include: unit systems and unit conversions; properties of fluids; mass balance calculations on flow systems; equilibrium compositions of reacting systems; vapour pressure and humidity. Energy related topics include: first law of thermodynamics applied to flow systems; thermodynamic properties such as enthalpy, internal energy, heat capacities; calculations for ideal gas and liquid gas systems and thermochemistry. Introduction to HYSYS flowsheeting software package.

CHNG2801
Conservation and Transport Processes

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. 6 hours of laboratory work per semester. **Prerequisites:** All core 1st year engineering units of study. **Assumed knowledge:** Calculus Computations (Matlab, Excel) Mass and Energy Balances **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

By the end of this unit of study, students should be proficient at applying the basic principles of mass, energy and momentum balances to solve engineering problems involving simple fluid flow, heat and mass transfer. Further, students will be able to perform simple dimensional analysis and to see the utility of this general approach in engineering: for example in friction factors, heat and mass-transfer correlations. Students will also develop skills in the basic design of different types of chemical reactors, given the corresponding chemical rate law. The focus of this unit of study is to provide the key concepts and principles as tools through keynote lectures, with supporting tutorials and laboratory sessions giving valuable hands-on experience. Guidance will be provided to students to seek additional detailed information for specific applications in their projects. This unit of study runs concurrently with another enabling technology unit of study CHNG2802. These two units together will provide students with the tools and know-how to tackle the real-life engineering problems encountered in the concurrent project-based unit of study, CHNG2803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

CHNG2802
Applied Maths for Chemical Engineers

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** All core 1st year engineering units of study. **Corequisites:** CHNG 2803 (Analysis Practice 1) CHNG 2801 (Conservation and Transport Processes) CHEM 2404 (Forensic and Environmental Chemistry) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study consists of two main strands : statistical analysis of data and numerical (computer based) methods for solution of equation sets. By the end of the statistical analysis strand, students should be proficient at applying the basic principles of statistical analysis, and appreciate how they can be applied to a variety of engineering applications. The following statistical tools are studied: normal distribution, the test statistic z, confidence intervals for the population mean, t-distribution, hypothesis testing, data fitting, uncertainty analysis, propagation of random errors and analysis of variance. The numerical methods strand will see students become proficient at: solution of single and multivariable algebraic equations; solution of nonlinear differential equations; use of Excel and Matlab for data manipulation and equation solving; use of commercial flowsheeting software (Hysys) for solving engineering problems. This unit of study runs concurrently with another enabling technology unit of study, CHNG2801. These two units together will provide students with the tools and know-how to tackle the real-life engineering problems encountered in the concurrent project-based unit of study, CHNG2803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

CHNG2803
Energy and Fluid Systems Practice

Credit points: 6 **Session:** Semester 1 **Classes:** 8 hours of project work in class per week **Prerequisites:** All core engineering 1st year units of study. **Corequisites:** CHNG 2801 (Conservation and Transport Processes) CHNG 2802 (Applied Mathematics for Chemical Engineers) CHEM 2404 (Forensic and Environmental Chemistry) **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is centred around real-life engineering projects which cover traditional and non-traditional domains of chemical engineering, and span the energy, chemical processing and bio-medical sectors.

By the end of this unit, students will be proficient in analysing complex fluid and energy networks and decomposing them into their essential component parts. Students will understand the functionality of each of these key components, and will be able to characterise the performance of the engineering network in terms of both component and system-wide variables. Students will also be able to take this information and explore the optimum operating conditions for the network.

This unit of study runs concurrently with two enabling technology units of study, CHNG2801 and CHNG2802. These two units will provide students with the tools and know-how to tackle the real-life engineering problems encountered in CHNG2803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

CHNG2804
Chemical & Biological Systems Behaviour

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** All core 1st year engineering units of study. **Corequisites:** CHNG 2805 (Industrial Systems and Sustainability) CHNG 2806 (Analysis Practice 2 - Treatment, Purification and Recovery Systems) CHEM 2403 (Chemistry of Biological Molecules) **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This is a core unit within the curriculum. Chemical Engineering requires an understanding of material and energy transformations and how these are driven by molecular interactions. The rate of such transformations is dependent on driving forces and resistances, and these need to be defined in terms of fundamental physical and chemical properties of systems. This course seeks to provide students with a sound basis of the thermodynamics of chemical and biological systems, and how these, in turn, define limits of behaviour for such real systems. The thermodynamic basis for rate processes is explored, and the role of energy transfer processes in these highlighted, along with criteria for equilibrium and stability. Emphasis is placed on the prediction of physical properties of chemical and biological systems in terms of state variables. The course delivery mechanism is problem-based, and examples from thermal, chemical and biological processes will be considered, covering molecular to macro-systems scale. The course builds naturally from the second year first semester course in conservation and transport processes, and prepares students fundamentally for the third year course in design of chemical and biological processes, which deals fundamentally with reaction/separation systems, and considers phase and chemical equilibria.

CHNG2805
Industrial Systems and Sustainability

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** All core 1st year engineering units of study. **Corequisites:** CHNG 2804 (Chemical and Biological Systems Behaviour) CHNG 2806 (Analysis Practice 2 - Treatment, Purification & Recovery Systems) CHEM 2403 (Chemistry of Biological Molecules) **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course involves the study of the various concepts which underpin sustainable development, including technical and economic efficiency, stewardship of the bio-physical environment, and social acceptability. The course examines the material economy from the perspective of open and closed thermodynamic systems, and the implications of this for resource consumption and waste generation. A number of governing sustainability frameworks are examined to determine their suitability within the context of chemical engineering. A range of approaches and tools for determining industries environmental performance are introduced as part of a sustainability framework. Process design and operation, product design are all investigated from a sustainability perspective. Green Engineering principles are highlighted as a potential method for transforming industry.

CHNG2806
Materials Purification and Recovery

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of project work in class per week **Prerequisites:** All core 1st year engineering units of study. **Corequisites:** CHNG2804 (Chemical and Biological Systems Behaviour) CHNG2805 (Industrial Systems and Sustainability) CHEM2403 (Chemistry of Biological Molecules) **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative and quantitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To recognise that chemical engineers are involved in creation of products and processes, in manipulating complex systems, and in managing technical operations. To develop an appreciation of the practical application of concepts and tools to real design problems in the process, products and service sectors in which chemical engineers are engaged. To consider this through three project-driven case studies covering a range of integrated analysis scenarios, from the domain of energy and fluid systems. This course is a concurrent requirement for the concept and enabling technology courses running in parallel in the same semester.

CHNG3041
Exchange Program 3A

Credit points: 24 **Session:** Semester 1, Semester 2 **Prerequisites:** 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 School of Chemical and Biomolecular Engineering at the University of Sydney and the host institution is required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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 (i.e. both CHNG3041 and CHNG3042), students will have completed work at least equivalent to Year 3 in the Chemical Engineering degree, including in particular all Year 3 core units of study.

CHNG3042
Exchange Program 3B

Credit points: 24 **Session:** Semester 1, Semester 2 **Prerequisites:** 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 School of Chemical and Biomolecular Engineering at the University of Sydney and the host institution is required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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 (i.e. both CHNG3041 and CHNG3042), students will have completed work at least equivalent to Year 3 in the Chemical Engineering degree, including in particular all Year 3 core units of study.

CHNG3801
Process Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **Corequisites:** CHNG3803, CHNG3802 **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study consists of three strands: reaction engineering; vapour-liquid equilibrium and distillation; heat transfer. The central aim is to show how these unit operations interact in the design and operation of process equipment. The reaction engineering strand covers the following: development of appropriate kinetic rate laws; use of rate laws in designing continuous stirred tank, plug-flow and packed-bed reactors. The second strand focuses on the following: numerical methods for predicting vapour-liquid equilibrium; binary and multi-component distillation; deviations from ideal behaviour. The heat transfer strand covers the following issues: forced and natural convective heat transfer; shell and tube heat exchangers; heat transfer with phase change; radiative heat transfer. The various strands make extensive use of computer software: Excel and Matlab for data manipulation and equation solving; commercial flowsheeting software (Hysys) for solving engineering design problems. This unit of study runs concurrently with another enabling technology unit of study CHNG3802. These two units together provide students with the tools and know-how to tackle real-life engineering problems encountered in the concurrent project-based unit of study, CHNG3803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

CHNG3802
Operating/Improving Industrial Systems

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **Corequisites:** CHNG3801 (Process Design) CHNG3803 (Design Practice 1 - Chemical & Biological Processes) **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives: All industrial processes require some process monitoring and control for satisfactory operation. The performance of a process may be improved via the implementation of some level of optimisation. This unit of study commences with a component on process data management before moving on to empirical modelling and data reconciliation techniques. The second component will concentrate on the role of process control covering: the development of linear models, control system analysis, the design and performance of feedback control systems, advanced control systems and the use of control related software. The final component will focus on process optimisation of batch and continuous processes. This UoS demonstrates that: process control and optimisation are integral concepts for any modern plant; a unified approach allows a diversity of application fields to be readily handled via a consistent approach from data analysis, though process control to process optimisation. The UoS will allow each student to achieve and demonstrate competency through a range of individual and group-based activities. By the end of this UoS a student should achieve competence in the following: process data management skills relevant to engineering (statistical analysis, data-based modelling and data reconciliation techniques); appreciation of the role of process control in modern manufacturing; designing an appropriate feedback control system and analysing its performance for a range of process applications using both traditional and software-based techniques; appreciation of the limitations of feedback control and be able to design a range of common enhancements; appreciation of the role of process optimisation in modern manufacturing; use of both traditional and software-based techniques to design optimisation schemes for a range of process applications and analyse the performance of such schemes; appreciate the limitations that exist whenever mathematical models are used as the basis for process control and/or optimisation; appreciate the 'vertical integration' that exists from modelling, through control, to optimisation. This UoS is part of an integrated third-year program in chemical engineering. Completion of this body of work is required before a student will be permitted to move into the final-year with its emphasis on detailed design work, thesis based research and advanced engineering options.

CHNG3803
Chemical/Biological Process Design

Credit points: 6 **Session:** Semester 1 **Classes:** 4 hours of project work in class per week. **Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **Corequisites:** CHNG3801 (Process Design) CHNG3802 (Operation, Analysis and Improvement of Industrial Systems) **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives: All industrial processes require some process monitoring and control for satisfactory operation. The efficient use and recovery of energy is vital for industrial processes. The performance of a process may be improved via the implementation of some level of optimisation. This unit of study commences with a component on process data management before moving on to empirical modelling and data reconciliation techniques. The second component will concentrate on the role of process control covering: the development of linear models, control system analysis, the design and performance of feedback control systems, advanced control systems and the use of control related software. In parallel, this unit of study also focuses on the efficient use of energy in process plants. The final component will focus on process optimisation of batch and continuous processes. This unit of study demonstrates that: process control and optimisation are integral concepts for any modern plant; a unified approach allows a diversity of application fields to be readily handled via a consistent approach from data analysis, though process control to process optimisation. The unit of study will allow each student to achieve and demonstrate competency through a range of individual and group-based activities. By the end of this unit of study a student should achieve competence in the following: process data management skills relevant to engineering (statistical analysis, data-based modelling and data reconciliation techniques); appreciation of the role of process control in modern manufacturing; designing an appropriate feedback control system and analysing its performance for a range of process applications using both traditional and software-based techniques; appreciation of the limitations of feedback control and be able to design a range of common enhancements; appreciation of the role of process optimisation in modern manufacturing; use of both traditional and software-based techniques to design optimisation schemes for a range of process applications and analyse the performance of such schemes; appreciate the limitations that exist whenever mathematical models are used as the basis for process control and/or optimisation; appreciate the "vertical integration" that exists from modelling, through control, to optimisation.

CHNG3804
Biochemical Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of project work in class per week. 12 hours of laboratory work per semester. **Prerequisites:** CHEM1101; CHEM1102; CHNG1103; CHNG2801; CHNG2802, CHNG2803; CHNG2804; CHNG2805; CHNG2806; **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering units of study in second year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Biochemical engineering is increasingly playing an important role in technology to modern society. The engineers with knowledge of various aspects of biochemical processes are tremendously valuable. The course will examine cutting edge examples of biochemical technologies across a broad range of applications relevant to chemical engineering. The specific objectives of this course are to understand the history and scope of the biotechnology industry; examine the role of biochemical engineering in the industrial application of biotechnology and its development. We will provide an understanding of the major fundamental aspects of biochemical engineering and implementing the knowledge acquired to some selected industrial applications.

At the completion of this unit of study students should have developed an appreciation of the underlying principles of biochemical engineering and the ability to apply these skills to new and novel situations. The students will be able to critically analyse different types of biochemical engineering processes and to improve these processes consistent with the principles of biochemical engineering.

Students are encouraged to engage in an interactive environment for exchange of information and develop problem-solving skills for successfully handling challenging engineering situations. This course will be assessed by quizzes, assignments and exams.

CHNG3805
Product Formulation and Design

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 2 hours per week; Tutorials : 1 hour per week **Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **Corequisites:** CHNG3806 (Management of Industrial Systems) CHNG3807 (Design Practice 2 - Products and Value Chains) **Assumed knowledge:** Mass and Energy Balances Conservation and Transport Phenomena Applied Mathematics (for Chemical Engineering) Process Design Concepts Process Control and Optimisation Concepts **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Product design is one of the new frontiers of chemical and biomolecular engineering. Many products emerge from their processing not as a continuous stream, but as discrete entities. There are many examples of discrete systems in chemical and biomolecular engineering; these include particulate systems (e.g. powders or solid particles in fluids), as well as polymeric and biological systems (e.g. emulsions and cells, respectively). This unit of study is an introduction to the basic concepts in discrete systems necessary for a chemical engineer to be able to formulate and design discrete products with desired properties. In essence it is a course on product formulation and design.

The unit of study will provide students with a working knowledge of the types of discrete systems available, the ways in which particulate systems can be characterized and their applications in industry. These aspects will form the foundation for an introduction to the common techniques used to model discrete systems. By the end of the unit of study students should be proficient at understanding the types of discrete systems available, and the techniques used to characterise particulate systems, understanding the basic principles of particle-fluid systems, applying these principles and solving simple problems in product design and particulate engineering.

CHNG3806
Management of Industrial Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of tutorials per week **Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **Corequisites:** CHNG3805 (Product Formulation and Design) CHNG3807 (Design Practice 2 - Products and Value Chains) **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives: To develop an appreciation of management practice in process-led and product-driven industries; considering project management, economic evaluation of processes, risk assessment and decision making with multiple objectives and uncertainty; to develop the requisite tools to support above; to consider approaches to innovation and entrepreneurship; to consider all this in the context of different scales of operation - from single process, to business unit, to enterprise, and across supply and value chains; to support this analysis through real-problem case studies and projects.

By the end of this unit of study a student should be competent in: developing project work plans in conjunction with project management schedules; performing economic evaluations of projects, plans and processes; performing qualitative risk assessments of projects, plans and processes; exploring optimisation of complex processes under risk and uncertainty, covering unit operations, business units, enterprises and value chains.

CHNG3807
Products and Value Chains

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 1 hour per week; Project Work in class : 6 hours per week **Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **Corequisites:** CHNG3805 (Product Formulation and Design) CHNG3806 (Management of Industrial Systems) **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is designed to give students experience at solving complex, interesting, real world engineering problems, by applying theoretical and experimental principles learnt during their studies. During the unit of study students will be required to work on three project-driven case studies covering a range of design scenarios, from the domain of particulate products, entrepreneurial ventures (business 'start ups'), ethics and product value chains. This unit of study is a concurrent requirement for the concept and enabling technology courses running in parallel in the same semester. By the end of the unit of study students should be proficient at developing a strategy for taking a product development idea from concept to commercial artefact - with a comprehensive appreciation of economic arguments, underlying uncertainties (and how to mitigate these), and consideration of trade-offs inherent in this development. They should also be able to apply design and analysis tools for the synthesis of particulate products leading to the manufacture of a preferred product at pilot scale and be able to develop a strategy for the design and analysis of extended business enterprises. A key aspect of the unit of study is that students demonstrate these outcomes in project mode. The three projects in the unit of study address "issues of scale" of chemical and biomolecular engineering, from molecular to macro-systems levels.

CHNG3808
Polymer Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 **Corequisites:** CHNG3801 **Assumed knowledge:** Completion of CHNG3801; CHNG3802; CHNG3803 and currently enrolled in CHNG3805, CHNG3806, CHNG3807. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Polymers are ubiquitous and a significant number of scientists and engineers are employed by the Polymer Industry. This unit of study will facilitate engagement with a broad spectrum of engineering knowledge base that range from polymer synthesis to design of polymer products to developing sustainable technology in polymer synthesis and applications. The industrial applications range from biomedical to electronics and semiconductors to nanotechnology, in addition to usual consumer products. Technical knowledge relating to polymer chemistry, mathematics, fluid and solid mechanics, heat transfer, mass transfer and reaction engineering will be applied for the planned outcomes of this course.

The specific objectives are: To analyse molecular structures and their relations with material properties; To investigate the variety of thermal and thermo-mechanical properties relevant for probing polymer structure as well as understanding material behaviour in the context of applications; To engage with rheological characterization of polymers to probe polymer structural as well as to understand material behaviour in the context of applications; To understand the principles of polymer synthesis and to design polymerization reactors for producing polymer resins; To understand the principles of polymer processing in order to design polymeric products for consumer and specialty applications; To critically analyze production of polymeric goods from the sustainability point of view; To engage with examples of cutting-edge engineering product and process designs and applications that encompass biomedical, nanotechnology, electronics and other emerging technologies.

At the completion of this Unit of Study students should have developed: An appreciation of the underlying principles of polymer engineering; The ability to apply these skills to new and novel situations; The ability to critically analyse the methods of manufacture of different products and processes and to improve these processes; The development of an integrated suite of problem-solving skills needed to successfully handle new engineering applications; An ability to independently research and be critical of the findings; An ability to analyze experimental data; An ability to carry out process and product design through critical thinking; Interpersonal, group and teamwork skills including the ability to communicate clearly and concisely; Professionalism in terms of taking responsibility for the results of their calculations and recommendations; Lifetime or self-directed learning skills including the ability to critically assess one's own performance in a constructive manner.

CHNG4001
Practical Experience

Session: Semester 1, Semester 2 **Assumed knowledge:** Advisory prerequisite: 28 credit points of 3rd year units **Campus:** Camperdown/Darlington **Mode of delivery:** Professional Practice

Students are to obtain first-hand experience of the way chemical engineering skills are employed in an industrial context. 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.

CHNG4003
Advances in Chemical Engineering A

Credit points: 4 **Session:** Semester 1, Semester 2 **Classes:** Lectures : 2 hours per week; Tutorials : 1 hour per week **Assumed knowledge:** Knowledge of modern chemical engineering principles and practice. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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

Objectives/Outcomes: The objective of this unit of study 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.

CHNG4006
Professional Option

Credit points: 2 **Session:** Semester 1, Semester 2 **Classes:** There are no formal classes for this course. **Assumed knowledge:** Passed at least 144 credit points. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must be in the final semester of their degree program.

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.

CHNG4041
Exchange Program 4A

Credit points: 24 **Session:** Semester 1, Semester 2 **Prerequisites:** 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 School of Chemical and Biomolecular Engineering at the University of Sydney and at the participating exchange institution. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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 (i.e. both CHNG4041 and CHNG4042), 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.

CHNG4042
Exchange Program 4B

Credit points: 24 **Session:** Semester 1, Semester 2 **Prerequisites:** 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 School of Chemical and Biomolecular Engineering at the University of Sydney and at the participating exchange institution. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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 (i.e. both CHNG4041 and CHNG4042), 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.

CHNG4203
Major Industrial Project

Credit points: 24 **Session:** Semester 1 **Classes:** no formal classes **Prerequisites:** Passed at least 144 credit points and have a WAM greater than credit average Students wishing to do this unit of study are required to discuss the matter with the Head of School prior to enrolment. **Campus:** Camperdown/Darlington **Mode of delivery:** Professional Practice

Note: Department permission required for enrolment.

This unit of study will give students a rich 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.

The project is carried out under joint University/industry supervision and extends over several months, with the student essentially being engaged fulltime on the project at the industrial site. Previous students have been placed with industries in areas including the mining industry, oil and gas processing, plastic and paint manufacture, food production, manufacturing and so on. Students will learn from this experience the following essential engineering skills : 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. Presentation skills will also be developed, which are highly relevant to many branches of engineering activity.

CHNG4802
Chemical Engineering Design A

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures 2 hours per week; Tutorials 2 hours per week; Group Work 2 hours per week **Prerequisites:** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering unit of study in third year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This unit of study is part of an integrated (two semester) fourth year program in chemical engineering design whose overarching aim is to complete the 'vertical integration' of knowledge.

Aims and Objectives: In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This units of study builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity. This design activity is spread over two unit of study (Chemical Engineering Design A and B) run in first and second semester. The primary aim in the first unit of study is to consider the technical issues -with an emphasis on creating and evaluating a range of alternative options that exist at both the unit operation and complete flowsheet levels. The primary emphasis in the subsequent unit of study is on evaluating how non-technical considerations affect the final process design and its operation.

By the end of both units of study a student should be able to develop a wide range of alternative conceptual designs for a given product specification and market analysis, have an appreciation of how to evaluate process alternatives at the conceptual level with a view to creating a 'short-list' worthy of more detailed technical investigation, be familiar with the use of process flowsheeting software to compare alternative designs , appreciate the fact that technical considerations are only one component in an overall successful design project and be able to clearly present the results from both individual and group work in oral/written formats.

CHNG4806
Chemical Engineering Design B

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures: 1-2 hours per week, Group Work 8-10 hours per week. **Prerequisites:** CHNG4802 Chemical Engineering Design A or CHNG4203 MIPPS **Assumed knowledge:** Enrolment in this unit of study assumes that all core chemical engineering units of study in third-year have been successfully completed, as well as the related first semester unit of study Chemical Engineering Design A. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This unit of study is part of an integrated (two semester) fourth year program in chemical engineering design whose overarching aim is to complete 'vertical integration' of knowledge - one of the pillars on which this degree program is based.

Aims and Objectives: In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This unit of study builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity. This design activity is spread over two unit of study (Chemical Engineering Design A or MIPPS run in first semester and Design B in second semester. The primary emphasis in this semester is on evaluating the interactions between the technical and non-technical considerations, and how they affect the final process design and its operation.

By the end of this unit of study a student should be able to develop a wide range of alternative conceptual designs for a given product specification and market analysis, have an appreciation of how to evaluate process alternatives at the conceptual level with a view to creating a 'short-list' worthy of more detailed technical investigation, be familiar with the use of process flowsheeting software to compare alternative designs , appreciate the fact that technical considerations are only one component in an overall successful design project and be able to clearly present the results from both individual and group work in oral/written formats.

CHNG4811
Honours Thesis A

Credit points: 6 **Session:** Semester 1 **Classes:** no formal classes **Prerequisites:** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains. This unit is available to only those students who have gained an entry to the Honours degree. **Prohibitions:** CHNG4801 Chemical Engineering Thesis A, CHNG4813 Engineering Project A **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.

The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Chemical Engineering Thesis A and B) run in first and second semester. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit, students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The progress at the end of Thesis A will be evaluated based on a seminar presentation and a progress report. The skills acquired will be invaluable to students undertaking engineering work.

CHNG4812
Honours Thesis B

Credit points: 6 **Session:** Semester 2 **Classes:** no formal classes **Prerequisites:** CHNG4811 Honours Thesis A **Prohibitions:** CHNG4805 Chemical Engineering Thesis B, CHNG4814 Engineering Project B **Assumed knowledge:** Enrolment in this unit of study assumes that Honours Thesis A and all (six) core chemical engineering units of study in third year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.

The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Honours Thesis A and B) run in first and second semester. In this unit of study, the primary emphasis is on the execution of a comprehensive and systemic series of investigations, and the reporting of the study in a major thesis document and an oral presentation. Students will acquire skills in developing a plan for a series of studies to illuminate an area of research, in evaluating alternatives at the conceptual level with a view to creating a 'short-list' worthy of more detailed technical investigation, and in searching the literature for guidance of the studies. Further, communication skills will be developed, such as the ability to clearly present the background and results in a written format and in an oral presentation to a general engineering audience. This UoS is part of an integrated (two semester) fourth year program involving a chemical engineering research project and thesis. It has the overarching aim of completing the 'vertical integration' of knowledge - one of the pillars on which this degree program is based. Students who have successfully completed CHNG4203 Major Industrial Project may apply for exemption from this unit of study and replace it with an advanced level chemical engineering elective unit of study.

CHNG4813
Engineering Project A

Credit points: 6 **Session:** Semester 1 **Classes:** no formal classes **Prerequisites:** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains. **Prohibitions:** CHNG4805 Chemical Engineering Thesis B, CHNG4811 Honours Thesis A **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.

The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Chemical Engineering Thesis A and B) run in first and second semester. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit, students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The progress at the end of Thesis A will be evaluated based on a seminar presentation and a progress report. The skills acquired will be invaluable to students undertaking engineering work.

CHNG4814
Engineering Project B

Credit points: 6 **Session:** Semester 2 **Classes:** no formal classes **Prerequisites:** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains. CHNG4813 Engineering Project A **Prohibitions:** CHNG4805 Chemical Engineering Thesis B, CHNG4812 Honours Thesis B **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.

The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Chemical Engineering Thesis A and B) run in first and second semester. In this unit of study, the primary emphasis is on the execution of a comprehensive and systemic series of investigations, and the reporting of the study in a major thesis document and an oral presentation. Students will acquire skills in developing a plan for a series of studies to illuminate an area of research, in evaluating alternatives at the conceptual level with a view to creating a 'short-list' worthy of more detailed technical investigation, and in searching the literature for guidance of the studies. Further, communication skills will be developed, such as the ability to clearly present the background and results in a written format and in an oral presentation to a general engineering audience.

School of Civil Engineering

CIVL0011
Civil Exchange A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Departmental permission required, Students must have a WAM >65 and to have completed one full year of study, that is 48 credit points **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL0012
Civil Exchange B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Department permission required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL0013
Civil Exchange C

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Department permission required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL0014
Civil Exchange D

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Department permission required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL0015
Civil Exchange E

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Department permission required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL0016
Civil Exchange F

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Department permission required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL0017
Civil Exchange G

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A work load one quarter of that of a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Department permission required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL0018
Civil Exchange H

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** A work load one quarter of that of a full time student at the exchange university. Meet requirements of the exchange course. **Prerequisites:** Department permission required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies. To be approved by relevant unit of study coordinators.

CIVL2110
Materials

Credit points: 6 **Session:** Semester 1 **Classes:** 4 hrs of lectures and a 2 hr tutorial per week & 4 hrs of lab work per semester **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Materials are an important part of the civil engineers' work. Indeed, civil engineers who are concerned with the design, construction, and maintenance of facilities need to understand the behaviour and performance of the materials used. And as it happens, mechanical properties which are essential and basic for civil engineers are highly dependent on the structure of materials at various scales. Therefore, it is important that a student in Civil Engineering possesses a fundamental knowledge in materials science. This unit of study aims to provide students with the tools necessary to select the adequate material for a particular application and to assess its mechanical behaviour while in use. This course will focus mainly on materials for civil engineering and construction applications, i.e. metals, concrete and soils.

CIVL2201
Structural Mechanics

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week, 2 hours of laboratory per semester. **Prerequisites:** ENGG1802 Engineering Mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The primary objective of this unit is to understand internal actions (forces and moments) in structures (deformable objects) under loads in three key areas: how structures resist external loads by internal actions; the distribution of internal actions within structures; and the deformations, stresses and strains associated with the internal actions.

At the end of this unit, students should be able to understand the basic methods of load transfer in structures - tension, compression, bending, shear and torsion (internal actions); apply the equations of equilibrium to determine the distribution of internal actions in a simple structure by drawing BMDs, SFDs, AFDs, and TMDs; understand the significance and methods of calculation of the geometric properties of structural sections (I, Z, S, J etc); understand the effect of internal forces and deformations of bodies through the concept and calculation of strains and stresses; appreciate the behaviour of structures by analysing structures without numerical calculations; display a knowledge of basic material properties, combined stresses and failure criteria; and demonstrate their hands-on experience of the behaviour of structural members via experiments and the ability to prepare written reports on those experiments.

Emphasis in the assessment scheme will be placed on understanding structural behaviour and solving problems, rather than remembering formulae or performing complex calculations.

The course seeks to utilise and improve the generic skills of students, in areas such as problem solving, neat and logical setting out of solutions, report writing, and team work.

The syllabus comprises introduction; equilibrium; internal actions: BMDs, SFDs, AFDs, and TMDs; elasticity, stress and strain, and basic material properties; axial forces: tension and compression; elastic bending of beams; shear force and shear stresses in beams; torsion; deflection of beams; pipes and pressure vessels; trusses; material properties, combined stresses and yield criteria; advanced bending; introduction to buckling and instability.

CIVL2230
Intro to Structural Concepts and Design

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** ENGG1802 Engineering Mechanics, CIVL2110 Materials CIVL2201 Structural Mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The primary objective is to develop an understanding of design concepts and an introduction to the design of steel, concrete and composite structures. This involves calculation of loads on structures caused by gravity, wind and earthquake; and analysis and design of basic structural elements

CIVL2410
Soil Mechanics

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 1 hour of tutorial per week, 10 hrs of laboratory work per semester. **Assumed knowledge:** CIVL2201 Structural Mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course provides an elementary introduction to Geotechnical Engineering, and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of: the nature of soils as engineering materials; common soil classification schemes; the importance of water in the soil and the effects of water movement; methods of predicting soil settlements, the stress-strain-strength response of soils, and earth pressures.

CIVL2511
Instrumentation and Measurement

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 to 4 hours of tutorial/project work/laboratory per week. Site visit. **Assumed knowledge:** CIVL2201 Structural Mechanics, ENGG1802 Engineering Mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to introduce students to the philosophy and principles of measurement, and its uses in Civil Engineering practice and research. The instrumentation used in practice, the underlying physical principles and the basic electrical/electronic and signal processing issues. It will introduce students to issues in the planning and construction of experiments. Give experience working in groups and in producing reports.

At the end of this unit, students should gain an understanding of the importance of measurement, of the methods and application of measurement; ability to conduct experiments and interpret measurements. The course will reinforce key concepts in Structural Mechanics, Fluid Mechanics, Soil Mechanics and Surveying.

The syllabus comprises principles of measurement, presentation of data, error analysis, stress and strain, sensor types and technologies wave based techniques and wave analysis, photographic techniques, signal processing, electric circuit theory.

CIVL2611
Fluid Mechanics: Inviscid Flow

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Assumed knowledge:** MATH1001 Differential Calculus, ENGG1802 Engineering Mechanics, CIVL2201 Structural Mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit of study are to develop an understanding of basic fluid mechanics concepts of incompressible flows. We assume that the physics of the flow can be described by inviscid fluid equations. Further we identify in which flow zones these equations apply and study the physics of irrotational flow, streamlines and velocity potential. Steady and unsteady flow solutions are investigated. Furthermore, flow around fixed and floating cylindrical structures and other objects are studied to estimate the pressures and forces on structures. We further study free-surface water wave models in deep water applications based on the Laplace and Bernoulli equations. Solutions are discussed in relation to waves in tanks, ship stability, oscillations in harbours, offshore platforms and other marine structures. We introduce model scale laws and dimensional analysis for undertaking basic fluid laboratory studies. Conducting classical experiments and corresponding report write-up training, reflecting an understanding of the basic theory and interpretation of flow physics, are important components of this unit of study. Although the unit of study has a focus on a theoretical background to fluid flow, computational as well as experimental approaches in obtaining fluid flow solutions are highlighted in the context of modern engineering analysis and design.

CIVL2810
Engineering Construction and Surveying

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and a 1 hour tutorials per week. 18 hrs of practical exercises per semester. **Assumed knowledge:** MATH1001, MATH1002, MATH1003, MATH1005 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to gain an understanding of the fundamentals of engineering construction including systems and methods in construction of excavation, embankments and other earthworks, hauling and associated operations. To provide basic analogue methods of distance, angle and height measurement. To provide an understanding of three dimensional mapping using basic total station electronic field equipment with associated data capture ability. To give an insight into future trends in the use of GPS and GIS systems.

At the end of this unit, 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 productivity evaluation. Proficiency in the design and implementation of mapping systems in Civil Engineering, using analogue and electronic field equipment and associated software packages.

The syllabus comprises introduction to the framework under which construction projects are formulated and analysed; construction engineering fundamentals; construction systems related to excavation, hauling and embankment construction, including selection and evaluation of plant and methods as well as the expected output and cost; introduction to construction operations management. Introduction to engineering surveying, distance measurement, angle measurement, levelling, traversing, topographic surveys, electronic surveying equipment, future surveying technologies.

CIVL3010
Engineering and Society

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2-3 hours workgroup sessions per week **Assumed knowledge:** ENGG1803 Professional Engineering **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The goals of this unit are to introduce students to major problems of environmental deterioration and to concepts of sustainability and ethics, and show the role of civil engineers in addressing these issues; to develop an appreciation for the impact of civil engineering decisions within the broader economic, environmental and socio-cultural contexts; to develop communication skills through participation in group discussions, oral presentations, and written report writing. Lectures, group discussions, case problems and projects are all used in teaching and learning in this unit of study.

At the end of the unit, students will be able to describe major environmental problems of local air pollution, climate change and water quality and the role civil engineers play in generating, preventing and resolving these problems. Students will have a better ability in designing more sustainable housing developments through the BASIX system. Students will develop a greater social awareness and their capabilities in ethical, moral and social reasoning will be strengthened, hence improving their decision-making abilities.

The syllabus comprises role(s) of Civil Engineers, historical development of profession, air pollution, climate change, water quality; history of the sustainability concept, definitions of sustainability; environment as an economic externality and polluter-pay principle; BASIX design system; theories of ethical behavior - deontology, utilitarianism, virtue ethics, codes of ethics, public interest disclosures, people, leadership and integrity, building ethical organization.

CIVL3205
Concrete Structures 1

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 3 hours of project work in class per week **Assumed knowledge:** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide a basic understanding of the behaviour of reinforced concrete members and structures; to provide a basic understanding of standard methods of analysis and design of reinforced concrete behaviour (including an understanding of capabilities and limitations); and to provide basic design training in a simulated professional engineering environment.

At the end of this unit students will gain proficiency in basic methods of reinforced concrete analysis and design.

The syllabus comprises the behaviour of reinforced concrete members and structures, including: material properties, 'elastic' analysis (stresses/deformations/time-dependence), ultimate strengths of beams (flexure), ultimate strength of columns (short and slender), behaviour or reinforced concrete slabs. The reinforced concrete truss analogy (shear/torsion/and detailing implications). Design of typical elements of a reinforced concrete building, structural modelling, analysis of load-effects (incl.earthquakes), design criteria (for durability, fire-resistance, serviceability and strength), design calculation procedures, reinforcement detailing, structural drawings.

CIVL3206
Steel Structures 1

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures, 3 hours of tutorials per week, 4 hours of laboratory work per semester **Assumed knowledge:** CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objective of this unit is to provide a basic understanding of behaviour and design of steel members, connections and structures.

At the end of this unit, students should be familiar with the behaviour of steel structures, in particular the various forms of buckling and failure, particularly those associated with tension, bending, shear, compression, combined actions and connections; have a working knowledge of AS 4100, and be competent in designing a simple structure to AS 4100.

The syllabus comprises the behaviour of steel members and structures - properties of cross-sections, local buckling, elastic beams, plastic beams, tension members, compression members, effective lengths and elastic in-plane frame buckling, local and lateral buckling of beams, in-plane bending of beam columns, lateral buckling of beam-columns, biaxial bending of beam-columns, bolted and welded connections.

CIVL3235
Structural Analysis

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** CIVL2110, CIVL2230 and MATH2061 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide an understanding of the principles of structural analysis by introducing the strain-displacement, stress-strain and equilibrium relationships for beam members; applying the relationships to the matrix displacement analysis of frame structures; and using computer software to conduct the linear-elastic and buckling analyses of frame structures.

At the end of this unit, students will be able to deduce appropriate structural models for frame structures; and use computer methods and simple hand methods to obtain internal forces and displacements as well as buckling loads for frame structures.

The syllabus comprises theoretical background (strain-displacement, stress-strain and equilibrium relationships), structural analysis software, matrix displacement method, beam theory, introduction to nonlinear analysis, buckling analysis.

CIVL3411
Geotechnical Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Assumed knowledge:** CIVL2410 Soil Mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide an understanding of the factors influencing soil strength, and to give practice in the application of this understanding by exploring the stability of slopes, retaining walls and foundations. At the end of this unit students will be able to: determine the strength parameters appropriate to a range of stability problems, and understand the difference between total and effective stress approaches; evaluate strength parameters from laboratory data; critically analyse foundation stability and slope stability problems; use spreadsheets to perform parametric studies and produce design charts for simple geotechnical design problems; and communicate the results of experiments and analyses using written methods appropriate for professional geotechnical engineers. The syllabus comprises; methods of analysis for gravity and sheet pile retaining walls; reinforced soil; slope stability, including modes of failure, analysis and computer methods; bearing capacity of shallow foundations under general loading, and axial and lateral capacities of deep pile foundations; the mechanical behaviour of sands and clays; the Cam Clay model and the breakage model.

CIVL3612
Environmental & Fluids Eng: Viscous Flow

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lecture and 2 hours of tutorials per week, 8 hours of laboratory work per semester **Assumed knowledge:** ENGG1802 Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2201 - Structural Mechanics, CIVL2611 - Fluid Mechanics: Inviscid Flow **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study introduces applied fluid mechanics using the fundamentals learned in CIVL2611 Fluid Mechanics. Combined, these units of study provide the foundation for the detailed study of Fluid mechanics. This unit of study aims to provide an understanding of: basic hydrology, meteorology, rainfall measurements, intensity-frequency-duration curves, hyetographs, hydrographs, open channel flow, pipe flow, flow around immersed bodies, compressible flow, and turbomachinery.

CIVL3613
Ocean and Coastal Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of lectures and 2 hours of tutorials per week. **Assumed knowledge:** CIVL2611 - Fluid Mechanics: Inviscid Flow **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit of study are to develop an understanding of the physics of ocean waves at any water depth and its application to the analysis and design of marine structures. This unit of study introduces the governing equations for free surface flows, including linear and nonlinear wave theories, wave transformation physics and nearshore hydrodynamics modelling. Furthermore, this unit of study includes the calculation of wave forces based on deterministic and probabilistic wave theories, wave-induced coastal currents and sediments, wind-wave-structure interactions, tides, ocean engineering operational sea state, storm surges (due to cyclones and tsunamis) and various other environmental effects. Many marine structure design applications are introduced, including jetties, harbours, breakwaters, bridge piers, dams, offshore platforms, turbines and other wind/wave energy devices. The major outcomes of this unit of study are (i) an understanding of wave physics at any water depth and the criteria for choosing the appropriate wave theory, and (ii) the ability to apply this understanding to the analysis and design of engineering marine structures. Although the unit has an analytical focus, the use of model scale, computational techniques and code of practice based design are also discussed.

CIVL3805
Project Scope, Time and Cost Management

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** 36 Intermediate credit points **Assumed knowledge:** CIVL2810 - Engineering Construction and Surveying **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is a third year 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. The general aim of this unit of study is to offer student the opportunity to develop an understanding of the scope, time and cost management in project environments. Student will engage with some of the key concepts and various activities which underpin project scope, time and cost management. At the end of this unit, students will be able to: develop Work Breakdown Structure (WBS), network diagrams, and undertake Critical Path Analysis (CPA) and Earned Value Analysis (EVA) using the given project information; explain in depth why scope, time and cost management are important to project management; analyze a project situation that involves scope, time and cost management issues; and explain how the components of scope, time and cost management interrelate in project environments. The syllabus comprises the project planning cycle, working with the project sponsor, scope initiation and definition, project scope definition tools, WBS, network scheduling techniques, CPA, Just-in-Time philosophy, estimating and budgeting, cash flow management, EVA and application of project management software.

CIVL3812
Project Appraisal

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** MATH1005 - Statistics, CIVL3805 Project Scope, Time and Cost Management **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is a third-year core unit for students enrolled in any of the undergraduate streams in the School of Civil Engineering and elective for all other branches of engineering and other faculties. The objectives of this unit of study are to develop students' ability to critically analyse issues involved in project appraisal and to equip students with the concepts, tools and analytical processes to effectively carry out project appraisal tasks for businesses, non-profit organisations, and governments. At the end of this unit, students should be able to comprehend and relate to real-life examples the fundamental concepts in project appraisal (e.g. the meaning of time value for money, equivalence); calculate common financial indicators for a given project and explain the relevance of each to the appraisal of the project; rank projects by combining both financial and non-financial indicators (e.g. environmental and social); understand how risks and uncertainties affect evaluation outcomes and be able to deal with uncertainties and risks in analysis; apply techniques to account for the effects of inflation/deflation and exchange rates in analysis; understand the concept and mechanisms for depreciation and carry out pre-tax as well as post-tax analysis; understand the assumptions, pros and cons of each evaluation method and be able to explain why a particular method is appropriate/not appropriate for a given project. The syllabus comprises time value of money, cost of capital, simple/compound interest, nominal/effective interest, cost/benefit analysis of projects; equivalence, net present worth (value), future worth (value), annual worth (value), internal rate of return, external rate of return, payback period, cost-benefit analysis, cost-utility analysis, identifying and quantifying non-financial benefits/externalities, price changes and exchange rates, techniques for multi-criteria group decision-making, economic analysis of business investment projects, depreciation, capitalisation and valuation studies, replacement of assets, real option, project risk analysis, decision-tree analysis, binomial method, WACC, MARR, equity capital, debt.

CIVL3813
Contracts Formulation and Management

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** 36 Senior Credit Points **Assumed knowledge:** CIVL3805 Project Scope, Cost & Time Management **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This Unit of Study aim to teach students a fundamental knowledge of the law, especially the law of contracts, as it relates to managing engineering and construction contracts. Emphasis will be on the principles of contract formulation, administration and finalisation, including prevention and/or management of disputes.

CIVL4008
Practical Experience

Session: Semester 1 **Classes:** 12wks practical work experience (420hrs minimum) **Prerequisites:** 30 credit points of third year units of study **Campus:** Camperdown/Darlington **Mode of delivery:** Professional Practice

This is a fourth year core unit of study for the degree in Civil Engineering and Project Engineering and Management (Civil).

The objectives of this unit are to expose students to Engineering Practice and provide working experience in the field of engineering.

At the end of this unit, students will gain first hand experience of working in an Engineering environment, will see how engineering companies are organised and will be exposed to problem solving in a commercial environment.

The syllabus requires each student 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 (420 hours minimum) is required and this is generally undertaken after the completion of the prescribed third year 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.

CIVL4022
Honours Thesis A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Weekly contact with supervisor - typically 1 hour per week **Prerequisites:** 30 credit points of Senior Units of Study, ISWAM 65 or over **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment in the following sessions: Semester 2.

Honours Thesis provides an opportunity for students to conduct original research. Students will generally work in groups, although planning and writing of the thesis will be done individually; i.e., a separate thesis must be submitted by each student. Only in exceptional circumstances and by approval of Thesis course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Honours Thesis is a major task and is to be conducted with work spread over most of the year, in two successive Units of Study of 6 credits points each, Honours Thesis A (CIVL4022) and Honours Thesis B (CIVL4023). This particular unit of study, which must precede CIVL4023 Honours Thesis B, should cover the first half the work required for a complete 'final year' thesis project. In particular, it should include almost all planning of a research or investigation project, a major proportion of the necessary literature review (unless the entire project is based on a literature review and critical analysis), and a significant proportion of the investigative work required of the project.

CIVL4023
Honours Thesis B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Weekly contact with supervisor - typically 1 hour per week **Prerequisites:** 30 credit points of Senior units of study and successful completion of CIVL4022 - Honours Thesis A **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment in the following sessions: Semester 1.

Honours Thesis provides an opportunity for students to conduct original research. Students will generally work in groups, although planning and writing of the thesis will be done individually; i.e., a separate thesis must be submitted by each student. Only in exceptional circumstances and by approval of Thesis course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Honours Thesis is a major task and is to be conducted with work spread over most of the year, in two successive Units of Study of 6 credits points each, Honours Thesis A (CIVL4022) and Honours Thesis B (CIVL4023). This particular unit of study, which must precede CIVL4023 Honours Thesis B, should cover the first half the work required for a complete 'final year' thesis project. In particular, it should include almost all planning of a research or investigation project, a major proportion of the necessary literature review (unless the entire project is based on a literature review and critical analysis), and a significant proportion of the investigative work required of the project.

CIVL4024
Engineering Project A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Weekly contact with Supervisor - typically 1 hour per week **Prerequisites:** 30 Credit Points of Senior Units of Study **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment in the following sessions: Semester 2.

Engineering Project A & B provide an opportunity for students to undertake a major project in a specialised area relevant to civil engineering. Students will generally work in groups, although planning and writing of reports will be done individually; i.e., a separate report must be submitted by each student. Only in exceptional circumstances and by approval of Engineering Project course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Engineering Project is spread over a whole year, in two successive Units of Study of 6 credits points each, Engineering Project A (CIVL4024) and Engineering Project B (CIVL4025). This particular unit of study, which must precede CIVL4025 Engineering Project B, should cover the first half of the work required for a complete 'final year' thesis project. In particular, it should include almost all project planning, a major proportion of the necessary background research, and a significant proportion of the investigative or design work required of the project.

CIVL4025
Engineering Project B

Credit points: 6 **Session:** Semester 1, Semester 2 **Prerequisites:** 30 Credit Points of Senior Units of Study and successful completion of CIVL4024 Engineering Project A **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment in the following sessions: Semester 1.

Engineering Project A & B provide an opportunity for students to undertake a major project in a specialised area relevant to civil engineering. Students will generally work in groups, although planning and writing of reports will be done individually; i.e., a separate report must be submitted by each student. Only in exceptional circumstances and by approval of Engineering Project course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Engineering Project is spread over a whole year, in two successive Units of Study of 6 credits points each, Engineering Project A (CIVL4024) and Engineering Project B (CIVL4025). This particular unit of study, which must be preceded by or be conducted concurrently with CIVL4024 Engineering Project A, should cover the second half of the work required project work. In particular, it should include completion of all components planned but not undertaken or completed in CIVL4024 Engineering Project A.

CIVL4414
Finite Element Analysis

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** ENGG1802 Engineering Mechanics, CIVL2201 Structural Mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The objectives of this unit are to provide an opportunity for students to develop an understanding of finite element analysis and how to apply this to the solution of civil engineering problems.

At the end of this unit, students should acquire knowledge of methods of formulating finite element equations, basic element types, the use of finite element methods for solving problems in structural, geotechnical and continuum analysis and the use of finite element software packages.

The syllabus comprises introduction to finite element theory, analysis of bars, beams and columns, and assemblages of these structural elements; analysis of elastic continua; problems of plane strain, plane stress and axial symmetry; use, testing and validation of finite element software packages.

CIVL4614
Flow-Induced Vibrations

Credit points: 6 **Session:** Semester 1 **Classes:** 4 hours of lectures per week. Site visits. **Assumed knowledge:** CIVL2611 Fluid Mechanics: Inviscid Flow, CIVL3612 Environmental Fluids Engineering: Viscous Flow, CIVL2230 Introduction to Structural Concepts and Design, CIVL3235 Structural Analysis **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Large civil engineering structures and structural components are subjected to dynamic environmental loadings. This unit of study focuses on the understanding of hydro- and aerodynamics to analyse and design against wave and/or wind loading on tall buildings, long-span bridges, chimneys, offshore structures, etc. Wave and wind loading are highly nonlinear and usually a detailed mathematical model is necessary. We will through structural dynamics theory and examples decide whether static or dynamic models are appropriate. Furthermore, nonlinear vibration effects are introduced through the description of concepts such as negative damping leading into the topic of vortex-induced vibrations. Having learnt about the loadings which may cause undesirable structural vibrations, methods for suppressing unwanted vibrations are introduced.

The fundamental aim of this course is to be able to design engineering structures using approximate models for analytical dynamic response estimates. A further aim is to understand the importance of the interaction between dynamic loads and structural response, especially the interaction between unsteady fluid dynamics and structural response. Although the course has an analytical focus, the use of model scale, computational techniques and code of practice based design are also discussed.

CIVL4615
Water Resources and Hydrology

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. Laboratory work. **Assumed knowledge:** ENGG1802 - Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2611 - Fluid Mechanics: Inviscid Flow, CIVL3612 - Environmental and Fluid Engineering: Viscous Flow **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study covers the basic aspects of water resources and hydrology. The water resources engineering component is separated into two parts: 1. Physical processes in water supplies and discharges, and 2. supply, management, and treatment of water resources. The hydrology component covers: Infiltration and groundwater; evaporation and transpiration; surface runoff; synthetic hydrographs; flood routing and reservoir design. The unit of study builds on the theory and concepts learnt in CIVL2611 Fluid Mechanics: Inviscid Flow and CIVL3612 Environmental and Fluid Engineering: Viscous Flow.

This unit of study aims to provide an understanding of: reservoir and lake dynamics, dispersion in rivers and the coastal ocean, water supply networks and systems, conservation and management of water resources, wastewater reuse and applications, indicators of water quality, water treatment methods, water treatment plants; surface runoff assessment, calculation of peak flows, hydrographs for various storm durations and intensities, flood routing calculations, design procedures for storage and service reservoirs; reservoir safe yield; and evaporation from reservoirs and evapo-transpiration from catchments.

CIVL4810
Mgmnt of People, Quality and Risk in PE

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** CIVL3805 Project Scope, Time and Cost Management **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is a fourth year core unit of study for the Bachelor of Project Engineering & Management (Civil), elective for all other branches of engineering and other faculties. The objectives of this unit are to provide underpinning knowledge and application skills in the project environment for quality, risk and people management. At the end of this unit, students will be able to understand the dynamics of team building and management, conflict resolution processes and techniques, project leadership; and, be able to design and implement plans for quality and risk management on a range of simple generic projects and provide input to these plans for more complex projects. The syllabus comprises team management, conflict resolution and project leadership; modern quality management principles and techniques, quality assurance, preparation of quality plans; risk analysis, planning and risk management throughout a project's life cycle.

Textbooks

Harold Kerzner, Project Management - Systems Approach to Planning, Scheduling, and Controlling, 9th Ed. (2006), Johns Wiley: New Jersey.

CIVL4811
Engineering Design and Construction

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, 3 hours of of project work in class per week. **Prohibitions:** CIVL3802 Engineering Construction 2 **Assumed knowledge:** CIVL2810 Engineering Construction and Survey **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to develop an understanding of construction methods, strategies, equipment and machinery in a range of construction activities and an understanding of the principles involved in the design for those construction activities.

At the end of this unit, students will have developed a familiarity with a variety of construction methods, strategies, equipment and machinery in a range of construction activities such that they will be able, if and when the opportunity arises to participate as site engineers (or similar role) in the planning and execution of those construction activities, albeit with supervision and guidance from experienced professionals. Students will also have developed an understanding of the design principles and techniques involved in the planning for those construction activities such that they are able, if and when the opportunity arises, to participate as design engineers, in the planning and design for those construction activities, with supervision and guidance from experienced professionals. The range of topics covered in this course is such that the learning outcomes form a basis for later development of more detailed knowledge, dependent on the future career experiences of the student. The course does not prepare a student for immediate, unsupervised participation in construction and design work associated with the topics covered.

The construction topics covered in this course have not been previously addressed in CIVL2810 (Engineering Construction and Survey). The topics may vary dependent on current and planned projects in Sydney, NSW and Australia. At this stage the topics are hard rock tunnelling and general hard rock underground excavation; soft ground tunnelling; underground construction; micro tunnelling; cut and cover (cover and cut) tunnelling; earth retaining systems; piling; formwork and falsework (incl Tilt up, Ultrafloor, Sacrificial form); dewatering; pavement design and construction - rigid and flexible (incl and pavement construction materials); stormwater drainage design and construction; marine construction; civil construction in environmentally sensitive areas; contract administration for construction engineers; general engineering in remote localities (project based); construction methods in bridge engineering; QA documentation on a typical project; insurance in the construction industry occupational health and safety issues in the construction industry.

CIVL4814
Project Procurement and Tendering

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** CIVL3805 Project Scope, Time and Cost Management **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is a fourth year core unit of study for the Bachelor of Project Engineering and Management (Civil), elective for all other branches of engineering and other faculties. The general aim of this unit is to offer student the opportunity to develop an understanding of the procurement of built facilities and the methods of job allocation in project environments. Student will engage with some of the key concepts which underpin job allocations in the construction industry. At the end of this unit of study, students should be able to: evaluate a client's procurement situation and apply an appropriate procurement route; explain how and why a particular procurement route is chosen; undertake procurement assessment exercises; analyze a contractor's strategic responses in tendering (bidding) decision-making; discuss why a particular bidding strategy is chosen in different contexts; and evaluate a contractor's bidding performance using competitor analysis techniques. The syllabus comprises fundamentals of building procurement, assessment of procurement risks, international contracting, competitive bidding, cost estimating, the competitive environment in the construction industry, contractors' competitive positioning, contractors' decision-making in bidding competition, bidding strategies and competitor analysis.

CIVL4815
Project Formulation

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Prerequisites:** CIVL3805 Project Scope, Time and Cost Management, CIVL3812 Project Appraisal **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is a fourth-year core unit for PEM students and an elective for all other branches of engineering and other faculties. The objective of this unit is, through the integration of areas of project management knowledge learned in various PEM subjects, to develop students' ability to develop project proposals through carrying out a feasibility study and developing a project plan for a real-life engineering project. This unit is relevant for students who intend to pursue a career related to project management. At the end of this unit, students should have developed understanding of the fundamentals of project conceptualisation, appraisal and planning plus the abilities to: model and analyse basic financing and cash flow requirements; develop risk management plan, marketing and sales plan, stakeholder management and communication plan, operations plan; and design professional documentation and presentation to a board of review. In addition, this unit also develops students' abilities in problem solving, working with other students, conducting independent research, communication in team environment, information need identification and collection, and understanding social and environmental issues. The syllabus comprises feasibility study, project appraisal, risk assessment and management, sensitivity analysis, project planning, project integration management, carbon-trading scheme, global warming, environmental impact assessment, investment capital, venture capital, due diligence, project planning, operational planning, revenue projection, community consultation, communication management, stakeholder management, political environment.

CIVL4903
Civil Engineering Design

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures and 3 hours of tutorial per week. **Assumed knowledge:** CIVL3205 Concrete Structures 1 and CIVL3206 Steel Structures 1. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This is a fourth year core unit of study for the degree in Civil Engineering and fourth year elective for the degree in Project Engineering and Management (Civil).

The objective of this unit is to give students an appreciation of the role of the designer in the development of Civil Engineering projects.

At the end of this unit, students will have developed an understanding of the design philosophy. They will gain this through their involvement in a number of exercises which cover the design sequence from concept to documentation.

The syllabus comprises: 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.

This unit is under the direction of an engineer in professional practice in cooperation with members of the academic staff. Lectures and exercises on architectural design and practice and their relationship to civil engineering are included in the unit.

Textbooks

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
AS1554 - Manual Welding, Part I
AS1170 - Loading Code, Parts I and II
AS1511 - High Strength Structural Bolting Code
MAI Steel Structures
Austroads Bridge Design Specification
AS1720 - Timber Engineering Code
(Purchase of separate codes is recommended)

School of Electrical and Information Engineering

ELEC1103
Fundamentals of Elec and Electronic Eng

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, 2 hours of laboratory, 2 hours tutorial and 4 hours of independent study per week. **Prohibitions:** ELEC1102 Foundations of Electronic Circuits. **Assumed knowledge:** HSC Physics, HSC Mathematics extension 1 or 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to develop knowledge of the fundamental concepts and building blocks of electrical and electronics circuits. This is a foundation unit in circuit theory. Circuit theory is the electrical engineer's fundamental tool.

The concepts learnt in this unit will be made use of heavily in many units of study (in later years) in the areas of electronics, instrumentation, electrical machines, power systems, communication systems, and signal processing.

Topics: a) Basic electrical and electronic circuit concepts: Circuits, circuit elements, circuit laws, node and mesh analysis, circuit theorems, energy storage, capacitors and inductors, circuits with switches, transient response, sine waves and complex analysis, phasors, impedance, ac power.; b) Project management, teamwork, ethics; c) Safety issues

ELEC1601
Foundations of Computer Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures, 1 hour of tutorial, 1 hour project work, 5 hours of independent study, and 2 hours of laboratory per week. **Prohibitions:** COMP2001 Computer Systems, COMP2901 Computer Systems (Adv). **Assumed knowledge:** HSC Mathematics extension 1 or 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study introduces the fundamental digital concepts upon which the design and operation of modern digital computers are based. A prime aim of the unit is to develop a professional view of, and a capacity for inquiry into, the field of computing.

The unit covers the fundamental digital concepts upon which the design and operation of modern digital computers are based. Topics covered include: data representation, basic computer organisation, the CPU, elementary gates and logic, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks.

ELEC2004
Electrical Engineering: Foundations

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hour of lectures, 1 hour of tutorial, 1 hour of laboratory and 1 hour of E-Learning per week. **Prohibitions:** ELEC1001 Introductory Electrical Engineering, ELEC1101 Foundations of Computer Systems, ELEC1102 Foundations of Electronic Circuits, ELEC2001 Electrical and Electronic Engineering, ELEC2003 Electrical and Electronic Engineering A, ELEC1103 Professional Electronic Engineering, ELEC1601 Professional Computer Engineering. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

1. Introduction to Electric Circuits: current and voltage, power, Kirchhoff's Laws, sources and resistors, Ohm's Law, series and parallel connections, voltage and current dividers, equivalent circuits. Inductors and capacitors, RC circuits, RL circuits, introduction to RLC circuits.

2. Electric Power Systems: sinusoidal signals, effective (rms) value of sinusoids, power in ac circuits, transformer principles and ideal transformers, balanced 3-phase circuits. Electromechanical machine types, DC machines, introduction to ac and induction machines.

3. Basic Electronics: Op amp, inverting amplifier, noninverting amplifier, basic op-amp circuits. Digital signals and circuits, truth table and basic logic functions, Boolean function, digital circuit design and realisation. Introduction to Sequential digital systems.

ELEC2103
Simulation & Numerical Solutions in Eng

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour lecture, 3 hours of laboratory per week **Prohibitions:** COSC1001 Computational Science in Matlab, COSC1901 Computational Science in Matlab (Advanced) **Assumed knowledge:** ELEC1103 Fundamentals of Electrical and Electronic Engineering, ELEC1601 Foundations of Computer Systems. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit assumes an understanding of the fundamental concepts and building blocks of electrical and electronics circuits. As well as covering the specific topics described in the following paragraphs, it aims to develop skills in professional project management and teamwork and promote an understanding of ethics.

Basic features of Matlab. The Matlab desktop. Interactive use with the command window. Performing arithmetic, using complex numbers and mathematical functions. Writing script and function m-files. Matrix manipulations. Control flow. Two dimensional graphics. Application of Matlab to simple problems from circuit theory, electronics, signals and systems and control. Investigation of the steady state and transient behaviour of LCR circuits.

Matlab based numerical solutions applicable to numerical optimization, ordinary differential equations, and data fitting. Introduction to symbolic mathematics in Matlab. Applications, including the derivation of network functions for simple problems in circuit analysis. Introduction to the use of Simulink for system modelling and simulation.

ELEC2104
Electronic Devices and Circuits

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures per week, 2 hours of tutorial and 2 hours lab per fortnight. **Prohibitions:** ELEC2401 Introductory Electronics. **Assumed knowledge:** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The purpose of this unit of study is to provide a working knowledge of fundamental principles of electronic engineering The topics covered include circuit theory and microelectronics. A background in introductory circuit theory is assumed..

The following specific topics are covered. Semiconductor diodes: junction diodes, special purpose diodes. Transistors: field effect and bipolar transistors. Large signal amplifiers: practical amplifiers, differential amplifiers, biasing circuits. Operational amplifiers: circuit applications.

ELEC2302
Signals and Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours lab/tutorial per week, 1 hour of ELearning per week. **Prohibitions:** ELEC2301 Signals & Systems, MATH3019 Signal Processing, MATH3919 Signal Processing (Adv). **Assumed knowledge:** MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach some of the basic properties of many engineering signals and systems and the necessary mathematical tools that aid in this process. The particular emphasis is on the time and frequency domain modeling of linear time invariant systems. The concepts learnt in this unit will be heavily used in many units of study (in later years) in the areas of communication, control, power systems and signal processing. A basic knowledge of differentiation and integration, differential equations, and linear algebra is assumed.

The following topics are covered. Continuous-time signals: classification and properties. Basic properties of systems: linearity, time-invariance, causality, and stability. Linear time-invariant (LTI) systems: characterization by differential equations (including state space formulation), and the convolution integral. Fourier series and Fourier Transform: definition, properties, frequency response and analysis of LTI systems based on Fourier transform. Sampling. Correlation and Power Spectral Density. Laplace transform: definition, properties, and analysis of LTI systems based on Laplace transform. Solution of state space equations using Laplace transform.

ELEC2602
Digital System Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures per week and 3 hours labs/tutorials per week. **Prohibitions:** ELEC3601 Digital Systems Design, ELEC3608 Digital Systems Design. **Assumed knowledge:** ELEC1103 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The purpose of this unit is to equip the students with the skills to design simple digital logic circuits which comprise modules of larger digital systems. The following topics are covered: logic operations, theorems and Boolean algebra, number operations (binary, hex, integer and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, and the design of a simple computer.

ELEC3104
Engineering Electromagnetics

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prohibitions:** ELEC3102 Engineering Electromagnetics. **Assumed knowledge:** Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit introduces students to the broad spectrum of engineering electromagnetics and helps students to develop theoretical and analytical skills in the area of electrical and telecommunications engineering and develop understanding of the basic electromagnetic theory underpinning optical communications, wireless communications and electrical engineering.

ELEC3105
Circuit Theory and Design

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours laboratory/tutorial per week. **Prerequisites:** ELEC2103 and ELEC2104 **Prohibitions:** ELEC3101 Circuit Theory and Design **Assumed knowledge:** ELEC2101 and ELEC2301 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study is to build on the platform provided by the basic theory and technical units such as ELEC2104 Electronic Devices and Basic Circuits and ELEC2103 Simulation and Numerical Solutions in Engineering. Based on deep understanding of aspects in active analog filter design students are equipped with the knowledge and skills to design, and to be in a good position to undertake further self study as required. This unit of study is conducted with theoretical study and design project practice. It covers the theory and design of active and passive analog filters including the followings: Fundamental concepts in circuit theory: network functions, characteristic frequencies; Types of filter: lowpass, bandpass, etc; Review of operational amplifiers; Design of first and second order filters using operational amplifiers; Cascade design; Typical filters: Butterworth, Chebyshev, etc; Frequency transformations in design; Sensitivity, etc.

ELEC3203
Electricity Networks

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures, 3 hours of lab and 1 hour tutorial per week. **Prohibitions:** ELEC3201 Electrical Energy Systems. **Assumed knowledge:** This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides an introduction to electrical power engineering and lays the groundwork for more specialised units. It assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in elements of introductory physics. A revision will be carried out of the use of phasors in steady state ac circuit analysis and of power factor and complex power. The unit comprises an overview of modern electric power system with particular emphasis on generation and transmission. The following specific topics are covered. The use of three phase systems and their analysis under balanced and unbalanced conditions. Transmission lines: calculation of parameters, modelling, analysis. Transformers: construction, equivalent circuits. Generators: construction, modelling for steady state operation. Cables: types and modelling for steady state operation. Types of electricity grids, radial, mesh, networks. The use of per unit system. The analysis of systems with a number of voltage levels. The control of active and reactive power. The load flow problem: bus and impedance matrices, solution methods.

ELEC3204
Power Electronics and Applications

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, 1 hour tutorial and 3 hours lab per week. **Prerequisites:** ELEC2104 **Prohibitions:** ELEC3202 Power Electronics and Drives. **Assumed knowledge:** Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to teach the fundamentals of advanced energy conversion systems based on power electronics. It provides description of the operation principles and control of these blocks. Through analysis and design methodologies, it delivers an in depth understanding of modern enabling technologies associated with energy conversion. Through laboratory hands-on experience on actual industrial systems, such electrical motor drives, robotic arms, and power supplies, it enhances the link between the theory and the "real" engineering world. The unit clarifies unambiguously the role these imperative technologies play in every human activity; from mobile telephone chargers to energy electricity grids; from electric vehicles and industrial automation to wind energy conversion to name just few. The following topics are covered: Introduction to power electronic converters and systems; applications of power electronic converters; power semiconductor devices; uncontrolled rectifiers: single- and three-phase; non-isolated dc-dc converters: buck, boost and buck-boost; isolated dc-dc converters; inverters: single- and three-phase; uninterruptible power supplies; battery chargers and renewable energy systems; electric and hybrid electric vehicles technologies, design of converters and systems.

ELEC3206
Electrical Energy Conversion Systems

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures per week, 1 hour tutorial per fortnight and 3 hours lab per fortnight. **Prerequisites:** ELEC2104 **Assumed knowledge:** Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to give students a good understanding of electrical energy conversion techniques and equipment. Students who successfully complete this unit will 1) have a broad view of electrical energy conversion systems including transformers, DC machines, induction machines and synchronous machines; 2) be able to analyze and solve problems in transformers and electric machines; 3) have gained confidence in their ability to undertake more advanced study in the power area. The following specific topics are covered: magnetic circuits, inductance, sinusoidal excitation, hysteresis and eddy current loss, permanent magnets, electromechanical energy conversion, singly-excited and doubly-excited systems, transformers, single-phase, equivalent circuit parameters, three-phase transformers, autotransformers, DC machines, separate excitation, shunt excitation, series excitation, and compound excitation, efficiency, armature reaction, induction machines, revolving field, equivalent circuit, squirrel cage machines, measurements of the parameters, DC resistance test, no-load test, blocked-rotor test, synchronous machines, field relationships, power-angle relationships, salient pole machines.

ELEC3304
Control

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week and 12 hours laboratory work per semester. **Prerequisites:** MATH2061 and ELEC2302 **Prohibitions:** ELEC3302 Fundamentals of Feedback Control, AMME3500 System Dynamics and Control. **Assumed knowledge:** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit is mainly concerned with the application of feedback control to continuous-time, linear time-invariant systems. It aims to give the students an appreciation of the possibilities in the design of control and automation in a range of application areas. The concepts learnt in this unit will be made use of heavily in many units of study in the areas of communication, control, electronics, and signal processing. The following specific topics are covered: Modelling of physical systems using state space, differential equations, and transfer functions, dynamic response of linear time invariant systems and the role of system poles and zeros on it, simplification of complex systems, stability of feedback systems and their steady state performance, Routh-Hurwitz stability criterion, sketching of root locus and controller design using the root locus, Proportional, integral and derivative control, lead and lag compensators, frequency response techniques, Nyquist stability criterion, gain and phase margins, compensator design in the frequency domain, state space design for single input single-output systems, pole placement state variable feedback control and observer design.

ELEC3305
Digital Signal Processing

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prerequisites:** ELEC2302 **Prohibitions:** ELEC3303 Digital Signal Processing. **Assumed knowledge:** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach how signals are processed by computers. It describes the key concepts of digital signal processing, including details of various transforms and filter design. Students are expected to implement and test some of these ideas on a digital signal processor (DSP). Completion of the unit will facilitate progression to advanced study in the area and to work in the industrial use of DSP. This unit assumes a basic knowledge of differentiation and integration, differential & difference equations and linear algebra, plus various time and frequency domain representations of continuous time signals and systems.

The following topics are covered. Review of analog and digital signals. Analog to digital and digital to analog conversion. Some useful digital signals. Difference equations and filtering. Impulse and step response of filters. Convolution representation of filters. The Z-transform. Transfer functions and stability. Discrete time Fourier transform (DTFT) and frequency response of filters. Finite impulse response (FIR) filter design: windowing method. Infinite impulse response (IIR) filter design: Butterworth filters, Chebyshev filters, Elliptic filters and impulse invariant design. Discrete Fourier Transform (DFT): windowing effects. Fast Fourier Transform (FFT): decimation in time algorithm. DSP hardware.

ELEC3404
Electronic Circuit Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures per week, and a 2 hour tutorial and 3 hours lab per fortnight. **Prohibitions:** ELEC3401 Electronic Devices and Circuits. **Assumed knowledge:** A background in basic electronics and circuit theory is assumed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to teach students analysis and design techniques for electronic systems such as signal amplifiers, differential amplifiers and power amplifiers. Completion of this unit will allow progression to advanced studies or to work in electronics and telecommunication engineering. Topics covered are as follows. The BJT as an amplifier. Biasing in BJT amplifier circuits. Small signal operation and models. Single stage BJT amplifiers. BJT internal capacitances and high frequency models. The frequency response of the common-emitter amplifier. BJT current sources and current mirrors. Differential amplifiers. Output stages and power amplifiers:class A, class B and class AB.

ELEC3405
Communications Electronics and Photonics

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prohibitions:** ELEC3402 Communications Electronics. **Assumed knowledge:** ELEC2401 Introductory Electronics or ELEC2104 Electronic Devices and Basic Circuits. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides an introduction to the fundamental operation and design of transmitter and receiver subsystems for two broad classes of communications systems: those based on electronic transmission and those based on optical transmission. In the area of electronic communication subsystems, the course presents transmitter and receiver design. Topics relating to the transmitter comprise electronic oscillator sources, tuned electronic amplifiers, and modulators. Topics relating to receiver design comprise RF and IF frequency selective amplifiers, mixers, demodulators, phase-lock loops, feedback amplifiers, and high frequency RF and microwave communication amplifiers. In the area of optical communication subsystems, the course presents photonic transmitters and receivers. On the transmitter side this focuses on the principles of light generation in optical sources such as semiconductor lasers and light emitting diodes, electro-optic modulation of light, and optical amplifiers. On the receiver side, photodetectors, optical receivers, and front-end circuits are discussed. The principles and design of these subsystems are considered with reference to a basic optoelectronic communication link.

ELEC3505
Communications

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures per week and 3 hours lab and 3hrs tutorial per fortnight. **Prohibitions:** ELEC3503 Introduction to Digital Communications. **Assumed knowledge:** Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This is an intermediate unit of study in telecommunications following on the general concepts studied in earlier units such as Signal and Systems and leading on to more advanced units such as Digital Communication Systems. Student will learn how to critically design and evaluate digital communication systems including the elements of a digital transmission system, understand the limitations of communications channels, different analog and digital modulation schemes and reasons to use digital techniques instead of analog, and the effect of noise and interference in performance of the digital communication systems. On completion of this unit, studentss will have sufficient knowledge of the physical channel of a telecommunications network to approach the study of higher layers of the network stack.

The following topics are covered. Introduction to communications systems, random signals and stochastic process, components, signals and channels, sampling, quantization, pulse amplitude modulation (PAM), pulse code modulation (PCM), quantization noise, time division multiplexing, delta modulation. Digital communications: baseband signals, digital PAM, eye diagram, equalization, correlative 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.

ELEC3506
Data Communications and the Internet

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours tutorials per week. 2 hours of laboratory per fortnight. **Prohibitions:** NETS2150 Fundamentals of Networking, NETS2009 Network Organisation, NETS2909 Network Organisation (Adv), NETS3007 Network Protocols, NETS3907 Network Protocols (Advanced), ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Students undertaking this unit should be familiar with fundamental digital technologies and representations such as bit complement and internal word representation. Students should also have a basic understanding of the physical properties of communication channels, techniques and limitations. Furthermore, students should be able to apply fundamental mathematical skills.

The unit will cover the following specific material: Communication reference models (TCP/IP, ATM and OSI). Circuit switched and packet switched communication. Network node functions and building blocks. LAN, MAN and WAN technologies. ATM systems. Protocols fundamental mechanisms. The TCP/IP core protocols (IP, ICMP, DHCP, ARP, TCP, UDP etc.). Applications and protocols (FTP, Telnet, SMTP, HTTP etc.).

ELEC3607
Embedded Computing

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures and 3 hours of laboratory per week. **Prerequisites:** ELEC1601 and ELEC2602 **Prohibitions:** ELEC2601 Microcomputer Systems. **Assumed knowledge:** ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Students undertaking this unit of study are assumed to have a basic understanding of digital concepts, and combinational and sequential devices, together with an introduction to computers.

The aim of this unit of study is to teach students about microprocessors and their use. This includes architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications.

ELEC3609
Internet Software Platforms

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours lecture and 2 hours tutorials per week **Prerequisites:** INFO1103, INFO2110, INFO2120 **Prohibitions:** EBUS4001 E-Business Engineering **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study will focus on the design, the architecture and the development of web applications using technologies currently popular in the marketplace including Java and .NET environments. There are three key themes examined in the unit: Presentation layer, Persistence layer, and Interoperability. The unit will examine practical technologies such as JSP and Servlets, the model-view-controller (MVC) architecture, database programming with ADO.NET and JDBC, advanced persistence using ORM, XML for interoperability, and XML-based SOAP services and Ajax, in support of the theoretical themes identified.

On completion the students should be able to:

- Compare Java/J2EE web application development with Microsoft .NET web application development.

- Exposure to relevant developer tools (e.g. Eclipse and VS.NET)

- Be able to develop a real application on one of those environments.

- Use XML to implement simple web services and AJAX applications.

ELEC3610
E-Business Analysis and Design

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours project work in class and tutorials per week. **Prerequisites:** INFO2120 **Prohibitions:** EBUS3003 E-Business System Design, EBUS3001 Introduction to e-Commerce Systems **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit focuses on the aspects of analysis, project specification, design, and prototype that lead up to the actual build of a website or application.

Topics include:

- technology fundamentals,

- business models (B2C, B2B and B2E systems),

- development methodologies, including writing use cases and UML diagrams), the Project Proposal and Project Specification Document,

- prototyping approaches: Ruby on Rails and WebRatio

- Other quality factors: Information Architecture, Fundamentals of HCI and User-Centred Design, legal issues, and standards-based web development.

Students build a simple use-case based e-business website prototype with web standards. A final presentation of the analysis, design and prototype are presented in a role play environment where students try to win funding from a venture capitalist.

An understanding of these pre-production fundamentals is critical for future IT and Software Engineering Consultants, Project Managers, Analysts and CTO's.

Specific topics covered include:

- Electronic Commerce Technology Fundamentals

- The e-project

- Prototyping with Ruby on Rails and WebRatio

- B2C, B2B and B2E systems.

ELEC3702
Management for Engineers

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures, 2 hours of tutorials per week. **Prohibitions:** ELEC3701 Management for Engineers, ENGG3005 Engineering & Industrial Management Fundamentals, MECH3661 Engineering Management **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to develop an understanding of the principles and practices of industry, to provide an overview of the various issues facing an industrial organisation, and of the basic approaches to their management, to understand the changing nature and effects of globalisation on Australia's economic performance, the competitiveness of Australian firms, and the generation of employment and wealth, to gain an insight into the importance of innovation at all levels and functions of all organisations, and of the ways of developing people-skills and organisational styles to promote innovation, to develop the broader skills required by employers of engineers, and to understand the objectives and roles appropriate to governments.

The following topics are covered; Introduction to engineers and management, Strategic planning, Operations and project management, Communication and people in organisations, Management and leadership, Economics and managerial finance, Accounting and management, Marketing, Human Resource Management, Industrial relations, The global knowledge economy, Legal and ethical environment of business.

ELEC3802
Fundamentals of Biomedical Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of lab/tutorial per week. **Prohibitions:** ELEC3801 Fundamentals of Biomedical Engineering. **Assumed knowledge:** A knowledge of basic electrical engineering is required: Ohm's law, Thevenin and Nortons' theorems, basic circuit theory involving linear resistors, capacitors and inductors, a basic knowledge of bipolar and field effect transistor theory, simplified theoretical mechanism of operation of transformers. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit assumes a knowledge of basic principles in physics, mathematics, circuit theory and electronics. In particular, some understanding of the following is required: Thevenins and Nortons theorems, Fourier analysis, radiation, filtering, bipolar and field effect transistors, and operational amplifiers.

The following topics are covered. Biology of the heart, circulatory and respiratory systems, physiology of nerve and muscle cells, fundamental organization of the brain and spinal cord. Medical instrumentation. ElectrocardioGram and automated diagnosis. Heart pacemakers and defibrillators. The bionic ear. Apparatus for treatment of sleep disordered breathing(sleep apnoea).

This unit is descriptive and does not require detailed knowledge of electronics or mathematics, but does require an understanding of some key aspects of mathematical and electronic theory. The unit concentrates on some of the practical applications of biomedical engineering to patient diagnosis and treatment.

ELEC3901
Electrical Exchange Unit 1A

Credit points: 6 **Session:** Semester 1 **Classes:** A workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This is a unit for students who have gone on exchange.

ELEC3902
Electrical Exchange Unit 1B

Credit points: 12 **Session:** Semester 1 **Classes:** A workload that is equivalent to one half of that of a (normal) full time student at the exchange university. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This is a unit for students who have gone on exchange.

ELEC3903
Electrical Exchange Unit 1C

Credit points: 24 **Session:** Semester 1 **Classes:** A workload that is equivalent to that of a (normal) full time student at the exchange university. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This is a unit for students who have gone on exchange.

ELEC3904
Electrical Exchange Unit 2A

Credit points: 6 **Session:** Semester 2 **Classes:** A workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This is a unit for students who have gone on exchange.

ELEC3905
Electrical Exchange Unit 2B

Credit points: 12 **Session:** Semester 2 **Classes:** A workload that is equivalent to one half of that of a (normal) full time student at the exchange university. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This is a unit for students who have gone on exchange.

ELEC3906
Electrical Exchange Unit 2C

Credit points: 24 **Session:** Semester 2 **Classes:** A workload that is equivalent to that of a (normal) full time student at the exchange university. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This is a unit for students who have gone on exchange.

ELEC4505
Digital Communication Systems

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prohibitions:** ELEC4502 Digital Communication Systems. **Assumed knowledge:** ELEC3505 Communications **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Digitally modulated signals: non-linear modulation methods, continuous phase FSK, continuous phase modulation. Modulated carrier data transmission: QPSK, QAM, MFSK, MSK. Trellis coded modulation and modem technologies. Spread spectrum, including frequency hopping and CDMA principles. Plus selected topics from: Optical communication systems - single and multi-channel systems, performance criteria and systems analysis. Satellite communications systems. Cellular mobile radio systems.

ELEC4605
Computer Architecture

Credit points: 6 **Session:** Semester 1 **Classes:** 1 hours of lectures and 3 hours lab/tutorial per week. **Prerequisites:** ELEC1601, ELEC 2602 and ELEC3607 **Prohibitions:** ELEC4601 Computer Design. **Assumed knowledge:** Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks, microprocessors and their use, the architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The digital systems design process. The design cycle. Top down design. Specification. Functional design. Structural design. Testing. Hardware description languages such as Verilog or VHDL. Digital systems architectures. Processors, buses and I/O devices. Synchronous, asynchronous and semi-synchronous buses. Bus interconnections. Memory and I/O interface design. Static and dynamic memory design. Memory interfacing. Interrupts. Vectored interrupts. Interrupt controllers. Parallel interface design. Serial interface design. Bus arbitration. Processor interfacing. IBM PC interfacing. PCB and packaging design, grounding, shielding and power distribution, some case studies.

ELEC4702
Practical Experience

Session: Semester 1, Semester 2 **Classes:** Not applicable. **Prerequisites:** 24 credit points of level 3 or 4 units of study. **Campus:** Camperdown/Darlington **Mode of delivery:** Professional Practice

The Bachelor of Engineering degree requires students to obtain industrial work experience of twelve weeks (60 working days) duration towards satisfying the requirements for award of the degree. Students may undertake their work experience after completion of a minimum of 24 credit points of Year 3 units of study when they have built up a sufficient background of engineering. In general, the type of job that is acceptable for work experience should be in an engineering environment but not necessarily in the same discipline of the degree the student is pursuing. The student is required to inform the School of any work arrangements made by email.

Assessment in this unit is by the submission of a written report of about 4-6 pages on the industrial experience undertaken. The report is to describe 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. A certificate from the company stating the period of employment and the type of work you have undertaken should be attached to your report. The student should inform the company that a short report on the work experience is to be submitted to the School.

The report is to be submitted to the School electronically (see details on the course website). There is no deadline for submission of the report but it is a good practice to submit it in the first two weeks after the new semester started.

ELEC4706
Project Management

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To introduce aspects relevant to the management of an engineering design project, namely: Why all projects are design projects, Engineering design, Intellectual property, The business plan, The design process, Understanding the client's problem, Objectives and Metrics, Functions and Specifications, Finding Answers to the Problem, Reporting the Outcome, Managing the Design Process, Design for Manufacture, Cost, Reliability, Quality and Sustainability, Ethics in Engineering

ELEC4710
Engineering Project A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** There are no lectures for this unit. However, the students are expected to spend at least one full day per week undertaking background research work, organizing their plan of work and preparing their experimental or developmental program. **Prerequisites:** 36 credit points of units of study from level 3 and above. **Prohibitions:** ELEC4703, ELEC4705, ELEC4707 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study builds on the technical competencies introduced in the previous years. The project work is spread over two units (Engineering Project A and B). In Engineering Project A, students are required to plan and begin work on their project and roughly complete half the work required for the whole 'final year' project. In particular, it should include almost all the planning, literature review, and a significant proportion of the experimental or analytical work required of the project. The student will prepare a Progress Report at the end of semester detailing the context of the problem, relevant background research and progress to date. The progress at the end of Engineering Project A will be evaluated by the supervisor based on the thoroughness of the proposed program and the progress achieved during the semester. The student can only progress to Engineering Project B on attainment of a satisfactory result in Engineering Project A.

In Engineering Project B, the students are required to complete the remaining aspects of the project, present their results to their peers and academic staff in a seminar format, and prepare and submit a detailed Treatise.

The final grade is based on the work done in both Engineering Project A and B, and will be awarded upon successful completion of Engineering Project B.

ELEC4711
Engineering Project B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** There are no lectures for this unit. However, the students are expected to spend at least one full day per week to complete the remaining aspects of the project, and present their results in a seminar format, and prepare a detailed Treatise. **Prerequisites:** ELEC4710 Engineering Project A **Prohibitions:** ELEC4703, ELEC4705, ELEC4707 **Assumed knowledge:** 36 credit points of units of study from level 3 and above **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit of study builds on the technical competencies introduced in the previous years. The project work is spread over two units (Engineering Project A and B). In Engineering Project A, students are required to plan and begin work on their project and roughly complete half the work required for the whole 'final year' project. In particular, it should include almost all the planning, literature review, and a significant proportion of the experimental or analytical work required of the project. The student will prepare a Progress Report at the end of semester detailing the context of the problem, relevant background research and progress to date. The progress at the end of Engineering Project A will be evaluated by the supervisor based on the thoroughness of the proposed program and the progress achieved during the semester. The student can only progress to Engineering Project B on attainment of a satisfactory result in Engineering Project A.

In Engineering Project B, the students are required to complete the remaining aspects of the project, present their results to their peers and academic staff in a seminar format, and prepare and submit a detailed Treatise.

The final grade is based on the work done in both Engineering Project A and B, and will be awarded upon successful completion of Engineering Project B.

ELEC4712
Honours Thesis A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** There are no lectures for this unit. However, the students are expected to spend at least one full day per week undertaking background research work, organizing their plan of work and preparing their experimental or developmental program. **Prerequisites:** 36 credit points of units of study from level 3 and above **Prohibitions:** ELEC4703, ELEC4705, ELEC4707 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study builds on the technical competencies introduced in the previous years. The project work is spread over two units (Honours Thesis A and B). In Honours Thesis A, students are required to plan and begin work on their project and roughly complete half the work required for the whole 'final year' project. In particular, it should include almost all the planning, literature review, and a significant proportion of the experimental or analytical work required of the project. The student will prepare a Progress Report at the end of semester detailing the context of the problem, relevant background research and progress to date. The progress at the end of Honours Thesis A will be evaluated by the supervisor based on the thoroughness of the proposed program and the progress achieved during the semester. The student can only progress to Honours Thesis B on attainment of a satisfactory result in Honours Thesis A.

In Honours Thesis B, the students are required to complete the remaining aspects of the project, present their results to their peers and academic staff in a seminar format, and prepare and submit a detailed Treatise.

The final grade is based on the work done in both Honours Thesis A and B, and will be awarded upon successful completion of Honours Thesis B.

ELEC4713
Honours Thesis B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** There are no lectures for this unit. However, the students are expected to spend at least one full day per week to complete the remaining aspects of the project, and present their results in a seminar format, and prepare a detailed Treatise. **Prerequisites:** ELEC4712 Honours Thesis A **Prohibitions:** ELEC4703, ELEC4705, ELEC4707 **Assumed knowledge:** 36 credit points of units of study from level 3 and above **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit of study builds on the technical competencies introduced in the previous years. The project work is spread over two units (Honours Thesis A and B). In Honours Thesis A, students are required to plan and begin work on their project and roughly complete half the work required for the whole 'final year' project. In particular, it should include almost all the planning, literature review, and a significant proportion of the experimental or analytical work required of the project. The student will prepare a Progress Report at the end of semester detailing the context of the problem, relevant background research and progress to date. The progress at the end of Honours Thesis A will be evaluated by the supervisor based on the thoroughness of the proposed program and the progress achieved during the semester. The student can only progress to Honours Thesis B on attainment of a satisfactory result in Honours Thesis A.

In Honours Thesis B, the students are required to complete the remaining aspects of the project, present their results to their peers and academic staff in a seminar format, and prepare and submit a detailed Treatise.

The final grade is based on the work done in both Honours Thesis A and B, and will be awarded upon successful completion of Honours Thesis B.

School of Information Technologies

COMP2007
Algorithms and Complexity

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** COMP (2907 or 3309 or 3609 or 3111 or 3811) **Assumed knowledge:** INFO1105, MATH1004 or MATH1904 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides an introduction to the design and analysis of algorithms. The main aims are (i) to learn how to develop algorithmic solutions to computational problem and (ii) to develop understanding of algorithm efficiency and the notion of computational hardness.

COMP2129
Operating Systems and Machine Principles

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** SOFT (2130 or 2830 or 2004 or 2904) or COMP (2004 or 2904) **Assumed knowledge:** Programming, as from INFO1103 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

In this unit of study elementary methods for developing robust, efficient and re-usable software will be covered. The unit is taught in C, in a Unix environment. Specific coding topics include memory management, the pragmatic aspects of implementing data structures such as lists and hash tables and managing concurrent threads. Debugging tools and techniques are discussed and common programming errors are considered along with defensive programming techniques to avoid such errors. Emphasis is placed on using common Unix tools to manage aspects of the software construction process, such as version control and regression testing. The subject is taught from a practical viewpoint and it includes a considerable amount of programming practice, using existing tools as building blocks to complete a large-scale task.

COMP2907
Algorithms and Complexity (Advanced)

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prerequisites:** Distinction level result in INFO (1105 or 1905) or SOFT (1002 or 1902) **Prohibitions:** COMP (2007 or 3309 or 3609 or 3111 or 3811) **Assumed knowledge:** INFO1905, MATH1904 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

An advanced alternative to COMP2007; covers material at an advanced and challenging level. See the description of COMP2007 for more information.

COMP3109
Programming Languages and Paradigms

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Assumed knowledge:** COMP2007 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides an introduction to the foundations of programming languages and their implementation. The main aims are to teach what are: grammars, parsers, semantics, programming paradigms and implementation of programming languages.

COMP3308
Introduction to Artificial Intelligence

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Tut 2hrs) per week **Prohibitions:** COMP (3608 or 3002 or 3902) **Assumed knowledge:** COMP2007 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Artificial Intelligence (AI) is all about programming computers to perform tasks normally associated with intelligent behaviour. Classical AI programs have played games, proved theorems, discovered patterns in data, planned complex assembly sequences and so on. This unit of study will introduce representations, techniques and architectures used to build intelligent systems. It will explore selected topics such as heuristic search, game playing, machine learning, and knowledge representation. Students who complete it will have an understanding of some of the fundamental methods and algortihms of AI, and an appreciation of how they can be applied to interesting problems. The unit will involve a practical component in which some simple problems are solved using AI techniques.

COMP3419
Graphics and Multimedia

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** MULT (3306 or 3606 or 3019 or 3919 or 3004 or 3904) or COMP(3004 or 3904) **Assumed knowledge:** COMP2007, MATH1002 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Computer Graphics and Multimedia are core technologies to support an interdisciplinary computing and communication environment. This unit provides a broad introduction to the field of multimedia to meet the diverse requirements of application areas such as entertainment, industrial design, virtual reality, intelligent media management, medical imaging and remote sensing. The unit covers both the underpinning theories and the practices of manipulating and enhancing digital media including image, computer graphics, audio, computer animation, and video. It introduces principles and cutting-edge techniques such as multimedia data processing, content analysis, media retouching, media coding and compression. It elaborates on various multimedia coding standards. A particular focus is on principles and the state-of-the-art research and development topics of Computer Graphics such as modelling, rendering and shading, and texturing.

COMP3456
Computational Methods for Life Sciences

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prerequisites:** INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit introduces the algorithmic principles driving advances in the life sciences. It discusses biological and algorithmic ideas together, linking issues in computer science and biology and thus is suitable for students in both disciplines. Students will learn algorithm design and analysis techniques to solve practical problems in biology.

COMP3520
Operating Systems Internals

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** NETS (3304 or 3604 or 3009 or 3909) or COMP (3009 or 3909) **Assumed knowledge:** COMP2129, INFO1105 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will provide a comprehensive discussion of relevant OS issues and principles and describe how those principles are put into practice in real operating systems. The contents include internal structure of OS; several ways each major aspect (process scheduling, inter-process communication, memory management, device management, file systems) can be implemented; the performance impact of design choices; case studies of common OS (Linux, MS Windows NT, etc). The contents also include concepts of distributed systems: naming and binding, time in distributed systems, resource sharing, synchronization models (distributed shared memory, message passing), fault-tolerance, and case study of distributed file systems.

COMP3608
Intro. to Artificial Intelligence (Adv)

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week. **Prerequisites:** Distinction-level results in some 2nd year COMP or MATH or SOFT units. **Prohibitions:** COMP (3308 or 3002 or 3902) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

An advanced alternative to COMP3308; covers material at an advanced and challenging level. See the description of COMP3308 for more information.

COMP3615
Software Development Project

Credit points: 6 **Session:** Semester 2 **Classes:** (Meeting with academic supervisor 1hr & Class meeting 1hr) per week **Prerequisites:** INFO3402 **Prohibitions:** INFO3600 or SOFT (3300 or 3600 or 3200 or 3700) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will provide students an opportunity to apply the knowledge and practise the skills acquired in the prerequisite and qualifying units, in the context of designing and building a substantial software development system in diverse application domains including life sciences. Working in groups students will need to carry out the full range of activities including requirements capture, analysis and design, coding, testing and documentation.

INFO1003
Foundations of Information Technology

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** (Lec 2 hrs & Prac 3hrs) per week **Prohibitions:** INFO1000 or INFS1000 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit prepares students from any academic discipline to develop the necessary knowledge, skills and abilities to be competent in the use of information technology for solving a variety of problems. The main focus of this unit is on modelling and problem solving through the effective use of IT. Students will learn how to navigate independently to solve their problems on their own, and to be capable of fully applying the power of IT tools in the service of their goals in their own domains while not losing sight of the fundamental concepts of computing.

Students are taught core skills related to general purpose computing involving a range of software tools such as spreadsheets, database management systems, internet search engines, HTML, and JavaScript. Students will undertake practical tasks including authoring an interactive website using HTML and JavaScript and building a small scale application for managing information. In addition, the course will address the many social, ethical, and intellectual property issues arising from the wide-spread use of information technology in our society.

INFO1103
Introduction to Programming

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** (Lec 2hrs & Lab 2hrs) per week **Prohibitions:** SOFT (1001 or 1901) or COMP (1001 or 1901) or DECO2011 **Assumed knowledge:** HSC Mathematics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides an introduction to programming using Java. The main aims are (i) to develop basic programming skills and (ii) learn how to express algorithms using computer programming and (iii) develop basic algorithmic problem solving skills.

INFO1105
Data Structures

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 3hrs) per week **Prohibitions:** INFO1905 or SOFT (1002 or 1902) or COMP (1002 or 1902 or 2160 or 2860 or 2111 or 2811 or 2002 or 2902) **Assumed knowledge:** Programming, as for INFO1103 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit will teach some powerful ideas that are central to quality software: data abstraction and recursion. It will also show how one can analyse the scalability of algorithms using mathematical tools of asymptotic notation. Contents include: both external "interface" view, and internal "implementation" details, for commonly used data structures, including lists, stacks, queues, priority queues, search trees, hash tables, and graphs; asymptotic analysis of algorithm scalability, including use of recurrence relations to analyse recursive code. This unit covers the way information is represented in each structure, algorithms for manipulating the structure, and analysis of asymptotic complexity of the operations. Outcomes include: ability to write code that recursively performs an operation on a data structure; experience designing an algorithmic solution to a problem using appropriate data structures, coding the solution, and analysing its complexity.

INFO1903
Informatics (Advanced)

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 3hrs & Prac 3hrs) per week **Prerequisites:** UAI (or ATAR equivalent) sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry **Assumed knowledge:** HSC Mathematics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit covers advanced data processing and management, integrating the use of existing productivity software, e.g. spreadsheets and databases, with the development of custom software using the powerful general-purpose Python scripting language. It will focus on skills directly applicable to research in any quantitative domain. The unit will also cover presentation of data through written publications and dynamically generated web pages, visual representations and oral presentation skills. The assessment, a long project, involves the demonstration of these skills and techniques for processing and presenting data in a choice of domains.

INFO1905
Data Structures (Advanced)

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 3hrs) per week **Prerequisites:** Distinction-level performance in INFO1103 or INFO1903 or SOFT1001 or SOFT1901. **Prohibitions:** INFO1105 or SOFT (1002 or 1902) or COMP (1002 or 1902) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

An advanced alternative to INFO1105; covers material at an advanced and challenging level. See the description of INFO1105 for more information.

INFO1911
IT Special Project 1A

Credit points: 6 **Session:** Semester 1 **Classes:** Meeting 1 hour per week, project work 8 hours per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Enrolment in this unit of study is by invitation only.

This unit of study is specially designed for students in their first year of study who is an academic high achiever, as well as talented in IT areas of study. In this unit, students will be involved in advanced projects, which may be research-oriented, in which students apply problem solving and IT skills.

INFO1912
IT Special Project 1B

Credit points: 6 **Session:** Semester 2 **Classes:** Meeting 1 hour per week, project work 8 hours per week. **Assumed knowledge:** UAI (or ATAR equivalent) of at least 98 and High Distinction average in first year IT units of study and Distinction average in first year non-IT units of study. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Departmental permission is required.

This unit of study is specially designed for students in their first year of study who is an academic high achiever, as well as talented in IT areas of study. In this unit, students will be involved in advanced projects, which may be research-oriented, in which students apply problem solving and IT skills.

INFO2110
Systems Analysis and Modelling

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** INFO (2810 or 2000 or 2900) **Assumed knowledge:** Experience with a data model as in INFO1003 or INFO1103 or INFS1000 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides a comprehensive introduction to the analysis of complex systems. Key topics are the determination and expression of system requirements (both functional and non-functional), and the representation of structural and behavioural models of the system in UML notations. Students will be expected to evaluate requirements documents and models as well as producing them. This unit covers essential topics from the ACM/IEEE SE2004 curriculum, especially from MAA Software Modelling and Analysis.

INFO2120
Database Systems 1

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** INFO (2820 or 2005 or 2905) **Assumed knowledge:** Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1003 or INFS1000 or INFO1903 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The proper management of data is essential for all data-centric applications and for effective decision making within organizations. This unit of study will introduce the basic concepts of database designs at the conceptual, logical and physical levels. Particular emphasis will be placed on introducing integrity constraints and the concept of data normalization which prevents data from being corrupted or duplicated in different parts of the database. This in turn helps in the data remaining consistent during its lifetime. Once a database design is in place, the emphasis shifts towards querying the data in order to extract useful information. The unit will introduce different query languages with a particular emphasis on SQL, which is industry standard. Other topics covered will include the important concept of transaction management, application development with a backend database, an overview of data warehousing and online analytic processing, and the use of XML as a data integration language.

INFO2315
Introduction to IT Security

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** NETS (3305 or 3605 or 3016 or 3916) or ELEC (5610 or 5616) **Assumed knowledge:** Computer literacy **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides a broad introduction to the field of IT security. We examine secure and insecure programs, secure and insecure information, secure and insecure computers, and secure and insecure network infrastructure. Key content includes the main threats to security; how to analyse risks; the role in reducing risk that can be played by technical tools (such as encryption, signatures, access control, firewalls, etc); the limitations of technical defences; and the simple process and behavioural changes that can reduce risk.

INFO2820
Database Systems 1 (Advanced)

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prerequisites:** Distinction-level result in INFO (1003 or 1103 or 1903 or 1105 or 1905) or SOFT (1001 or 1901 or 1002 or 1902) **Prohibitions:** INFO (2120 or 2005 or 2905) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

An advanced alternative to INFO2120; covers material at an advanced and challenging level. See the description of INFO2120 for more information.

INFO2911
IT Special Project 2A

Credit points: 6 **Session:** Semester 1 **Classes:** Meeting 1 hour per week, project work 8 hours per week. **Prerequisites:** Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Departmental permission required.

This unit of study enables talented students to apply their IT knowledge from their first year study to more advanced and exciting projects. In this unit, students will be provided with the opportunity to be involved in projects will a greater research focus.

INFO2912
IT Special Project 2B

Credit points: 6 **Session:** Semester 2 **Classes:** Meeting 1 hour per week, project work 8 hours per week. **Prerequisites:** Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Departmental permission required.

This unit of study enables talented students to apply their IT knowledge from their first year study to more advanced and exciting projects. In this unit, students will be provided with the opportunity to be involved in projects will a greater research focus.

INFO3220
Object Oriented Design

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2 hrs) per week **Prohibitions:** SOFT (3301 or 3601 or 3101 or 3801) or COMP (3008 or 3908) **Assumed knowledge:** INFO2110, INFO1105 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit covers essential design methods and language mechanisms for successful object-oriented design and programming. C++ is used as the implementation language and a special emphasis is placed on those features of C++ that are important for solving real-world problems. Advanced software engineering features, including exceptions and name spaces are thoroughly covered.

INFO3315
Human-Computer Interaction

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** MULT (3307 or 3607 or 3018 or 3918) or SOFT (3102 or 3802) or COMP (3102 or 3802) **Assumed knowledge:** INFO2110 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will introduce techniques to evaluate software user interfaces using heuristic evaluation and user observation techniques. Students will (i) learn how to design formal experiments to evaluate usability hypothesis and (ii) apply user centered design and usability engineering principles to design software user interfaces. A brief introduction to the psychological aspects of human-computer interaction will be provided.

INFO3402
Management of IT Projects and Systems

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week. **Prohibitions:** ISYS (3000 or 3012) or ELEC3606 **Assumed knowledge:** INFO (2000 or 2110 or 2810 or 2900) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course introduces the basic processes and techniques for managing IT projects, systems and services, throughout the IT lifecycle. It addresses both the technical and behavioural aspects of IT management at the enterprise level. Major topics include: organisational strategy and IT alignment, IT planning, project planning, tracking, resource estimation, team management, software testing, delivery and support of IT services, service level agreements, change and problem management, cost effectiveness and quality assurance.

INFO3404
Database Systems 2

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** INFO (3504 or 3005 or 3905) or COMP (3005 or 3905) **Assumed knowledge:** Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides a comprehensive overview of the internal mechanisms of Database Management Systems (DBMS) and other systems that manage large data collections. These skills are needed for successful performance tuning, to understand the scalability challenges faced by the information age. Topics include: the internal components of a DBMS engine, physical data organization and disk-based index structures, query processing and optimisation, locking and logging, database tuning, distributed and replicated databases, web search engines, and indices and processing when doing information retrieval from textual data. This unit will be valuable to those pursuing such careers as Software Engineers, Database Experts, Database Administrators, Web Developers and e-Business Consultants.

INFO3504
Database Systems 2 (Adv)

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prerequisites:** Distinction-level result in INFO (2120 or 2820) or COMP (2007 or 2907) **Prohibitions:** INFO (3404 or 3005 or 3905) or COMP (3005 or 3905) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

An advanced alternative to INFO3404; covers material at an advanced and challenging level. See the description of INFO3404 for more information.

INFO3600
Major Development Project (Advanced)

Credit points: 12 **Session:** Semester 2 **Classes:** no formal classes **Prerequisites:** INFO3402 **Prohibitions:** COMP3615 or ISYS3400 or SOFT (3300 or 3600 or 3200 or 3700) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Only available to students in BIT, BCST(Adv) or BSc(Adv)

This unit will provide students an opportunity to carry out substantial aspects of a significant software development project. The project will be directed towards assisting a client group (from industry or with strong industry links). The student's contribution could cover one or more aspects such as requirements capture, system design, implementation, change management, upgrades, operation, and/or tuning. Assessment will be based on the quality of the delivered outputs, the effectiveness of the process followed, and the understanding of the way the work fits into the client's goals, as shown in a written report.

INFO3911
IT Special Project 3A

Credit points: 6 **Session:** Semester 1 **Classes:** Meeting 1 hour per week, project work 8 hours per week. **Prerequisites:** Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Departmental permission required.

This unit of study enables talented students with maturing IT knowledge to integrate various IT skills and techniques to carry out projects which are predominantly research-intensive.

INFO3912
IT Special Project 3B

Credit points: 6 **Session:** Semester 2 **Classes:** Meeting 1 hour per week, project work 8 hours per week. **Prerequisites:** Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Departmental permission required.

This unit of study enables talented students with maturing IT knowledge to integrate various IT skills and techniques to carry out projects which are predominantly research-intensive.

INFO4991
IT Research Thesis A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 12 hours per week research work (including interaction with supervisor and research group). **Prerequisites:** Enrolment in Honours (BCST or BIT) **Corequisites:** INFO4990 and INFO4992 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Together with INFO4992, this unit covers the research and writing of the student's Honours thesis.

INFO4992
IT Research Thesis B

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** 24 hours per week research work (including interaction with supervisor and research group). **Prerequisites:** Enrolment in Honours (BCST or BIT) **Corequisites:** INFO4990 and INFO4991 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Together with INFO4991, this unit covers the research and writing of the student's Honours thesis.

INFO4999
Computer Science Honours Result

Session: Semester 1, Semester 2 **Prerequisites:** Permission of the Head of Department **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

All SIT Honours students must enrol in this non assessable unit of study in their final semester.

ISYS2140
Information Systems

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** ISYS (2006 or 2007) **Assumed knowledge:** INFO1003 or INFS1000 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study will provide a comprehensive conceptual and practical introduction to information systems (IS) in contemporary organisations. Content: General Systems Theory; Basic concepts of organisations, systems and information; The role of information systems in operating and managing organisations; How IS and the Internet enables organisations to adopt more competitive business models, including e-Commerce; The technologies that underpin IS; Distributed systems, including security, networking principles, the client server model and how distributed components locate and communicate with each other; The integration of disparate systems both within the organisation and between organisations, including the role of XML; Behavioural, managerial and ethical issues in implementing and managing IS.

ISYS3400
Information Systems Project

Credit points: 6 **Session:** Semester 2 **Classes:** (Meeting with academic supervisor 1hr & Class meeting 1hr) per week **Prerequisites:** (INFO3402 or ISYS3012) and (ISYS3401 or ISYS3015) **Prohibitions:** INFO3600 or ISYS3207 **Assumed knowledge:** INFO2120 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will provide students an opportunity to apply the knowledge and practise the skills acquired in the prerequisite and qualifying units, in the context of a substantial information systems research or development project and to experience in a realistic way many aspects of analysing and solving information systems problems. Since information systems projects are often undertaken by small teams, the experience of working in a team is seen as an important feature of the unit. Students often find it difficult to work effectively with others and will benefit from the opportunity provided by this unit to further develop this skill.

ISYS3401
Analytical Methods & Information Systems

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 1hr) per week **Prohibitions:** ISYS3015 **Assumed knowledge:** INFO2110, ISYS2140 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course will provide an introduction to the scientific approach and basic research methods that are relevant for conceptualizing and solving complex problems encountered Information Systems practice. A collection of different methods for collecting and analyzing information will be studied in the context of a few typical information system projects. These methods include surveys, controlled experiments, questionnaire design and sampling.

Advanced Engineering and general units offered by the Faculty

ENGG1061
Advanced Engineering 1A

Credit points: 6 **Session:** Semester 1 **Prerequisites:** UAI (or ATAR equivalent) score of at least 98 and good performance in HSC Maths, Physics and Chemistry. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: 1st year Interdisiplinary unit for all degree streams in Engineering.

The project is a major component of this unit of study. Students will be allotted to groups based on their preferences and will work on a particular project. Although the project will be supervised by a senior Faculty member, 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 complete an engineering project by the end of Semester 1.

ENGG1800
Engineering Disciplines (Intro) Stream A

Credit points: 6 **Session:** Semester 1 **Classes:** 1 hours of lecture and one 3 hour laboratory session per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit introduces students to specialisations in the Engineering discipline areas of Aeronautical, Biomedical Chemical, Civil, Mechanical and Mechatronic Engineering, and Project Engineering and Management. By providing first-year students with an experience of these various engineering streams, the unit aims to develop the students' professional identity as an engineer and thus provide a suitable basis on which students can choose their discipline for further study.

Introductory sessions in the School of Aerospace,

Mechanical and Mechatronic Engineering

-4 weeks-

An overview of the degree requirements in each stream. The roles of the engineer in each stream (employments, skills, etc). How each of the subjects taught relate to the skills/knowledge and applications required of the engineers. Basically make sure students fully understand what engineers are in the discipline areas and why the students do the subjects they do. In each stream, one engineering technical topic will be taught as a problem solving exercise, and this topic will be the focus of the laboratory.

School of Civil Engineering

-4 weeks-

Introductory lectures in Engineering Economics and Construction Planning, Foundation Engineering, Structural Engineering, Materials, Environmental Engineering. Each student will be involved in the erection and dismantling of an 8 metre high steel and timber tower in the Civil Engineering Courtyard. Preliminary lectures related to the tower will include safety issues, loading, statical analysis, foundation calculations, construction management, engineering drawings and detailing, geometric calculations, and survey measurements. Exercises related to these issues will be performed before assembly and disassembly of the tower.

School of Chemical and Biomolecular Engineering

-4 weeks-

This course will enable students to gain an appreciation of: the methods and materials of construction of items of process equipment; the role of this equipment in building an entire chemical processing plant: its operation and maintenance and safety requirements and procedures. Students will dismantle, disassemble 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 parameters.

ENGG1801
Engineering Computing

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hour of lectures and 2 hours of computer laboratory sessions per week. **Prohibitions:** MECH1800 Computational Engineering 1A; MECH1801 Computational Engineering 1C; INFO1000 Information Technology Tools; ISYS1003 Foundations of Information Technology; COSC1001 Computational Science in Matlab; COSC1002 Computational Science in C; INFO1003 Foundations of Information Technology **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit will introduce students to fundamental principles of programming. The language used will be Matlab but the principles taught are readily portable to other languages like C and Java. The unit material will be presented in a manner which will help students to draw a connection between programming constructs and real engineering applications. The unit will use engineering inspired case-studies : especially from Civil, Chemical, Aerospace and Mechanical streams, to motivate new material. Besides introductory concepts like variables, arrays and loops, the unit will also introduce more sophisticated Matlab data structures like structs and cells. The extensive Matlab library for visualization will also be introduced. Matlab will cover two-thirds of the unit. The remaining one-third will be devoted to the use of Excel in engineering scenarios. Furthermore, cross integration between Matlab and Excel will also be highlighted.

ENGG1802
Engineering Mechanics

Credit points: 6 **Session:** Semester 2 **Classes:** 2hrs of lectures per week, 3hrs of tutorials per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit aims to provide students with an understanding of and competence in solving statics problems in engineering. Tutorial sessions will help students to improve their group work and problem solving skills, and gain competency in extracting a simplified version of a problem from a complex situation. Emphasis is placed on the ability to work in 3D as well as 2D, including the 2D and 3D visualization of structures and structural components, and the vectorial 2D and 3D representations of spatial points, forces and moments.

ENGG1803
Professional Engineering 1

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 2 1hr hour lectures, 1 2hr hour tutorial/project work per week (on average - varies week by week) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Professional Engineering is an introductory Unit of Study within the Faculty of Engineering. It seeks to acquaint newly admitted undergraduates with the principles of professional engineering practice, a range of contemporary professional engineering issues, together with the skills of academic study within an engineering environment. The subject is structured around a design and build project, in which students apply the professional engineering they are learning to an engineering project. Professional engineering topics to be covered include: accessing information, teamwork, creativity, leadership, written and oral communication, project management, problem solving, ethics, liability, occupational health and safety and environmental issues.

ENGG1805
Professional Engineering and IT

Credit points: 6 **Session:** Semester 1 **Classes:** 2hrs lectures and 2 hrs of lab per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

It is the intention of the Faculty of Engineering and Information Technologies to integrate the acquisition of certain generic attributes seamlessly into all units taught by the School. In ENGG1805 - Professional Engineering and Information Technology, this intention is reflected in the objectives of the Unit of Study, the specific topics included in lectures and tutorials, the skills and commitment of the teaching team and in the way in which students' contributions and work is assessed.

ENGG2004
Engineering Studies B

Credit points: 4 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Special project specified for individual requirement.

ENGG2005
Engineering Studies C

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Special project specified for individual requirement.

ENGG2008
Engineering Studies A

Credit points: 2 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Special project specified for individual requirement.

ENGG2062
Engineering Project: Business Plan 2 Adv

Credit points: 6 **Session:** Semester 1 **Classes:** 1hr Lecture, 2hr Project work in class per week **Prerequisites:** Only students who have been named on the Dean's list at the end of Year 1 will be eligible. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This course aims to extend student experience beyond the design and build phase of engineering to the business planning necessary to transform a good idea into a commercial reality. It will provide the opportunity for students to develop a range of skills used by professional engineers in a business environment, including planning, strategy development and assessment, business environment and market analysis together with financial management and resource allocation.

ENGG3005
Engineering & Industrial Management Fund

Credit points: 6 **Session:** Semester 2 **Classes:** 2hrs lectures, 2 hrs tutorials per week. **Prohibitions:** ELEC3702, MECH3661 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Engineers and management; communication; micro-and macro-economics; strategic management; business planning; legal responsibilities; industrial hazard management; human resource management; industrial relations; project management; quality assurance; operations management; accounting and financial management.

This unit is to introduce students to a range of management concepts and techniques, and to develop an understanding of the role and challenges of management

ENGG3062
Technology Education (Advanced)

Credit points: 6 **Session:** Semester 2 **Classes:** 1hr Lecture; 2hrs Project work in class per week. **Prerequisites:** Only students who have been named on the Dean's list at the end of Year 2 will be eligible **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This UoS aims to give the student experience in critically engaging an audience in the theoretical and practical understanding of engineering and technology. Students will learn professional skills in client relationship management, teaching and presenting, project management, leadership and teamwork. This work will be carried out with partner schools to enhance the engineering knowledge and understanding of Stage 5 high school students. This UoS places students in an environment with which they are familiar, albeit in a very different and challenging role. It allows them the opportunity to deliver a project for a professional external client and in doing so showcase engineering, the faculty and the University to the wider community.

ENGG4006
Adv Professional Eng Managemt & Practice

Credit points: 6 **Session:** Semester 1 **Classes:** 4hr Project Work in class per week. **Prerequisites:** ENGG1803 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

ENGG 4006 - Advanced Professional Engineering Management and Practice seeks to build upon the learning of students in earlier management and professional studies UoS to deepen student understanding of management theory and practice in preparation for the transition to professional employment. This is achieved through: a lecture series that extends student knowledge beyond the basics, student group work student group work that embeds team management skills, and assessment tasks designed to integrate theoretical knowledge with practical experience of management. The ENGG 4006 experience will allow students to reflect upon their practical experience of management (work, industrial experience, community activities) in conjunction with their knowledge of theory to develop their desired approach to management that will guide them as they enter their professional lives.

ENGG4061
Innovation/Technology Commercialisation

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hr lecture; 1 hour project work in class per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit is designed as a 'Master Class' for final year Engineering students to grapple with the challenges of engaging in, facilitating and managing innovation and technology commercialisation. Key learning outcomes are: developing an understanding of the processes of management, and in particular of innovation, dealing with uncertain and inadequate information, how to communicate effectively to and motivate a group of people to work out what to do, and how to do it.

Introduction to challenges of modern management; understanding of the new rules of international competitiveness; effects of globalisation on Australia's economic performance; the competitiveness of Australian firms; the generation of employment and wealth; the changing requirements on the engineer; the engineer as manager and strategist; the role of innovation in business management; product innovation and commercialisation; IP recognition and management; starting a high-tech company.

ENGG4064
Advanced Engineering Design A

Credit points: 6 **Session:** Semester 2 **Classes:** project work - own time **Prerequisites:** Only students on the Dean's List at the end of Year 3 will be invited to join this interdisciplinary group **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The aim to this unit is 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 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. We try to centre projects around a client, which can be an industrial facility, the Campus and Property Services Office of the University, Research departments within the university, or outside clients (e.g. Nature Conservation Council NSW).

Elements drawn from: Introduction to the design process, Clarification of the Brief, Inquiry, brainstorming, Design philosophy,

Design optimization, Equipment design and costing, Hazard assessment, Environmental Impact Assessment, Project financial Analysis, Business planning.

ENGG4065
Advanced Engineering Design B

Credit points: 6 **Session:** Semester 2 **Classes:** project work - own time **Prerequisites:** This unit is an extension module for students in ENGG4064. So only students on the Dean's List at the end of Year 3 will be invited to join this interdisciplinary group **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The unit aims to extend and deepen the understanding of the practice of engineering, gained in ENGG 4064 by undertaking this course as a parallel module. The intention is that this 12 credit point module may allow a student to undertake a body of work which is comparable to a thesis. It would need to involve an extensive process of inquiry and synthesis. In order to undertake this module approval of the Department and Engineering Faculty is required, so students who are interested in perusing this option MUST negotiate a suitable project and the likely deliverables during Semester 1.

5. Postgraduate degree regulations

This chapter contains the regulations governing postgraduate degrees offered by the Faculty of Engineering and Information Technologies.

Resolutions of the Senate

Pertaining to postgraduate degrees in the Faculty of Engineering and Information Technologies

These resolutions must be read in conjunction with the *University of Sydney (Coursework) Rule 2000 (as amended)* that sets out the requirements for all postgraduate courses, and the Resolutions of the faculty relating to these courses.

Degrees, diplomas and certificates in the Faculty of Engineering and Information Technologies

1. The postgraduate degrees in the Faculty of Engineering and Information Technologies shall be:
1.1 Master of Professional Engineering (MPE)
1.2 Master of Engineering (ME)
1.3 Master of Information Technologies (MIT)
1.4 Master of Information Technology Management (MITM)
1.5 Master of Philosophy (MPhil)
1.6 Master of Project Management (MPM)
1.7 Doctor of Philosophy (PhD)
1.8 Doctor of Engineering (DEng)
1.9 Doctor of Engineering Practice (DEngPrac)

2. The diplomas in the Faculty of Engineering and Information Technologies shall be:
2.1 Graduate Diploma in Engineering (GradDipEng)
2.2 Graduate Diploma in Power Engineering (GradDipPowEng)
2.3 Graduate Diploma in Project Management (GradDipPM)
2.4 Graduate Diploma in Information Technologies (GradDip IT)
2.5 Graduate Diploma in Information Technology Management (GradDipITM)
2.6 Graduate Diploma in Computing (GradDipComp)

3. The certificates in the Faculty of Engineering and Information Technologies shall be:
3.1 Graduate Certificate in Engineering (GradCertEng)
3.2 Graduate Certificate in Project Management (GradCertPM)
3.3 Graduate Certificate in Greenhouse Gas Mitigation (GradCertGHGMit)
3.4 Graduate Certificate of Information Technologies (GradCertIT)
3.5 Graduate Certificate of Information Technology Management (GradCertITM)

Master of Philosophy

1. **Requirements for the Master of Philosophy**
1.1 A candidate who has been admitted in accordance with section 1 shall:
1.1.1 engage in research in some branch of Engineering or Information Technologies in the University of Sydney either full-time for not less than one year or part-time for not less than two years,
1.1.2 undertake units of study as the School or the Faculty may prescribe,
1.1.3 undergo a probationary period as imposed by the Faculty.

Master of Engineering, Graduate Diploma in Engineering, Graduate Certificate in Engineering

1. **Requirements for the Graduate Certificate in Engineering, Graduate Diploma in Engineering and Master of Engineering**
1.1 A candidate who has been admitted to the Graduate Certificate in Engineering shall:
1.1.1 complete a total of 24 credit points from units of study listed in the Faculty postgraduate tables.
1.1.2 For named certificates, the prescribed core units of study of the specialisation listed in the Faculty postgraduate tables must be completed. At least half of the credit points (that is, 12 credit points) shall come from the area of the specialisation.
1.2 A candidate who has been admitted to the Graduate Diploma in Engineering shall:
1.2.1 complete a total of 36 credit points from units of study listed in the Faculty postgraduate tables.
1.3 A candidate who has been admitted to the Master of Engineering shall proceed either:
1.3.1 by coursework and project, in accordance with the relevant sections of the Resolutions; or
1.3.2 by coursework only, in accordance with the Resolutions.
1.4 A candidate proceeding by coursework and project shall:
1.4.1 complete coursework prescribed by the School to a total value of 36 credit points and carry out a 12 credit point project;
1.4.2 carry out under supervision a project in a field of study approved by the School and submit for examination a report;
1.4.3 lodge with the school two bound copies (typewritten) of the report.
1.5 A candidate proceeding by coursework only shall complete, to the satisfaction of the Committee, coursework prescribed by the School to a total value of 48 credit points and according to requirements prescribed in the Faculty Postgraduate Tables. For named masters degrees, the prescribed core units of study of the specialisation listed in the Faculty Postgraduate Tables must be completed. At least half of the credit points (that is, 24 CPs) shall come from the area of the specialisation.

2. The degree of Master of Engineering may be awarded in the following specialisations and the testamur for the degree shall specify the specialisation:
2.1 Aerospace Engineering
2.2 Automation and Manufacturing Systems
2.3 Biophysical Processes
2.4 Biomedical Engineering
2.5 Environmental Engineering
2.6 Environmental Fluids
2.7 Fluid and Wind Engineering
2.8 Geotechnical Engineering
2.9 Mechanical Engineering
2.10 Network Engineering
2.11 Power Engineering
2.12 Structural Engineering
2.13 Sustainable Processing
2.14 Wireless Engineering

Master of Professional Engineering

1. **Requirements for the Master of Professional Engineering**
1.1 A candidate who has been admitted to the Master of Professional Engineering shall proceed:
1.1.1 by coursework and project, in accordance with the relevant sections of the Resolutions:

1.2.1 complete successfully units of study giving credit for a total of 96 credit points.
1.2.2 complete successfully the core requirements of an Engineering specialisation as shown in the Master of Professional Engineering specialisations tables in the Faculty of Engineering and Information Technologies Handbook.
1.2.3 satisfy the requirements of all other relevant By-laws, Rules and Resolutions of the Faculty and the University.
2. The degree of Master of Professional Engineering is awarded in the following specialisations:
2.1 Aerospace Engineering
2.2 Biomedical Engineering
2.3 Chemical and Biomolecular Engineering
2.4 Civil Engineering
2.5 Electrical Engineering
2.6 Environmental Fluids
2.7 Geotechnical Engineering
2.8 Mechanical Engineering
2.9 Network Engineering
2.10 Power Engineering
2.11 Software Engineering
2.12 Structural Engineering
2.13 Wireless Engineering

Master of Information Technology, Graduate Diploma in Information Technology, Graduate Certificate of Information Technology

1. Requirements for the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology and Master of Information Technology

1.1 Candidates for the Graduate Certificate in Information Technology are required to complete satisfactorily units of study giving credit for a total of 24 credit points selected from units of study, excluding: INFO5990 and IT Project units of study, approved for the Master of Information Technology. A maximum of 12 credit points may be selected from units offered outside the Faculty of Engineering and IT.
1.1.1 Candidates for the Graduate Diploma in Information Technology are required to complete satisfactorily units of study giving credit for a total of 36 credit points selected from units of study approved for the Master of Information Technology.
1.1.1.1 Of the 36 credit points required for the Graduate Diploma in Information Technology, a maximum of 24 credit points can be selected from Foundational units of study; and at least 12 credit points should come from Specialist units of study, excluding INFO5990 and IT project units of study. A maximum of 12 credit points may be selected from units offered outside the Faculty of Engineering and IT.
1.1.2 Candidates for the Master of Information Technology are required to complete satisfactorily units of study giving credit for a total of 48 credit points selected from the units of study approved for the Master of Information Technology, satisfying the conditions approved from time to time by the Faculty.
1.1.2.1 Of the 48 credit points required for the Master of Information Technology, a maximum of 24 credit points can be selected from Foundational units; and at least 24 credit points should come from Specialist units or IT projects. A maximum of 12 credit points may be selected from units offered outside the Faculty of Engineering and IT.
1.1.2.2 Enrolment in IT projects will be approved only for those students who have completed at least 24 credit points from Foundational or Specialist units at Credit average or above.
1.1.2.3 Enrolment in IT projects may be limited by quota.
1.1.2.4 To qualify for the award of Master of Information Technology students must complete one of the defined majors referred to in subsection 3 of the Resolutions of the Senate, as published in the University of Sydney Calendar.
1.1.2.5. The testamur for the Master of Information Technology shall specify the major completed in order to qualify for the award.

Master of Information Technology Management, Graduate Diploma in Information Technology Management, Graduate Certificate in Information Technology Management

1. Requirements for the Graduate Certificate in Information Technology Management, Graduate Diploma in Information Technology Management and Master of Information Technology Management

1.1 Candidates for the Graduate Certificate in Information Technology Management are required to complete satisfactorily units of study giving credit for a total of 24 credit points selected from units of study approved for the Master of Information Technology Management.
1.1.1 Candidates for the Graduate Certificate in Information Technology must select units from the list of core units of study, excluding IT Research Project units of study.
1.1.2 INFO5990 Professional Practice in IT must be completed as a core unit of study.
1.2 Candidates for the Graduate Diploma in Information Technology Management are required to complete satisfactorily units of study giving credit for a total of 36 credit points selected from units of study approved for the Master of information Technology Management.
1.2.1 Of the 36 credit points, a minimum of 30 credit points must be selected from core units of study, excluding IT Research Project units of study.
1.2.2 INFO5990 Professional Practice in IT and INFO5991 Services Science Management and Eng, must be completed as core units of study.
1.2.3 A maximum of 6 credit points of elective units of study can be taken.
1.3 Candidates for the Master of Information Technology Management are required to complete satisfactorily units of study giving credit for a total of 48 credit points selected from units of study approved for the Master of Information Technology Management.
1.3.1 Of the 48 credit points, a minimum of 30 credit points must be selected from core units of study.
1.3.2 INFO5990 Professional Practice in IT, INFO5991 Services Science Management and Eng, and INFO5992 Understanding IT Innovations, must be completed as core units of study.
1.3.3 A maximum of 18 credit points of elective units of study can be taken of which no more than 12 credit points of units may be chosen from units offered outside the Faculty of Engineering and IT;
1.3.4 Enrolment in IT projects will be approved only for students who have completed at least 24 credit points and may be limited by quota.
1.3.5 After completing 24 credit points of coursework, students who achieve Credit average results or above in their coursework may select 12 credit points of Information Technology project units of study among their core units.
1.4 Research path in the Master of Information Technology Management
1.4.1 After completing 24 credit points of coursework, students who have Distinction average results or above may be eligible for the research path subject to the approval of the Head of the School of Information Technologies, and the Dean.
1.4.2 Students who pursue the rsearch path must study INF04990 Research Methods, and select 18 credit points from IT Research Project units of study among their core units.
1.4.3 Students who pursue the research path are not required to take INFO5991 Services Science Management and Eng and INFO5992 Understanding IT Innovations as core units of study.

Graduate Diploma in Computing

1. Requirements for the Graduate Diploma in Computing

1.1 Candidates for the Graduate Diploma in Computing are required to complete satisfactorily units of study giving credit for a total of 48 credit points, selected from units of study approved for the Graduate Diploma in Computing.

1.2 Satisfactory completion of the Graduate Diploma in Computing for purposes of entry into the Master of Information Technology require that a candidate has not failed more than 12 credit points of units of study in the Graduate Diploma in Computing.

Master of Project Management, Graduate Diploma in Project Management, Graduate Certificate in Project Management

1. Requirements for the Graduate Certificate in Project Management, Graduate Diploma in Project Management and Master of Project Management.

1.1 A candidate who has been admitted to the Graduate Certificate in Project Management shall:

1.1.1 complete a total of 24 credit point from units of study listed in the Faculty Postgraduate tables comprising a minimum of 12cp foundation UOS, a minimum of 6cp specialist UOS and a minimum of 6cp elective or professional practice UOS.

1.2 A candidate who has been admitted to the Graduate Diploma in Project Management shall:

1.2.1 complete a total of 36 credit points from units of study listed in the Faculty Postgraduate tables comprising a minimum of 12cp foundation UOS, a minimum of 12cp specialist UOS, a minimum of 6cp professional practice UOS and a minimum of 6cp of elective UOS.

1.3 A candidate who has been admitted to the Master of Project Management shall proceed either:

1.3.1 by coursework; or by coursework and project.

1.3.2 A candidate proceeding by coursework only shall:

1.3.2.1 complete coursework prescribed by the Committee to a total value of 48 credit points comprising a minimum of 12cp of foundation UOS, a minimum of 12cp UOS from the area of specialisation, a minimum of 12cp UOS from professional practice units, and a minimum of 6cp to a maximum of 12cp of elective UOS.

1.3.3 A candidate proceeding by coursework and project shall:

1.3.3.1 complete coursework prescribed by the Committee to a total value of 48 credit points comprising a minimum of 12cp from foundation UOS, a minimum of 12cp of specialisation UOS, a minimum of 12cp of research practice UOS, a minimum of 6cp of elective UOS and a minimum of 6cp of professional practice UOS;

1.3.3.2 carry out under supervision a project in a field of study approved by the Committee and submit for examination a report on such a project;

1.3.3.3 lodge with the school/schools two bound copies (typewritten or printed) of the project report.

2. The degree of Master of Project Management may be awarded in the following subject areas and the named testamurs for the degree shall specify the subject area. To qualify for one of these streams, students will have completed 12cp of specific subject area.

2.1 Project Economics and Scheduling Management;

2.2 International Project Management;

2.3 Project Risk Management;

2.4 Strategic PM Implementation.

Doctor of Engineering Practice

1. Definitions

1.1 In these Resolutions:

1.1.1 **Committee** – means the Committee for Postgraduate Studies of the Faculty of Engineering and Information Technologies;

1.1.2 **Dean** – means the Dean of the Faculty of Engineering and Information Technologies;

1.1.3 **degree** – means the degree of Doctor of Engineering Practice;

1.1.4 **department** – means the department or school in the Faculty of Engineering and Information Technologies in which the candidate is proceeding;

1.1.5 **embedded program** – is a program of study in the graduate certificate/graduate diploma/master's degree by coursework sequence which allows unit of study credit points to count in more than one of the awards;

1.1.6 **Faculty** – means the Faculty of Engineering and Information Technologies;

1.1.7 **unit of study or unit** – is the smallest stand-alone component of a candidate's course that is recordable on a candidate's transcript;

1.1.8 **University** – means the University of Sydney.

2. Admission to candidature

2.1 An applicant for admission to candidature shall:

2.1.1 apply in writing to the Dean;

2.1.2.1 hold, or have fulfilled the requirements for the award of, the degree of Bachelor of Engineering of the University of Sydney with First or Second Class Honours; or

2.1.2.2 hold, or have fulfilled the requirements for the award of, a Master's degree of the Faculty of Engineering and Information Technologies at the University of Sydney that has been completed by research; or

2.1.2.3 hold, or have fulfilled the requirements for the award of, a master's degree of the Faculty of Engineering and Information Technologies at the University of Sydney that has been completed by coursework with at least a Credit grade average; or

2.1.2.4 hold qualifications from another faculty of the University of Sydney or from another tertiary institution considered by the Dean to be the equivalent of those prescribed in sections 2.1.2.1–2.1.2.3 above;

2.1.3 submit with the application:

2.1.3.1 an outline of the proposed course of advanced study and research, including the general area of the proposed thesis;

2.1.3.2 evidence of at least three years' recent, full-time experience in Engineering or Project Management as the Dean shall consider appropriate for postgraduate study at this level; and

2.1.3.3 such evidence of adequate training and ability to pursue the proposed program of study as the Dean may require.

2.2 An applicant for admission to either part-time candidature or candidature by distance education/flexible learning shall, in addition to the above, also submit with the application a written undertaking that he or she:

2.2.1 will have sufficient time available to complete the requirements for the degree in accordance with these Resolutions; and

2.2.2 will be able to attend at the University at such times and on such occasions for purposes of consultation and participation in departmental activities as may be required by the head of the relevant department or the Dean.

3. Probationary acceptance

3.1 A candidate shall be accepted on a probationary basis for a period not exceeding two semesters, and, upon completion of this probationary period, the Dean

3.1.1 shall review the candidate's work; and

3.1.2 shall either confirm the candidate's status or terminate the candidature.

3.2 In the case of a candidate accepted on a probationary basis, the candidature shall be deemed to have commenced from the date of such acceptance.

4. Availability

4.1 Admission to candidature may be limited by quota.

4.2 In determining the quota the University will take into account:

4.2.1 availability of resources, including space, library, equipment and computing facilities; and

4.2.2 availability of adequate and appropriate supervision.

4.3 In considering an applicant for admission to candidature, the Dean may take account of the quota and will select in preference applicants who are most meritorious in terms of the eligibility for admission criteria.

5. Degree requirements

5.1 In order to complete the requirements for the degree, a candidate shall complete a total of 144 credit points comprising the following advanced coursework and research:

5.1.1 approved postgraduate units of study totalling 48 credit points; and

5.1.2 a doctoral seminar program and a thesis totalling 96 credit points.

6. Units of study

6.1 The postgraduate units of study approved by the Committee are those offered for the coursework master's degrees in the Faculty.

6.2 The Dean may permit a candidate to include within the required 48 credit points of units of study up to a maximum of 24 credit points for postgraduate units of study offered by another faculty in the University or by another tertiary institution, subject to the approval of that other body.

6.3 Notwithstanding any permission to include units of study offered by another faculty in accordance with section 2 above or any credit granted for previous study in accordance with section 10.1.2 below, a candidate must complete at least 24 credit points of units of study offered for the coursework master's degrees in the Faculty.

7. Seminar program and supervised research

7.1 In the doctoral seminar program a candidate must present three research colloquia to his or her peers in the form of a thesis proposal and two 'work in progress' seminars, one of which might be analogous to an oral defence of the nearly-completed thesis.

7.2.1 A candidate must carry out, under supervision, a research project in a field of study approved by the Dean.

7.2.2 The research project will normally comprise the investigation of a specific aspect or specific aspects of either the candidate's own and/or others' professional practice.

7.2.3 While normally only one research project is undertaken, the Dean may permit a candidate to undertake research in a series of different projects that must be related and form a coherent body of research.

8. The thesis

8.1 On completing the course of advanced study and research, a candidate shall present a thesis embodying the results of the work undertaken in the research project, that shall be a substantially original contribution to the subject concerned.

8.2 The candidate shall state, generally in the preface and specifically in notes;

8.2.1 the sources from which the information is derived;

8.2.2 the extent to which use has been made of the work of others; and

8.2.3 the portion of the work the candidate claims as original.

8.3 The thesis shall normally be approximately 60,000 words (that is, about 200 pages) and shall in no circumstances be longer than 80,000 words.

8.4 The topic of the thesis must have the prior approval of the Dean.

8.5.1 A candidate may also submit in support of the candidature any publication of which the candidate is the sole or joint author.

8.5.2 In such a case the candidate must produce evidence to identify satisfactorily the sections of the work for which the candidate is responsible.

8.6 A candidate may not present as the thesis any work that has been presented for a degree or diploma at this or another university, but the candidate will not be precluded from incorporating such in the thesis, provided that, in presenting the thesis, the candidate indicates the part of the work which has been so incorporated.

8.7 The thesis shall be written in English.

8.8 A candidate shall submit to the relevant department four copies of the thesis and four copies of a summary of about 300 words in length.

8.9 The copies of the thesis submitted for examination will be either printed copies or, where prior approval has been obtained from the relevant head of department, in the form of CDs, as provided in the Resolutions of the Academic Board relating to the form of the thesis for the degree of Doctor of Philosophy.

8.10 The thesis shall be accompanied by a certificate from the supervisor stating whether, in the supervisor's opinion, the form of presentation of the thesis is satisfactory.

8.11 When the degree has been awarded, a hard copy of the thesis printed on archival paper and incorporating any required emendations and revisions shall be lodged in the University Library, except as provided in section 20 below.

9. Length of candidature

9.1 A candidate may proceed either on a full-time or part-time basis.

9.2 Except with the express approval of the Dean:

9.2.1 a full-time candidate shall complete the degree requirements:

9.2.1.1 no earlier than the end of the sixth semester of candidature; and

9.2.1.2 no later than the end of the eighth semester of candidature; and

9.2.2 a part-time candidate shall complete the degree requirements:

9.2.2.1 no earlier than the end of the eighth semester of candidature; and

9.2.2.2 no later than the end of the sixteenth semester of candidature.

9.3 Where a candidate is granted credit for previous studies in accordance with section 10 below, the candidate's minimum and maximum length of candidature may be adjusted accordingly.

9.4 Where a candidate is granted a period of suspension of candidature, this period will not count as part of the time-limits prescribed above in section 9.2.

9.5 Where a candidate is granted permission to change from full- to part-time candidature, or the reverse, the minimum and maximum lengths of candidature will be amended pro-rata.

10. Credit transfer

10.1 Coursework component

10.1.1 A candidate who, at the date of admission to candidature, has completed postgraduate coursework (whether a degree for that work has been awarded or not) may apply for credit transfer towards the degree.

10.1.2 On the recommendation of the relevant head of department, the Dean may grant a candidate credit for previous studies provided that:

10.1.2.1 the coursework for which credit is sought is deemed by the Dean to have been completed with a high level of competency and to be relevant to the candidate's total program of study; and

10.1.2.2 no more than 24 credit points shall normally be so credited, unless the units of study for which credit is sought were completed in an embedded program at this University, in which case there shall be no restriction on the amount of credit that may be granted.

10.2 Research component

10.2.1 A candidate who, at the date of admission to candidature, has completed not less than one semester as a candidate for a degree of master in the Faculty of Engineering and Information Technologies or in another faculty in the University of Sydney, may be permitted by the Dean to transfer credit for the whole or any part of that candidature towards the DEngPrac degree, provided that:

10.2.1.1 the period of candidature for the degree of master for which credit is sought shall have been in a program of full-time or part-time advanced study and research under a supervisor appointed by the faculty and directly related to the candidate's proposed course of advanced study and research for the DEngPrac degree; and

10.2.1.2 the candidate shall have abandoned candidature for that degree of master.

10.2.2 A candidate who, at the date of admission to candidature, has completed not less than one semester as a candidate for the degree of Doctor of Philosophy in the University of Sydney may be permitted by the Dean to transfer credit for the whole or any part of that candidature towards the DEngPrac degree, provided that:

10.2.2.1 the period of candidature for the PhD degree for which credit is sought shall have been in a program directly related to the candidate's proposed course of advanced study and research for the DEngPrac degree; and

10.2.2.2 the candidate shall have abandoned candidature for the PhD degree.

10.2.3 A candidate who, at the date of admission, has completed not less than one semester as a candidate for a higher degree in another university or institution may be credited for the whole or any part of that period of candidature towards the DEngPrac degree, provided that:

10.2.3.1 the period of candidature for the higher degree for which credit is sought shall have been in a program of full-time or part-time advanced study and research under a supervisor appointed by the other university or institution concerned and is directly related to the candidate's proposed course of advanced study and research for the DEngPrac degree;

10.2.3.2 the candidate shall have abandoned candidature for the higher degree of the other university or institution concerned for which credit is sought; and

10.2.3.3 the amount of credit which may be so granted shall not exceed two semesters.

11. Control of candidature

11.1 Each candidate shall pursue his or her course of advanced study and research wholly under the control of the University.

11.2 Where a candidate is employed by an institution other than the University, the Dean may require a statement from that employer acknowledging that the candidature will be under the control of the University.

12. Location of candidature

12.1 Subject to the approval of the supervisor, relevant head of department and the Dean, a candidate shall pursue the program of advanced study and research:

12.1.1 within the University, including its research centres;

12.1.2 on fieldwork either in the field or in libraries, museums or other repositories;

12.1.3 within industrial laboratories or research institutions or other institutions considered by the Dean to provide adequate facilities for that candidature; or

12.1.4 within a professional working environment considered to be appropriate by the Dean.

12.2 A candidate shall be regarded as engaging in work within the University if he or she is undertaking approved distance and/or off-campus study, this being a mode of study in which the student would not be in regular physical attendance on a designated campus of the University.

12.3 A candidate must, however, be able to attend the University at such times and on such occasions for the purposes of consultation and participation in prescribed academic and educational activities, as may be required by the relevant head of department.

12.4 Except in respect of a candidate undertaking approved distance and/or off-campus study, a candidate pursuing candidature outside Australia must also complete a cumulative minimum period of two semesters of candidature within the University.

13. Supervision

13.1 *Appointment of supervisor*

13.1.1 The Dean, on the recommendation of the relevant head of department, shall appoint a suitably qualified supervisor for each candidate to take primary responsibility for the conduct of the candidature.

13.1.2 The Dean, on the recommendation of the relevant head of department, shall normally appoint one or more associate supervisors for each candidate to assist in the supervision of that candidature.

13.2 *Qualifications of supervisors*

13.2.1 A person appointed as a supervisor must be:

13.2.1.1 a member of the academic staff;

13.2.1.2 a member of the senior research staff;

13.2.1.3 a person upon whom the Senate has conferred an academic title or a clinical academic title; or

13.2.1.4 such other member of the staff of the University as may be considered appropriate in a particular case by the Graduate Studies Committee of the Academic Board.

13.3 *Qualifications of associate supervisors*

13.3.1 A person appointed as an associate supervisor must:

13.3.1.1 hold the qualifications referred to in section 13.2; or

13.3.1.2 have been appointed as an honorary associate of the University.

14. Progress

14.1 *Annual review*

14.1.1 At the end of each year of candidature, each candidate shall complete and submit an annual progress report form to provide evidence of progress to the satisfaction of the supervisor, the relevant head of department and the Dean.

14.1.2 The supervisor shall comment on the candidate's report, and the form will then be referred back to the candidate who shall sign the report to indicate that he or she has sighted the supervisor's comments.

14.1.3.1 The form shall then be referred to the head of the relevant department, who, on the basis of the evidence provided, shall recommend the conditions of candidature to apply for the following year.

14.1.3.2 The head may require the candidate to provide further evidence of progress at the end of one semester or such other period as the head considers appropriate.

14.1.4 The progress report form is then forwarded to the Dean for consideration and comment.

14.2 *Interview at the end of the first year of candidature*

14.2.1 In addition to the requirement for the submission of an annual progress report, at the end of the first year of candidature each candidate's progress will be reviewed at an interview to be organised by the relevant department.

14.2.2.1 The review shall include an assessment of the research project including the resources being made available, the candidate's progress (including seminar performance) and the supervisory arrangements.

14.2.2.2 If both the supervisor and the relevant head of department participate in the review, another member of staff – usually the departmental postgraduate coordinator – shall normally also participate in the review.

14.2.2.3 There shall also be a segment where the candidate has the opportunity to discuss in confidence his or her progress in the absence of the supervisor.

14.2.3.1 An outcome will be considered by the head of department, if not directly involved, and the Dean.

14.3.1.2 Where difficulties have been identified, the report will include an agreed course of action which may include discontinuation of candidature.

14.3 Lack of evidence of satisfactory progress

14.3.1 If a candidate fails to submit evidence of progress or if the relevant head of department considers that the evidence submitted does not indicate satisfactory progress, the Dean may, on the head's recommendation:

14.3.1.1 call upon the candidate to show good cause why that candidature should not be terminated by reason of unsatisfactory progress towards completion of the degree; and

14.3.1.2 where, in the opinion of the Dean, the candidate does not show good cause, the Dean may terminate that candidature or may impose conditions on the continuation of that candidature.

14.3.2.1 For the purposes of these Resolutions, good cause means circumstances beyond the reasonable control of a candidate, which may include serious ill-health or misadventure, but does not include demands of employers, pressure of employment or time devoted to non-University activities, unless these are relevant to serious ill health or misadventure.

14.3.2.2 In all cases the onus is on the candidate to provide the University with satisfactory evidence to establish good cause.

15. Discontinuation of enrolment

15.1 A candidate who wishes to discontinue enrolment in the degree or in a unit of study must apply to the relevant head of department and will be presumed to have discontinued enrolment from the date of that application, unless evidence is produced showing:

15.1.1 that the discontinuation occurred at an earlier date; and

15.1.2 that there was good reason why the application could not be made at the earlier time.

15.2 A candidate who discontinues enrolment in a unit of study shall have that discontinuation recorded as Withdrawn (W) or Discontinued not to count as failure (DNF) where that discontinuation occurs within the time-frames specified by the University or where the candidate meets other conditions as specified by the relevant head of department.

15.3 A candidate who discontinues candidature for the degree shall have that discontinuation recorded as Withdrawn (W) or Not enrolled or Not continuing where that discontinuation occurs:

15.3.1 within the time-frames specified by the University or

15.3.2 where the candidate meets other conditions as specified by the relevant head of department.

15.4 A candidate who discontinues candidature and who seeks to re-enrol as a candidate for the degree must apply for re-admission in accordance with procedures determined by the Committee.

16. Suspension of candidature

16.1 A candidate must be enrolled in each semester in which he or she is actively completing the requirements for the degree.

16.2 A candidate who wishes to suspend candidature must first obtain approval from the Dean.

16.3 The candidature of a candidate who has not re-enrolled and who has not obtained approval from the Dean for suspension will be deemed to have lapsed.

16.4.1 A student whose candidature has lapsed must apply for re-admission in accordance with procedures determined by the Committee.
16.4.2 If re-admitted to candidature, the candidate shall complete the degree requirements under such conditions as determined by the Dean.
16.5 A candidate who enrols after suspending candidature shall complete the requirements for the degree under such conditions as determined by the Dean.

17. Examination

17.1 Except as prescribed in these resolutions, the examination procedures shall be in accordance with the policies and procedures prescribed by the Academic Board for the degree of Doctor of Philosophy.

18. Appointment of Examiners

18.1 On receiving the thesis and having considered the certificate of the supervisor, the Dean shall consult with the relevant head of department and, if the Dean sees fit, appoint examiners.
18.2 If the Dean resolves to appoint examiners, three independent examiners shall be appointed.
18.3 Of the examiners so appointed:
18.3.1 at least two examiners shall be external to the University;
18.3.2 the supervisor may not be appointed as an examiner;
18.3.3 an industry-based associate supervisor may not be appointed as an external examiner; and
18.3.4 each examiner shall hold a professional doctorate or PhD-level qualification and/or be a member of staff at a recognised university at the level of professor or associate professor.
18.4 The Dean shall report the names of the examiners appointed to the PhD Award Subcommittee of the Graduate Studies Committee of the Academic Board, which may appoint one or more additional examiners.
18.5 In any case where the Dean, having received the thesis and having considered the report of the supervisor, resolves not to appoint examiners, the Dean shall report the circumstances to the PhD Award Subcommittee of the Graduate Studies Committee of the Academic Board.

19. Determination of the result of the candidature

19.1 The Head of Department will refer the results of the coursework and the examiners' reports on the thesis, together with a recommendation concerning the award of the degree, to the Faculty Board.
19.2 The Head's recommendation for the thesis shall then be treated as for a PhD (section 3 of the Resolutions for PhD), in that the award of the degree can be made if the Head recommends typographical corrections or minor emendations.
19.3 If the Head recommends that changes asked for by the examiners not be carried out, or there is disagreement among the examiners, then the Faculty shall forward a report (along with the Head's report and the student's comments on the examiner's reports) to the PhD Award Subcommittee of the Academic Board's Graduate Studies Committee, which shall determine the result of the candidature.

20. Public availability of thesis

20.1 It is the policy of the Senate that a candidate for a higher degree should not normally be permitted to undertake a program of advanced study and research which is likely to result in the lodgement of a thesis that cannot be available for use immediately, to be read, photocopied or microfilmed, except as provided in sections 20.3 and 20.4 below.
20.2 An applicant for admission to candidature for a higher degree shall be required to acknowledge awareness of this policy when applying for such admission.
20.3 Use of confidential material and access to a restricted thesis
20.3.1 If, at any time between application for admission to candidature and the lodgement of the thesis, it shall appear to the supervisor and to the relevant head of department that successful prosecution of the candidature will require the use of confidential material which the candidate would not be at liberty fully to disclose in the thesis, the matter shall be reported as soon as practicable to the Dean.
20.3.2 The Dean may, if the Dean thinks fit, recommend to the Graduate Studies Committee of the Academic Board that the candidate be granted:
20.3.2 1 permission to include in an appendix to the thesis such material as is essential to the thesis but which, for a limited period, may not be available for general inspection; and
20.3.2.2 exemption, in respect of such an appendix, from the requirement to give the undertaking specified in section 20.2 above.
20.3.3.1 Subject to the provisions in section 20.3.4 below, if the Graduate Studies Committee of the Academic Board resolves to grant such permission and exemption, the University Librarian shall restrict access, for a period to be specified by the Graduate Studies Committee of the Academic Board, to any appendix referred to in section 20.3.2 above.
20.3.3.2 This period of restriction shall not exceed five years unless there are exceptional reasons for an extension of the period.
20.3.4 The University Librarian may grant access to an appendix to a thesis to which access has been restricted in accordance with section 20.3.3 above, to a scholar who:
20.3.4.1 demonstrates bona fide concern with the material in that appendix; and
20.3.4.2 has the written consent of either: the author of the thesis; or the head of the relevant department in a case where the author cannot be contacted, notwithstanding that all reasonable steps have been taken to contact the author.
20.3.5 Notwithstanding any other provision of these resolutions, the examiners of a thesis, including any Faculty committee or any committee of the Academic Board which is directly concerned with the examination of such thesis, shall have access to the thesis and any appendix to the thesis for the purposes of any examination or re-examination.
20.4 *Deferment of public availability of thesis*
20.4.1 The Senate recognises that there are certain circumstances where deferment of the public availability of the thesis is appropriate.
20.4.2 In a case where a candidate or potential candidate is to be associated with a project in collaboration with industry that has potential for concern over exploitation of intellectual property, the Dean, if satisfied that the circumstances warrant it, may recommend to the Graduate Studies Committee of the Academic Board that:
20.4.2.1 the candidate or prospective candidate be granted exemption from the requirement to give the undertaking specified in section 20.2 above; and
20.4.2.2 authorisation be given to delay lodgement of the thesis in the Library for a period that, except in exceptional circumstances, shall not exceed 18 months from the date of the award of the degree.
20.4.3 The Chair of the Graduate Studies Committee of the Academic Board may approve such applications on behalf of the Graduate Studies Committee, where the Chair is satisfied that they are appropriate.
20.4.4.1 If, at any time between application for admission to candidate and the lodgement of the thesis, it shall appear to the candidate, supervisor and to the relevant head of department that there are reasons to believe that the candidate's interests would be at risk if the thesis were immediately made available, the candidate may apply in writing for deferment of the availability of that thesis in the University Library for a specific period of time.
20.4.4.2 Any such application should set out clearly the reasons for the request and include supporting evidence, as appropriate.
20.4.5 The Dean, if satisfied that such a deferment is necessary to protect the interests of the candidate, may:
20.4.5.1 give authorisation for the thesis not to be lodged in the Library for a period not exceeding six months from the date of award of the degree; and may also
20.4.5.2 recommend to the Graduate Studies Committee of the Academic Board that a longer period of deferment, or an extension of the original deferment, be approved provided that, except in exceptional circumstances, the total period shall not exceed 18 months.

21. Heads of department

21.1 A head of department may delegate to a specified member of the academic staff his or her responsibilities under these resolutions by:
21.1.1 countersigning a specific recommendation in respect of a particular candidature; or
21.1.2 making, and forwarding to the Registrar, a written statement of delegation of those powers.

Graduate Certificate in Greenhouse Gas Mitigation

1. Eligibility for admission

1.1 Admission to candidature for the Graduate Certificate in Greenhouse Gas Mitigation may be granted:

1.1.1 to an applicant who has completed the requirements for a degree of Bachelor of Engineering or other appropriate degree at the University of Sydney; or

1.1.2 to a graduate in an appropriate discipline of another university or tertiary institution.

2. Availability

2.1 Admission to the Graduate Certificate in Greenhouse Gas Mitigation may be limited by quota.

2.2 In determining the quota the University will take into account:

2.2.1 availability of resources, including space, library, equipment and computing facilities; and

2.2.2 availability of adequate and appropriate supervision.

2.3 In considering an application for admission to candidature the Faculty will take account of the quota and will select in preference applicants who are most meritorious in terms of past academic and professional achievements.

3. Method of progression

3.1 A candidate for the Graduate Certificate in Greenhouse Gas Mitigation shall proceed by coursework.

4. Time limits

4.1 A candidate shall complete the requirements of the Graduate Certificate in Greenhouse Gas Mitigation within a minimum length of candidature of six months and a maximum length of candidature of 24 months.

4.2.1 This period excludes the periods during which the candidature is suspended and is shorter when credit for prior learning is granted; but

4.2.2 under no circumstances can the candidature period be less than six months.

5. Credit

5.1 A candidate who before admission to candidature has spent time in postgraduate study in the University of Sydney or in another university or institution and has completed work considered by the Faculty to be equivalent to units of study prescribed for the Graduate Certificate in Greenhouse Gas Mitigation, may receive credit towards satisfying the requirements for the Graduate Certificate in Greenhouse Gas Mitigation, provided that no more than half the requirements are so met.

6. Requirements for the Graduate Certificate in Greenhouse Gas Mitigation

6.1 A candidate shall complete such units of study as may be prescribed by the Faculty.

6.2 For the Graduate Certificate in Greenhouse Gas Mitigation 24 credit points are required to be completed from Table 1, appended to these resolutions.

7. Examination

7.1 A candidate may be tested by written and oral examination, assignments, exercises and practical work or any combination of these.

7.2 On completion of the requirements for the Graduate Certificate in Greenhouse Gas Mitigation the results of the examination shall be reported to the Faculty which shall determine the result of the candidature.

8. Progress

8.1 The Faculty may call upon any candidate to show cause why that candidature should not be terminated by reason of unsatisfactory progress towards completion of the Graduate Certificate in Greenhouse Gas Mitigation; and where, in the opinion of the Faculty, the candidate does not show good cause, terminate the candidature.

Resolutions of the faculty

Pertaining to postgraduate degrees in the Faculty of Engineering and Information Technologies

These Resolutions must be read in conjunction with the *University of Sydney (Coursework) Rule 2000 (as amended)* that sets out the requirements for all postgraduate courses, and the Resolutions of the Senate relating to these courses.

Master of Philosophy

1. Admission requirements

1.1 Except as provided in *Part 9, University of Sydney (Amendment Act) 1999*, an applicant for admission to candidature for the degree of Master of Philosophy shall:

1.1.1 be a graduate in Engineering or Information Technologies of the University of Sydney and have achieved First or Second Class Honours or a standard deemed acceptable by the Faculty; or

1.1.2 be a graduate of any other faculty of the University of Sydney and have achieved first or second class honours or a standard deemed acceptable by the Faculty; or

1.2 be a graduate of another institution holding equivalent qualifications to a graduate of the University of Sydney; and

1.2.1 have completed courses acceptable to the Faculty of Engineering and Information Technologies; and

1.2.2 have in the opinion of the Faculty reached First or Second Class Honours standard.

1.3 Any applicant who furnishes evidence that satisfies the Faculty that a suitable standard of knowledge has been acquired, may be admitted by the Dean on the recommendation of the Head of School.

1.4 Candidates who have completed a Masters by Coursework in the Faculty of Engineering and Information Technologies will be admitted to the MPhil provided that they:

1.4.1 achieve a minimum weighted average mark of 75% in the Masters by coursework, and

1.4.2 complete a research thesis with a weighting of at least 12 credit points and a minimum grade of Distinction.

1.5 Candidates who have completed a Masters by coursework and have not achieved the requirements detailed in Section 1.4, may still be admitted to the MPhil subject to the approval of the Faculty.

2. Requirements of the degree

2.1 A candidate who has been admitted in accordance with section 1 shall:

2.1.1 engage in research in some branch of Engineering or Information Technology in the University of Sydney either full-time for not less than one year or part-time for not less than two years

2.1.2 undertake units of study as the School or the Faculty may prescribe, and

2.2 undergo a probationary period as imposed by the Faculty.

3. Time limits

3.1 A candidate shall, unless special permission is granted by the Faculty, complete the requirements of the degree, in the case of a full-time student not later than two years, and in the case of a part-time student not later than four years, after the commencement of candidature.

3.2 The Faculty may include in the minimum period of candidature time spent in advanced study and research in the University of Sydney Faculty of Engineering and Information Technologies (or any other institution as approved by the Faculty) prior to the application for admission to candidature.

4. Suspension of candidature

4.1 Candidates seeking suspension for a semester or longer (up to 12 months) should apply in writing to the Faculty and should have their HECS status amended accordingly. Scholarship holders should also notify the Research Office of their intended periods of absence.

5. Supervision

5.1 The Dean of the Faculty, on the recommendation of the Head of the School concerned, shall appoint a full-time member of the academic staff or research staff of the University to act as supervisor of each candidate.

5.2 Where the supervisor is a member of the research staff, the Dean of the Faculty, on the recommendation of the Head of the School concerned, shall also appoint a member of the full-time academic staff as associate supervisor. Any person so appointed as associate supervisor must be capable of acting as supervisor in the event that the supervisor is no longer able to act.

5.3 The Dean of the Faculty, on the recommendation of the Head of the School concerned, may appoint a full-time member of the academic staff of the University or other appropriately qualified person to act as associate supervisor.

6. Satisfactory progress

6.1 A report on the progress towards completion of the requirements for the degree shall be submitted annually in respect of each candidate through the Head of School to the Faculty by the Postgraduate Advisor of the School concerned.

6.2 Candidates deemed to have achieved outstanding performance may be recommended for an upgrade to PhD.

6.3 If the candidate fails to submit evidence of progress or if the Faculty considers that the evidence submitted does not indicate satisfactory progress, the Faculty may call upon that candidate to show cause why that candidature should not be terminated by reason of unsatisfactory progress towards completion of the degree and where, in the opinion of the Faculty, the candidate does not show good cause the Faculty may terminate that candidature or may impose conditions on the continuation of that candidature.

7. Assessment and examination

7.1 A candidate shall submit a thesis embodying the results of the research.

7.2 A candidate may be required, at the discretion of the Faculty, to attend lectures, seminar courses or practical work courses or to undertake courses and, if required, the assessment of such courses, subject to the approval of the Faculty.

7.3 A candidate shall state in the thesis, generally in a preface and specifically in notes;

7.3.1 the sources from which the information was derived;

7.3.2 the extent to which the work of others has been used; and

7.3.3 the portion of the work claimed as original.

7.4 The candidate shall not present as the thesis any work previously submitted for a degree of this or any other institution, but may incorporate any work that has not been submitted elsewhere, provided that the work so incorporated is indicated.

7.5 A candidate shall lodge with the Faculty three copies (printed or typewritten) of the thesis.

7.6 The thesis shall be accompanied by a certificate from the supervisor stating whether, in the supervisor's opinion, the form of presentation of the thesis is satisfactory, and that the examiners have expertise in the field of the thesis.

7.7 Having considered the certificate of the supervisor, the Faculty shall, if it thinks fit, appoint two examiners, one of which is external to the University of Sydney. The Supervisor shall not be one of the examiners.

7.8 The examiners shall report to the Faculty which shall determine the result of the examination.

8. Previous work

8.1 The Faculty may deem time spent or work done (either at the University of Sydney or other institution as approved by the Faculty) towards the degree of Doctor of Philosophy by a candidate before admission to candidature to be time spent or work done after admission, provided that the candidate has ceased to be a candidate for the degree of Doctor of Philosophy.

9. Transition arrangements for candidates enrolled in Master of Engineering Research

9.1 Candidates enrolled in Master of Engineering Research (MER) may elect to continue with the current degree or transfer to MPhil in which case the time spent or work done towards the degree of MER by a candidate before admission to MPhil will be deemed time spent or work done towards the degree of MPhil after admission, provided that the candidate has ceased to be a candidate for the degree of MER.

Master of Engineering, Graduate Diploma in Engineering, Graduate Certificate in Engineering

1. Eligibility for admission

1.1 Except as provided in Part 9, the *University of Sydney (Amendment Act) Rule 1999* of the By-laws, an applicant for admission to candidature for the degree of Master of Engineering shall:

1.1.1 be a graduate of Engineering at the University of Sydney with a credit average; or

1.1.2 be a graduate of any other Faculty of the University of Sydney with a credit average; and

1.1.3 have completed courses acceptable to the Faculty of Engineering and Information Technologies; or

1.1.4 be a graduate of another institution holding equivalent qualifications to those of a graduate of the University of Sydney with a credit average.

1.2 An applicant for admission to candidature shall apply in writing to the Graduate School of Engineering and Information Technologies for such admission to candidature.

1.3 An applicant for admission to the ME(Biomedical) or Chemical and Biomolecular specialisations shall have the following equivalent prerequisites:

1.3.1 12 cp of mathematics; 6cp of computing, 6cp of biology or chemistry or related fundamental science units.

2. Probationary admission

2.1 A candidate shall:

2.1.1 engage in such study in engineering as the school shall prescribe for not less than one year of full-time candidature or two years of part-time candidature up to a maximum of four years part-time.

3. Credit transfer policy

3.1 Credit may be available for time spent or study done towards the Graduate Certificate of Engineering, the Graduate Diploma of Engineering, and the Master of Engineering subject to the approval of the Faculty and to the following guidelines:

3.1.1 where previous relevant study undertaken at the University of Sydney at a credit average where no award has been conferred, credit may be transferred in full to the Graduate Diploma of Engineering, and the Master of Engineering.

3.1.2 If an award has been conferred for this study, credit to a limit of 12 credit points may be transferred to the Graduate Diploma of Engineering or the Master of Engineering, provided a credit average has been obtained and subject to approval of the Program Director.

3.1.3 Where study has been undertaken at postgraduate level at an external institution recognised by the University of Sydney and no award has been conferred, credit to a maximum of 24 credit points may be transferred to the Master of Engineering, provided units of study have been completed at credit average and equivalent to units of study offered under the degree being taken, subject to the approval of the Program Director.

3.1.4 Where study has been undertaken at postgraduate level at an external institution recognised by the University of Sydney and an award has been conferred, credit to a maximum of 12 credit points may be transferred to the Master of Engineering, provided units of study have been completed at credit average and equivalent to units of study offered under the degree being taken, subject to approval of the Program Director.

4. Satisfactory progress

4.1 The Dean may advise a candidate where academic progression requirements have not been met and call upon that candidate to show good cause as to why the candidate should remain enrolled in the degree.

4.2 A candidate who fails fifty percent of credit points in a given semester will be confirmed as a Stage One Student at Risk and will be subject to Stage One requirements. The Program Director may recommend that the candidate be transferred to the Graduate Diploma or Graduate Certificate.

4.3 A candidate failing academic progression requirements for a second time shall be confirmed as a Stage Three Student at Risk and shall be required to show good cause as to why the candidate should remain enrolled in the degree. The Faculty will assess the candidate's submission and will determine if the candidate is to be excluded or be allowed to reenrol.

4.3.1 If good cause has not been established, the Dean may, in accordance with clause 16 of the *University of Sydney (Coursework) Rule 2000 (as amended)*:

4.3.2 exclude the student from the degree course; or

4.3.3 permit the student to re-enrol in the degree course subject to restrictions on units of study, which would include: a completion plan; exclusion from a unit or units of study; and specification of the earliest date on which a student may re-enrol in a unit or units of study.

5. Suspension of candidature

5.1 A student may seek written permission from the Dean to suspend candidature in the course. Suspension may be granted for a maximum period of two semesters.

6. Degree requirements

6.1 *Graduate Certificate:*

6.1.1 A total of 24 credit points of units of study as prescribed in the Faculty of Engineering and Information Technologies postgraduate degree tables and at the discretion of the program director in each discipline.

6.2 *Graduate Diploma:*

6.2.1 A minimum of 36 credit points of units of study as prescribed in the Faculty of Engineering and Information Technologies postgraduate degree tables and at the discretion of the program director in each discipline.

6.3 *Master of Engineering:*

A candidate shall proceed either

6.3.1 by coursework and project, in accordance with section 7; or

6.3.2 by coursework only, in accordance with section 9.

7. A candidate proceeding by coursework and project shall:

7.1 complete coursework prescribed by the schools.

7.1.2 Candidates entering Civil Engineering specialisations must complete 12 cp of fundamental units, 24 cp of specialist units and a 12 cp project as listed in the Faculty Postgraduate Tables.

7.1.3 Candidates entering Chemical and Biomolecular Engineering or Electrical Engineering specialisations must complete 12 cp fundamental units, 12 cp specialist units, 12 cp elective units and a 12 cp project as listed in the Faculty Postgraduate Tables.

7.1.4 Candidates entering Aerospace, Biomedical and Mechanical specialisations must proceed by coursework and project and must complete 36 cp of specialist units and a 12 cp project as listed in the Faculty Postgraduate Tables.

7.1.5 For named specialisations, the prescribed fundamental and specialist units of study of the specialisation listed in the Faculty Postgraduate Tables must be completed. Graduates of the Faculty may complete specialist units in lieu of fundamental units at the discretion of the Program Director.

7.1.6 Enrolment in the 12 cp project is subject to a distinction average in the first 24 cp completed or at the discretion of the Program Director.

7.1.7 A candidate should carry out under supervision a project in the discipline of enrolment under the supervision of an academic approved by the School and submit a report for examination;

7.1.8 The School shall appoint an academic who is a member of the Faculty to act as a supervisor in respect of the candidate's project.

7.1.9 The candidate should submit two bound copies (typewriiten) of the report to the school for the examination.

7.1.10 The school shall nominate at most two examiners for the assessment of the report for approval by the School.

7.1.11 The results of the coursework and project, together with a recommendation by the Program Director shall determine the outcome of the candidature.

8. A candidate proceeding by coursework only shall complete coursework prescribed by the Schools:
8.1.1 Candidates entering Civil Engineering specialisations must complete 12 cp of fundamental units, 24 cp of specialist units and 12 cp of electives as listed in the Faculty Postgraduate Tables.
8.1.2 Candidates entering Chemical and Biomolecular Engineering or Electrical Engineering specialisations must complete 12 cp fundamental units, 12 cp specialist units and 24 cp of elective units as listed in the Faculty Postgraduate Tables.
8.1.3 Candidates entering Aerospace, Biomedical and Mechanical specialisations must complete 36 cp of specialist units and 12 cp elective units as listed in the Faculty Postgraduate Tables.
8.1.4 Graduates of the Faculty may complete specialist units in lieu of fundamental units at the discretion of the Program Director.

9. Candidates who do not complete the requirements of the specialisation of the school will be awarded the Master of Engineering in the following discipline area and the named testamur for the degree shall specify the discipline area:
9.1 Aerospace Engineering
9.2 Biomedical Engineering
9.3 Chemical and Biomolecular Engineering
9.4 Civil Engineering
9.5 Electrical Engineering
9.6 Mechanical Engineering

10. The degree of Master of Engineering may be awarded in the following specialisations and the testamur for the degree shall specify the specialisation:
10.1 Aerospace Engineering
10.2 Automation and Manufacturing Systems
10.3 Biophysical Processes
10.4 Biomedical Engineering
10.5 Environmental Engineering
10.6 Environmental Fluids
10.7 Fluid and Wind Engineering
10.8 Geotechnical Engineering
10.9 Mechanical Engineering
10.10 Network Engineering
10.11 Power Engineering
10.12 Structural Engineering
10.13 Sustainable Processing
10.14 Wireless Engineering
11. *Assessment Policy*
11.1 If a candidate is awarded the Master of Engineering and receives an overal WAM of 75 they will be awarded the Master of Engineering with Honours.
11.2 If a candidate is awarded the Master of Engineering and receives an overall WAM of 65 they will be awarded the Master of Engineering with Merit.

Master of Professional Engineering

1. **Eligibility for Admission for Master of Professional Engineering:**
1.1 Except as provided in Part 9, the University of Sydney (Amendment Act) Rule 1999 of the By-laws, an applicant for admission to candidature for the degree of Master of Professional Engineering must hold one of the following qualifications:
1.1.1 be a graduate in Engineering from the University of Sydney with a minimum credit average; or
1.1.2 be a graduate of another institution holding equivalent qualifications to those of a Bachelor of Engineering graduate of the University of Sydney with a minimum credit average; or
1.1.3 be a graduate of the University of Sydney with a minimum credit average and have substantial tertiary knowledge equivalent to at least 48 credit points in mathematics, physics, chemistry, biology, geology, computing or statistics, as related to the entry requirements for the discipline area sought for admission; or
1.1.4 be a graduate of another institution holding equivalent qualifications to those of a graduate of the University of Sydney with a minimum credit average and have substantial tertiary knowledge equivalent to at least 48 credit points in mathematics, physics, chemistry, biology, geology, computing or statistics, as related to the entry requirements for the discipline area sought for admission.
1.2 All candidates entering the MPE degree must have completed prior learning equivalent to 96 credit points of units of study as specified in the relevant entry requirement tables as listed in the Faculty of Engineering and Information Technologies Handbook postgraduate tables.
1.2.1 Candidates requiring additional studies to meet these entry requirements may be granted conditional admission to the Master of Professional Engineering. This is subject to candidates successfully completing one of the following awards with a minimum credit average:
1.2.1.1 Graduate Certificate of Engineering; or
1.2.1.2 Graduate Diploma of Engineering.
1.3 All candidates entering the MPE must have completed units of study or their equivalents as listed in the Tables of Entry Requirements given below, for their specialisation, irrespective of their prior undergraduate degree.
1.3.1 Applicants undertaking additional studies to meet these entry requirements will not have that study credited toward the requirements of the Master of Professional Engineering.
1.3.2 Entry Requirements for Master of Professional Engineering:
1.3.2.1 To gain admission to the Master of Professional Engineering, candidates must have completed the units of study or other study deemed by the Faculty to be equivalent to these units as listed in the Faculty of Engineering and Information Technologies Table of Entry Requirements for the Master of Professional Engineering, below, for the specialisation they wish to pursue.

1.3.3 **Table of Entry Requirements for the Master of Professional Engineering**

1.3.3.1 *MPE degree entry requirements for Aerospace Engineering*

UOS Code	UOS Name	CP Value
MATH1001	Differential Calculus	3
MATH1002	Linear Algebra	3
MATH1003	Integral Calculus and Modelling	3
MATH1005	Statistics	3
MATH2065	Partial Differential Equations (Intro)	6
MATH2061	Linear Mathematics and Vector Calculus	6
ENGG1801	Engineering Computing	6
AERO1560	Introduction to Aerospace Engineering	6
AERO1400	Intro to Aircraft Construction & Design	6
ENGG1802	Engineering Mechanics	6
ENGG1803	Professional Engineering 1	6
AMME1550	Dynamics	6
AERO2703	Aerospace Technology 1	6
AMME2301	Mechanics of Solids	6
AMME2500	Engineering Dynamics	6
AMME2302	Materials 1	6
MECH2400	Mechanical Design 1	6
AMME2200	Thermodynamics and Fluids	6
	Total	96

1.3.3.2 *MPE degree entry requirements for Biomedical Engineering*

UOS Code	UOS Name	CP Value
MATH1001	Differential Calculus	3
MATH1002	Linear Algebra	3

UOS Code	UOS Name	CP Value
MATH1003	Integral Calculus and Modelling	3
MATH1005	Statistics	3
MATH2067	Des and Vector Calculus for Engineers	6
ENGG1801	Engineering Computing	6
CHEM1101	Chemistry 1A	6
BIOL1003	Human Biology	6
ENGG1802	Engineering Mechanics	6
AMME1550	Dynamics 1	6
AMME2301	Mechanics of Solids	6
AMME2500	Engineering Dynamics	6
ELEC2004	Electrical Engineering: Foundations	6
AMME2200	Thermodynamics and Fluids	6
AMME2302	Materials 1	6
MECH2400	Mechanical Design 1	6
MECH2901	Anatomy and Physiology for Engineers	6
ENGG1803	Professional Engineering 1	6
	Total	**96**

1.3.3.3 *MPE degree entry requirements for Mechanical Engineering*

UOS Code	UOS Name	CP Value
MATH1001	Differential Calculus	3
MATH1002	Linear Algebra	3
MATH1003	Integral Calculus and Modelling	3
MATH1005	Statistics	3
MATH2061	Linear Mathematics and Vector Calculus	6
MATH2065	Partial Differential Equations (Intro)	6
ENGG1801	Engineering Computing	6
MECH1560	Introduction to Mechanical Engineering	6
MECH1400	Mechanical Construction	6
ENGG1802	Engineering Mechanics	6
AMME2301	Mechanics of Solids	6
AMME2500	Engineering Dynamics	6
ELEC2004	Electrical Engineering: Foundations	6
AMME2200	Thermodynamics and Fluids	6
AMME2302	Materials 1	6
MECH2400	Mechanical Design 1	6
AMME1550	Dynamics 1	6
ENGG1803	Professional Engineering 1	6
	Total	**96**

1.3.3.4 *MPE degree entry requirements for Chemical and Biomolecular Engineering*

UOS Code	UOS Name	CP Value
MATH1001	Differential Calculus	3
MATH1002	Linear Algebra	3
MATH1003	Integral Calculus and Modelling	3
MATH1005	Statistics	3
CHEM1101	Chemistry 1A	6
CHEM1102	Chemistry 1B	6
ENGG1801	Engineering Computing	6
CHNG2802	Applied Mathematics	6
CHEM2403	Physical Chemistry for Chemical Engineers	6
CHEM2404	Chemistry of Biological Systems	6
ENGG1800	Introduction to Engineering Disciplines	6
ENGG1803	Professional Engineering 1	6
CHNG1103	Material and Energy Transformation	6
CHNG2804	Chemical/Biological Systems (Thermodynamics)	6
CHNG2801	Conservation and Transport Processes	6
CHNG2803	Energy and Fluid Systems Practice	6
CHNG2806	Materials Purification	6
CHNG2805	Industrial Systems	6
	Total	**96**

1.3.3.5 *MPE degree entry requirements for Civil Engineering and Structural Engineering and Geotechnical Engineering and Environmental Fluids*

UOS Code	UOS Name	CP Value
MATH1001	Differential Calculus	3
MATH1002	Linear Algebra	3
MATH1003	Integral Calculus and Modelling	3
MATH1005	Statistics	3
MATH2061	Linear Mathematics and Vector Calculus	6
ENGG1800	Intro to Engineering Disciplines	6
PHYS1001	Physics 1	6
GEOL1501	Engineering Geology	6
CHEM1001	Fundamentals of Chemistry 1A	6
ENGG1801	Engineering Computing	6
ENGG1803	Professional Engineering 1	6
ENGG1802	Engineering Mechanics	6
CIVL2201	Structural Mechanics	6
CIVL2110	Materials	6
CIVL2810	Engineering Construction & Surveying	6
CIVL2410	Soil Mechanics	6
CIVL2611	Fluid Mechancis: Inviscid Flow	6
CIVL2230	Introduction to Structural Concepts & Design	6
	Total	**96**

1.3.3.6 **MPE degree entry requirements for Electrical Engineering and Network Engineering and Power Engineering and Wireless Engineering**

UOS Code	UOS Name	CP Value
MATH1001	Differential Calculus	3
MATH1002	Linear Algebra	3
MATH1003	Integral Calculus and Modelling	3
MATH1005	Statistics	3
INFO1103	Introduction to Programming	6
INFO1105	Data Structures	6
PHYS1001	Physics 1 (Regular)	6
ENGG1805	Professional Engineering and IT	6
ELEC1601	Foundation of Computer Systems	6

UOS Code	UOS Name	CP Value
ELEC1103	Fundamentals of Elec and Electronic Eng	6
COMP2129	Operating Systems and Machine Principles	6
ELEC2103	Simulations & Numerical Solutions in Eng	6
ELEC2104	Electronic Devices and Circuits	6
ELEC2302	Signals and Systems	6
ELEC2602	Digital System Design	6
MATH2061	Linear Mathematics and Vector Calculus	6
PHYS1003	Physics 1 (Technological)	6
PHYS2213	Physics 2EE	6
	Total	**96**

1.3.3.7 *MPE degree entry requirements for Software Engineering*

UOS Code	UOS Name	CP Value
Note: any of the units of study marked with an * can be substituted by other engineering, IT, science or business units.		
MATH1001	Differential Calculus	3
MATH1002	Linear Algebra	3
MATH1003	Integral Calculus and Modelling	3
MATH1005	Statistics	3
INFO1103	Introduction to Programming	6
INFO1105	Data Structures	6
*PHYS1001	Physics 1 (Regular)	6
ENGG1805	Professional Engineering and IT	6
ELEC1601	Foundations of Computer Systems	6
*PHYS1003	Physics 1 (Technological)	6
COMP2007	Algorithms and Complexity	6
COMP2129	Operating Systems and Machine Principles	6
INFO2110	Systems Analysis and Modelling	6
INFO2120	Database Systems 1	6
INFO2315	Introduction to IT Security	6
MATH2069	Discrete Mathematics and Graph Theory	6
*ELEC2602	Digital System Design	6
*ELEC2302	Signals and Systems	6
	Total	**96**

2. **Credit transfer policy**

2.1 Subject to the restriction in 1.1.2, candidates transferring from the Graduate Diploma of Engineering and Master of Engineering to the Master of Professional Engineering are eligible to transfer 24 credit points from their current degree provided units of study have been completed at credit average and equivalent to units of study offered under the Master of Professional Engineering, subject to approval of the Program Director. Further credit may be given subject to approval of the Program Director.

2.1.1 Where study has been undertaken at postgraduate level in an institution which is acceptable to the University of Sydney and no award has been granted, a maximum of 36 credit points may be transferred to the Master of Professional Engineering subject to the approval of the Program Director.

2.1.2 Credit towards postgraduate awards will not be granted for previously completed postgraduate awards except in the case of awards in an embedded program at the University of Sydney, or a program completed at another university or institution deems by the relevant faculty to be the equivalent of a University of Sydney embedded program.

3. **Students at Risk**

3.1 The Faculty requires students to demonstrate satisfactory progress with their studies.

3.2 A student may be deemed not to have made satisfactory progress in any semester if the student:

3.2.1 fails to complete at least half the credit points in which he/she is enrolled; or

3.2.2 obtains a Weighted Average Mark (WAM) of less than 50 based on units of study for a given semester; or

3.2.3 fails a unit of study for the second time; or

3.2.4 has an unsatisfactory attendance record; or

3.2.5 is unable to complete the degree in the maximum time permitted.

3.3 A student who fails to demonstrate satisfactory progress in any semester of enrolment may be considered to fall into the "Students at Risk" category and will be subject to the procedures of the University policy on Identifying and Supporting Students at Risk.

3.4 A student who has been identified as being at risk on three consecutive instances will normally be called upon to show good cause why he or she should be allowed to re-enrol in the degree course.

3.5 Where a student fails to show good cause why he or she should be allowed to re-enrol, the Dean may exclude the student from re-enrolment in the degree.

3.6 **Appeals**

3.6.1 A two level appeals process will be available to students.

3.6.2 A student who:

3.6.2.1 has been listed in an At Risk Report for the third time and who has been excluded from their award course (Stage 3); or

3.6.2.2 has been listed in an At Risk Report for the fourth time and automatically excluded (Stage 4); will be entitled to appeal against the decision of the Faculty in accordance with the Resolutions of the Academic Board: *Postgraduate Coursework Awards; and Procedures for Student Appeals Against Academic Decisions for Postgraduate Research Awards.*

3.6.3 Students will be entitled to appeal to the Students Appeals Body in accordance with the *University of Sydney (Student Appeals against Academic Decisions) Rule 2006*.

4. **Degree Requirements**

4.1 *Master of Professional Engineering:* A candidate shall proceed

4.1.1 by coursework and project, in accordance with sections 5 and 6.

5. **A candidate proceeding by coursework and project shall:**

5.1 Complete units of study that total at least 96 credit points and comprise:

5.1.1 the core units of study as set out in the stream requirements tables in the Faculty of Engineering and Information Technologies Handbook Postgraduate tables relating to the stream that the student is pursing; and

5.1.2 recommended units of study, to the credit value specified in the relevant stream requirement tables as referred to in 5.1.1; and

5.1.3 such additional free elective units of study as may be necessary to gain a total of not less than 96 credit points.

6. The degree of Master of Professional Engineering may be awarded in the following specialisations and the testamur for the degree shall specify the specialisation:

6.1 Aerospace Engineering
6.2 Biomedical Engineering
6.3 Mechanical Engineering
6.4 Chemical and Biomolecular Engineering
6.5 Civil Engineering
6.6 Environmental Fluids
6.7 Geotechnical Engineering
6.8 Structural Engineering
6.9 Electrical Engineering
6.10 Network Engineering
6.11 Power Engineering
6.12 Software Engineering
6.13 Wireless Engineering

Master of Information Technology, Graduate Diploma in Information Technology, Graduate Certificate in Information Technology

1. Admission

1.1 The Dean of the Faculty of Engineering and IT may admit to candidature for:

1.1.1 the Graduate Certificate in Information Technology:

1.1.1.1 graduates who have completed a bachelor's degree, with a substantial study in a relevant field of Information Technology;

1.1.1.2 graduates who have completed a Bachelor of Engineering degree with a major sequence of study in Computer Engineering, Software Engineering or Telecommunications Engineering; or

1.1.1.3 persons who offer evidence of recognised prior learning which is considered to demonstrate the knowledge and aptitude required to undertake the units of study.

1.1.2 the Graduate Diploma in Information Technology:

1.1.2.1 graduates who have completed a bachelor's degree in any aspect of Information Technology;

1.1.2.2 graduates who have completed a Bachelor of Engineering degree with a major sequence of study in Computer Engineering, Software Engineering or Telecommunications Engineering: or

1.1.2.3 persons who have completed requirements for the Graduate Certificate in Information Technology at the University of Sydney, with Credit average results or above.

1.1.3 the Master of Information Technology:

1.1.3.1 graduates who have completed a bachelor's degree, with results equivalent to Credit average or above in a major sequence of study in any aspect of Information Technology; or

1.1.3.2 graduates who have completed a Bachelor of Engineering degree with results equivalent to Credit average or above in a major sequence of study in Computer Engineering, Software Engineering or Telecommunications Engineering; or

1.1.3.3 persons who have completed the Graduate Diploma in Information Technology at the University of Sydney, with Credit average results or above; or

1.1.3.4 persons who have completed the Graduate Diploma in Computing at the University of Sydney.

1.2 The Dean of the Faculty of Engineering and IT shall only admit students to units of study in the defined majors in the Master of Information Technology, who have completed preliminary study in the relevant major area of study.

1.3 In considering an application for admission to candidature, the Head of the School of Information Technologies and the Dean shall select, in preference, applicants who are most meritorious in terms of subsections 1.1.1–1.1.3 above.

2. Units of study

2.1 The units of study for the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology and Master of Information Technology are listed in the tables in Part 6e of this handbook.

2.2 Credit point value, assumed knowledge, corequisites, prerequisites and any special conditions are included in the unit of study descriptions.

3. Requirements for the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology and Master of Information Technology

3.1 Candidates for the Graduate Certificate in Information Technology are required to complete satisfactorily units of study giving credit for a total of 24 credit points selected from units of study, excluding: INFO5990 and IT Project units of study, approved for the Master of Information Technology. A maximum of 12 credit points may be selected from units offered outside the Faculty of Engineering and IT.

3.1.1 Candidates for the Graduate Diploma in Information Technology are required to complete satisfactorily units of study giving credit for a total of 36 credit points selected from units of study approved for the Master of Information Technology.

3.1.1.1 Of the 36 credit points required for the Graduate Diploma in Information Technology, a maximum of 24 credit points can be selected from Foundational units of study; and at least 12 credit points should come from Specialist units of study, excluding INFO5990 and IT project units of study. A maximum of 12 credit points may be selected from units offered outside the Faculty of Engineering and IT.

3.1.2 Candidates for the Master of Information Technology are required to complete satisfactorily units of study giving credit for a total of 48 credit points selected from the units of study approved for the Master of Information Technology, satisfying the conditions approved from time to time by the Faculty.

3.1.2.1 Of the 48 credit points required for the Master of Information Technology, a maximum of 24 credit points can be selected from Foundational units; and at least 24 credit points should come from Specialist units or IT projects. A maximum of 12 credit points may be selected from units offered outside the Faculty of Engineering and IT.

3.1.2.2 Enrolment in IT projects will be approved only for those students who have completed at least 24 credit points from Foundational or Specialist units at Credit average or above.

3.1.2.3 Enrolment in IT projects may be limited by quota.

3.1.2.4 To qualify for the award of Master of Information Technology students must complete one of the defined majors referred to in sub-section 3 of the Resolutions of the Senate, as published in the University of Sydney Calendar.

3.1.2.5 The testamur for the Master of Information Technology shall specify the major completed in order to qualify for the award.

4. Details of units of study

4.1 The units of study for the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology and Master of Information Technology are listed in Part 6e of this handbook.

4.2 A candidate for the course shall proceed by completing units of study as prescribed by the Faculty.

4.3 A unit of study shall consist of such lectures, seminars, tutorial instruction, essays, exercises, practical work, or project work as may be prescribed.

4.4 In these resolutions, 'to complete a unit of study' or any derivative expression means:

4.4.1 to attend the lectures and the meetings, if any, for seminars or tutorial instruction;

4.4.2 to complete satisfactorily the essays, exercises, practical and project work if any; and

4.4.3 to pass any other examination of the unit of study that may apply.

4.5 All units of study for a particular subject area may not be available every semester.

4.6 The Dean may allow substitution of any unit of study by another unit of study, including units of study from other postgraduate coursework programs in the Faculty or elsewhere in the University.

5. Enrolment in more/less than minimum load

5.1 A candidate may proceed on either a full-time or a part-time basis.

6. Cross-institutional study

6.1 Cross-institutional study shall not be available to students enrolled in the Graduate Certificate in Information Technology, the Graduate Diploma in Information Technology, and the Master of Information Technology, except where the University of Sydney has a formal cooperation agreement with another university.

7. Restrictions on enrolment

7.1 Admission to the Graduate Certificate in Information Technology, the Graduate Diploma in Information Technology and the Master of Information Technology, may be limited by a quota.

7.2 In determining the quota, the University will take into account:

7.2.1 availability of resources including space, laboratory and computing facilities; and

7.2.2 availability of adequate and appropriate supervision.

7.3 In considering an application for admission to candidature the Dean shall take account of the quota and will select, in preference, applicants who are most meritorious in terms of sub-section 1 above.

8. Discontinuation of enrolment

8.1 A student who does not enrol in any semester without first obtaining written permission from the Dean to suspend candidature will be deemed to have discontinued enrolment in the course.

8.2 Students who have discontinued from the course will be required to apply for admission to the course and be subject to admission requirements pertaining at that time.

9. Suspension of candidature

9.1 A student may seek written permission from the Dean to suspend candidature in the course.

9.2 Suspension may be granted for a maximum of one year.

10. Re-enrolment after an absence

10.1 A student who plans to re-enrol after a period of suspension must advise the Faculty of Engineering and IT Office in writing of their intention by no later than the end of October for Semester One of the following year or the end of May for Semester Two of the same year.

11. Satisfactory progress

11.1 Candidates for the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology, and the Master of Information Technology, shall be governed by the rules as follows:

11.1.1 The Dean may:

11.1.1.1 advise a student when his or her performance has been such that a rule would normally be applied and call upon that student to show good cause why the rule should not be applied; and

11.1.1.2 where the student does not show good cause, apply the rule.

11.1.2 A student who has failed a cumulative total of 12 credit points at any stage of enrolment in the Master of Information Technology will be required to show good cause why he or she should be allowed to re-enrol and, if good cause has not been established, the student's enrolment will be transferred to the Graduate Diploma in Information Technology;

11.1.3 A student who has failed a cumulative total of 18 credit points at any stage of enrolment in the Master of Information Technology and/or the Graduate Diploma in Information Technology will be required to show good cause why he or she should be allowed to re-enrol and, if good cause has not been established, the student's enrolment will be transferred to the Graduate Certificate in Information Technology;

11.1.4 A student who has failed a cumulative total of more than 18 credit points in the Master of Information Technology and/or the Graduate Diploma in Information Technology and/or the Graduate Certificate in Information Technology will be required to show good cause why he or she should be allowed to re-enrol.

11.1.5 If good cause has not been established, the Dean may, in accordance with the in accordance with clause 16 of the University of Sydney (Coursework) Rule 2000 (as amended):

11.1.5.1 exclude the student from the degree course; or

11.1.5.2 permit the student to re-enrol in the degree course subject to restrictions on units of study, which may include: completion of a unit or units of study within a specified time; exclusion from a unit or units of study; and specification of the earliest date on which a student may re-enrol in a unit or units of study.

12. Time limit

12.1 A candidate for the Graduate Certificate in Information Technology shall complete the requirements for the award in a minimum enrolment of one semester and a maximum enrolment of four semesters.

12.2 A candidate for the Graduate Diploma in Information Technology shall complete the requirements for the award in a minimum enrolment of two semesters and a maximum enrolment of six semesters.

12.3 A candidate for the Master of Information Technology shall complete the requirements for the award in a minimum of two semesters and a maximum of eight semesters.

13. Assessment policy

13.1 On completion of the requirements for the course, the Faculty shall determine the results of the candidature.

14. Credit transfer policy

14.1 Credit is not available in the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology, and the Master of Information Technology except for postgraduate study which has been undertaken in information technology at the University of Sydney within the previous three years.

14.2 Previous study undertaken at the University of Sydney where no award has been conferred, credit may be transferred in full to the Graduate Certificate in Information Technology, the Graduate Diploma in Information Technology and the Master of Information Technology.

14.3 If an award has been conferred for this study, credit to a limit of 12 credit points may be transferred to the Graduate Diploma in Information Technology and the Master of Technology. Credit can be transferred only for specialist units of study, excluding the specialist unit of study INFO5990 for which no credit can be transferred.

14.4 Where study has been undertaken at postgraduate level at an external institution recognized by the University of Sydney and no award has been conferred, credit to a maximum of 24 credit points may be transferred to the Master of Information Technology, provided units of study have been completed at credit average and equivalent to units of study offered under the degree being taken, subject to approval of the Academic Director.

14.5 Where study has been undertaken at postgraduate level at an external institution recognized by the University of Sydney and an award has been conferred, credit to a maximum of 12 credit points may be transferred to the Master of Information Technology, provided units of study have been completed at credit average and equivalent to units of study offered under the degree being taken, subject to approval of the Academic Director.

Master of Information Technology Management, Graduate Diploma of Information Technology Management, Graduate Certificate of Information Technology Management

1. Admission

1.1 The Dean of the Faculty of Engineering and IT may admit to candidature for:

1.1.1 the Graduate Certificate in Information Technology Management:

1.1.1.1 graduates who have completed a bachelor's degree and who have worked in the IT industry for minimum of three years;

1.1.1.2 persons who are able to offer evidence of recognised prior learning which is considered to demonstrate the knowledge and aptitude required to undertake this course.

1.1.1.3 The bachelor's degree does not have to be an Information Technology degree, but it should contain a significant amount of technical subjects related to computing, as typically found in an IT, engineering and IT, or engineering degree.

1.1.1.4 Applicants holding a bachelor's degree in other areas, such as finance, commerce, health engineering and IT, and social engineering and IT, who have completed relevant IT subjects will also be eligible.

1.1.1.5 Applicants holding a bachelor's degree in any discipline and who have worked in IT for more than five years are eligible.

1.1.2 the Graduate Diploma in Information Technology Management:

1.1.2.1 graduates who have completed a bachelor's degree and who have worked in the IT industry for a minimum of three years;

1.1.2.2 persons who have completed the Graduate Certificate in Information Technology Management at the University of Sydney, with Credit average results or above

1.1.2.3 The bachelor's degree does not have to be an Information Technology degree, but it should contain a significant amount of technical subjects related to computing, as typically found in an IT, engineering and IT, or engineering degree.

1.1.2.4 Applicants holding a bachelor's degree in other areas, such as finance, commerce, health engineering and IT, and social engineering and IT, who have completed relevant IT subjects will also be eligible.

1.1.2.5 Applicants holding a bachelor's degree in any discipline and who have worked in IT for more than five years are eligible.

1.1.3 the Master of Information Technology Management:

1.1.3.1 graduates who have completed a bachelor's degree, with results equivalent to Credit average or above, and who have worked in the IT industry for a minimum of two years.

1.1.3.2 persons who have completed the Graduate Diploma in Information Technology Management at the University of Sydney, with Credit average results or above;

1.1.3.3 persons who have completed the Graduate Diploma in Computing or the Master of Information Technology at the University of Sydney.

1.1.3.4 The bachelor's degree does not have to be an Information Technology degree, but it should contain a significant amount of technical subjects related to computing, as typically found in an IT, engineering and IT, or engineering degree.

1.1.3.5 Applicants holding a bachelor's degree in other areas, such as finance, commerce, health engineering and IT, and social engineering and IT, who have completed relevant IT subjects will also be eligible.

1.1.3.6 Applicants holding a bachelor's degree in any discipline and who have worked in IT for more than five years are eligible.

1.2 In considering an application for admission to the Graduate Certificate in Information Technology Management, the Graduate Diploma in Information Technology Management and the Master of Information Technology Management, the Head of the School of Information Technologies and the Dean shall select, in preference, applicants who are most meritorious in terms of subsections 1.1.1–1.1.3 above.

2. Units of study

2.1 The units of study for the Graduate Certificate in Information Technology Management, Graduate Diploma in Information Technology Management and Master of Information Technology Management are listed in the tables in Part 6e of this handbook.

2.2 Credit point value, assumed knowledge, corequisites, prerequisites and any special conditions are included in the tables associated with these resolutions.

3. Requirements for the Graduate Certificate in Information Technology Management, Graduate Diploma in Information Technology Management and Master of Information Technology Management

3.1 Candidates for the Graduate Certificate in Information Technology Management are required to complete satisfactorily units of study giving credit for a total of 24 credit points selected from units of study approved for the Master of Information Technology Management.

3.1.1 Candidates for the Graduate Certificate in Information Technology must select units from the list of core units of study, excluding IT research project units of study.

3.1.2 INFO5990 Professional Practice in IT must be completed as a core unit of study.

3.2 Candidates for the Graduate Diploma in Information Technology Management are required to complete satisfactorily units of study giving credit for a total of 36 credit points selected from units of study approved for the Master of information Technology Management.

3.2.1 Of the 36 credit points, a minimum of 30 credit points must be selected from core units of study, excluding IT research project units of study.

3.2.2 INFO5990 Professional Practice in IT and INFO5991 Services Science Management and Eng, must be completed as core units of study.

3.2.3 A maximum of 6 credit points of elective units of study can be taken.

3.3 Candidates for the Master of Information Technology Management are required to complete satisfactorily units of study giving credit for a total of 48 credit points selected from units of study approved for the Master of Information Technology Management.

3.3.1 Of the 48 credit points, a minimum of 30 credit points must be selected from core units of study.

3.3.2 INFO5990 Professional Practice in IT, INFO5991 Services Science Management and Eng, and INFO5992 Understanding IT Innovations, must be completed as core units of study.

3.3.3 A maximum of 18 credit points of elective units of study can be taken of which no more than 12 credit points of units may be chosen from units offered outside the Faculty of Engineering and IT;

3.3.4 Enrolment in IT projects will be approved only for students who have completed at least 24 credit points and may be limited by quota.

3.3.5 After completing 24 credit points of coursework, students who achieve Credit average results or above in their coursework may select 12 credit points of Information Technology project units of study among their core units.

3.4 Research Path in the Master of Information Technology Management

3.4.1 After completing 24 credit points of coursework, students who have Distinction average results or above may be eligible for the Research Path subject to the approval of the Head of the School of Information Technologies, and the Dean.

3.4.2 Students who pursue the Research Path must study INFO5993 Research Methods instead of INFO5990, and select 18 credit points from IT Research Project units of study among their core units.

3.4.3 Students who pursue the Research Path are not required to take INFO5991 Services Science Management and Eng and INFO5992 Understanding IT Innovations as core units of study.

4. Details of units of study

4.1 The units of study for the Graduate Certificate in Information Technology Management, Graduate Diploma in Information Technology Management and Master of Information Technology Management are listed in Part 6e of this handbook.

4.2 A candidate for the course shall proceed by completing units of study as prescribed by the Faculty.

4.3 A unit of study shall consist of such lectures, seminars, tutorial instruction, essays, exercises, practical work, or project work as may be prescribed.

4.4 In these resolutions, 'to complete a unit of study' or any derivative expression means:

4.4.1 to attend the lectures and the meetings, if any, for seminars or tutorial instruction;

4.4.2 to complete satisfactorily the essays, exercises, practical and project work if any; and

4.4.3 to pass any other examination of the unit of study that may apply.

4.5 All units of study for a particular subject area may not be available every semester.

4.6 The Dean may allow substitution of any unit of study by another unit of study, including units of study from other postgraduate coursework programs in the Faculty or elsewhere in the University.

5. Enrolment in more/less than minimum load

5.1 A candidate may proceed on either a full-time or a part-time basis.

6. Cross-institutional study

6.1 Cross-institutional study shall not be available to students enrolled in the Graduate Certificate in Information Technology Management, the Graduate Diploma in Information Technology Management, and the Master of Information Technology Management, except where the University of Sydney has a formal cooperation agreement with another university.

7. Restrictions on enrolment

7.1 Admission to the Graduate Certificate in Information Technology Management, the Graduate Diploma in Information Technology Management and the Master of Information Technology Management, may be limited by a quota.

7.2 In determining the quota, the University will take into account:

7.2.1 availability of resources including space, laboratory and computing facilities; and

7.2.2 availability of adequate and appropriate supervision.

7.3 In considering an application for admission to candidature the Dean shall take account of the quota and will select, in preference, applicants who are most meritorious in terms of subsection 2 above.

8. Discontinuation of enrolment

8.1 A student who does not enrol in any semester without first obtaining written permission from the Dean to suspend candidature will be deemed to have discontinued enrolment in the course.

8.2 Students who have discontinued from the course will be required to apply for admission to the course and be subject to admission requirements pertaining at that time.

9. **Suspension of candidature**

9.1 A student may seek written permission from the Dean to suspend candidature in the course.

9.2 Suspension may be granted for a maximum of one year.

10. **Re-enrolment after an absence**

10.1 A student who plans to re-enrol after a period of suspension must advise the Faculty of Engineering and IT Office in writing of their intention by no later than the end of October for Semester One of the following year or the end of May for Semester Two of the same year.

11. **Satisfactory progress**

11.1 Candidates for the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology, and the Master of Information Technology, shall be governed by the rules as follows:

11.1.1 The Dean may:

11.1.1.1 advise a student when his or her performance has been such that a rule would normally be applied and call upon that student to show good cause why the rule should not be applied; and

11.1.1.2 where the student does not show good cause, apply the rule.

11.1.2 A student who has failed a cumulative total of 12 credit points at any stage of enrolment in the Master of Information Technology Management will be required to show good cause why he or she should be allowed to re-enrol and, if good cause has not been established, the student's enrolment will be transferred to the Graduate Diploma in Information Technology Management;

11.1.3 A student who has failed a cumulative total of 18 credit points at any stage of enrolment in the Master of Information Technology Management and/or the Graduate Diploma in Information Technology Management will be required to show good cause why he or she should be allowed to re-enrol and, if good cause has not been established, the student's enrolment will be transferred to the Graduate Certificate in Information Technology Management;

11.1.4 A student who has failed a cumulative total of more than 18 credit points in the Master of Information Technology Management and/or the Graduate Diploma in Information Technology Management and/or the Graduate Certificate in Information Technology Management will be required to show good cause why he or she should be allowed to re-enrol.

11.1.5 If good cause has not been established, the Dean may, in accordance with the in accordance with clause 16 of the University of Sydney (Coursework) Rule 2000 (as amended):

11.1.5.1 exclude the student from the degree course; or

11.1.5.2 permit the student to re-enrol in the degree course subject to restrictions on units of study, which may include: completion of a unit or units of study within a specified time; exclusion from a unit or units of study; and specification of the earliest date on which a student may re-enrol in a unit or units of study.

12. **Time limit**

12.1 A candidate for the Graduate Certificate in Information Technology Management shall complete the requirements for the award in a minimum enrolment of one semester and a maximum enrolment of four semesters.

12.2 A candidate for the Graduate Diploma in Information Technology Management shall complete the requirements for the award in a minimum enrolment of two semesters and a maximum enrolment of six semesters.

12.3 A candidate for the Master of Information Technology Management shall complete the requirements for the award in a minimum of two semesters and a maximum of eight semesters.

13. **Assessment policy**

13.1 On completion of the requirements for the course, the Faculty shall determine the results of the candidature.

14. **Credit transfer policy**

14.1 Credit is not available in the Graduate Certificate in Information Technology Management, Graduate Diploma in Information Technology Management, and the Master of Information Technology Management except for postgraduate study which has been undertaken in information technology at the University of Sydney within the previous three years.

14.2 Previous study undertaken at the University of Sydney where no award has been conferred, credit may be transferred in full to the Graduate Certificate in Information Technology Management, the Graduate Diploma in Information Technology Management and the Master of Information Technology Management.

14.3 If an award has been conferred for this study, credit to a limit of 12 credit points may be transferred to the Graduate Diploma in Information Technology Management and the Master of Technology Management. Credit can be transferred only for specialist units of study, excluding the specialist unit of study INFO5990 for which no credit can be transferred.

14.4 Where study has been undertaken at postgraduate level at an external institution recognized by the University of Sydney and no award has been conferred, credit to a maximum of 24 credit points may be transferred to the Master of Information Technology Management, provided units of study have been completed at credit average and equivalent to units of study offered under the degree being taken, subject to approval of the Academic Director.

14.5 Where study has been undertaken at postgraduate level at an external institution recognized by the University of Sydney and an award has been conferred, credit to a maximum of 12 credit points may be transferred to the Master of Information Technology Management, provided units of study have been completed at credit average and equivalent to units of study offered under the degree being taken, subject to approval of the Academic Director.

Graduate Diploma in Computing

1. **Admission**

1.1 The Dean of the Faculty of Engineering and IT may admit to candidature for the Graduate Diploma in Computing:

1.1.1.1 graduates who have completed a bachelor's degree, with results equivalent to credit average or above, and who have demonstrated significant numeracy skills by completing relevant subjects with a mathematical foundation; or

1.1.1.2 graduates who have completed a bachelor's degree, with results equivalent to Credit average or above, and who have worked in the area of IT for more than 5 years, who can offer evidence of prior learning which is considered to demonstrate the knowledge and aptitude required to undertake this course.

2.1 The units of study for the Graduate Diploma in Computing are listed in the table associated with these Resolutions in subsection 4.1.

2.2 Credit point value, assumed knowledge, corequisites, prerequisites and any special conditions are included in the unit of study descriptions.

3. **Requirements for the Graduate Diploma in Computing**

3.1 Candidates for the Graduate Diploma in Computing are required to complete satisfactorily units of study giving credit for a total of 48 credit points, selected from units of study approved for the Graduate Diploma in Computing.

3.2 Satisfactory completion of the Graduate Diploma in Computing for purposes of entry into the Master of Information Technology require that a candidate has not failed more than 12 credit points of units of study in the Graduate Diploma in Computing.

4. **Details of units of study**

4.1 The units of study for the Graduate Diploma in Computing are listed in Part 6e of this Handbook.

4.2 A candidate for the course shall proceed by completing units of study as prescribed by the Faculty.

4.3 A unit of study shall consist of such lectures, seminars, tutorial instruction, essays, exercises, practical work, or project work as may be prescribed.

4.4 In these resolutions, 'to complete a unit of study' or any derivative expression means:

4.4.1 to attend the lectures and the meetings, if any, for seminars or tutorial instruction;

4.4.2 to complete satisfactorily the essays, exercises, practical and project work if any; and

4.4.3 to pass any other examination of the unit of study that may apply.

4.5 All units of study for a particular subject area may not be available every semester.

4.6 The Dean may allow substitution of any unit of study by another unit of study, including units of study from other postgraduate coursework programs in the Faculty or elsewhere in the University.

5. Enrolment in more/less than minimum load

5.1 A candidate may proceed on either a full-time or a part-time basis.

6. Cross-institutional study

6.1 Cross-institutional study shall not be available to students enrolled in the Graduate Diploma in Computing except where the University of Sydney has a formal cooperation agreement with another university.

7. Restrictions on enrolment

7.1 Admission to the Graduate Diploma in Computing, may be limited by a quota.

7.2 In determining the quota, the University will take into account:

7.2.1 availability of resources including space, laboratory and computing facilities; and

7.2.2 availability of adequate and appropriate supervision.

7.3 In considering an application for admission to candidature the Dean shall take account of the quota and will select, in preference, applicants who are most meritorious in terms of subsection 1 above.

8. Discontinuation of enrolment

8.1 A student who does not enrol in any semester without first obtaining written permission from the Dean to suspend candidature will be deemed to have discontinued enrolment in the course.

8.2 Students who have discontinued from the course will be required to apply for admission to the course and be subject to admission requirements pertaining at that time.

9. Suspension of candidature

9.1 A student may seek written permission from the Dean to suspend candidature in the course.

9.2 Suspension may be granted for a maximum of one year.

10. Re-enrolment after an absence

10.1 A student who plans to re-enrol after a period of suspension must advise the Faculty of Engineering and IT Office in writing of their intention by no later than the end of October for Semester One of the following year or the end of May for Semester Two of the same year.

11. Satisfactory progress

11.1 The Dean may require any student who has failed a cumulative total of 18 credit points or more at any stage of enrolment in the Graduate Diploma in Computing to show good cause why he or she should be allowed to re-enrol.

11.2 If good cause has not been established, the Dean may, in accordance with the in accordance with clause 16 of the University of Sydney (Coursework) Rule 2000 (as amended):

11.2.1 exclude the student from the degree course; or

11.2.2 permit the student to re-enrol in the degree course subject to restrictions on units of study, which may include: completion of a unit or units of study within a specified time; exclusion from a unit or units of study; and specification of the earliest date on which a student may re-enrol in a unit or units of study.

12. Time limit

12.1 A candidate for the Graduate Diploma in Computing shall complete the requirements for the award in a minimum enrolment of two semesters and a maximum enrolment of eight semesters.

13. Assessment policy

13.1 On completion of the requirements for the course, the Faculty shall determine the results of the candidature.

14. Credit transfer

14.1 Credit is not available in the Graduate Diploma in Computing for previous study unless it was postgraduate study undertaken in this award course within the previous three years.

14.2 Units of study completed in the Graduate Diploma in Computing cannot be counted as units of study completed within the Graduate Certificate of Information Technology, Graduate Diploma of Information Technology, or Master of Information Technology.

Master of Project Management, Graduate Diploma in Project Management, Graduate Certificate in Project Management

1. Award of the degree/graduate diploma/graduate certificate in project management:

1.1 The Master of Project Management (MPM), Graduate Diploma in Project Management (GradDipPM) and Graduate Certificate in Project Management (GradCertPM) shall be awarded in one grade; namely pass.

Master of Project Management

1. Eligibility for admission

1. Except as provided in Part 9, the University of Sydney (Amendment Act) Rule 1999 of the By-laws, an applicant for admission to candidature for the degree of Master of Engineering shall:

1.1 be a graduate of Engineering or other discipline at the University of Sydney; or

1.2.1 be a graduate of any other Faculty of the University of Sydney; and

1.2.2 have completed courses acceptable to the Faculty of Engineering and Information Technologies.

1.3 be a graduate of another institution holding equivalent qualifications to those of a graduate of the University of Sydney.

1.4 admission to graduate certificate may be based on candidates prior learning and work experience.

1.5 An applicant for admission to candidature shall apply in writing to the relevant School or the Faculty of Engineering and Information Technologies for such admission to candidature.

2. Probationary admission

2. A candidate shall:

2.1 if required by the head of the school or schools concerned, produce evidence of such engineering and other discipline experience as the Committee for Postgraduate Studies shall consider satisfactory;

2.2 engage in such study in project management as the Committee shall prescribe for not less than one year of full-time candidature and two years of part-time candidature;

2.3 unless granted an extension by the Committee, complete the requirements for the degree within two years (full-time) or three years (part-time) of admission.

3. Credit transfer policy

3.1 Credit may be available for time spent or study done towards the Graduate Certificate of Project Management, the Graduate Diploma of Project Management, and the Master of Project Management or other relevant degree with a focus on project management subject to the approval of the Faculty and to the following guidelines:

3.1.1 If no award has been conferred for this study, credit may be transferred in full to the Graduate Certificate of Project Management, the Graduate Diploma of Project Management, and the Master of Project Management.

3.1.2 If an award has been coferred for this study, credit to a limit of 12 credit points may be transferred to the Graduate Certificate of Project Management, Graduate Diploma of Project Management, and Master of Project Management subject to the standing of the institution and grades as well as the conditions of the credit assessment policy of the Graduate School of Engineering and IT of the University of Sydney.

3.1.3 Credit may be transferred provided a credit average has been obtained and subject to the approval of the Faculty.

4. Satisfactory Progress

4.1 The dean may advise a student when his or her performance has been such that a rule would normally be applied and call upon that student to show good cause why the rule should not be applied; and where the student does not show good cause, apply the rule.

4.2 A student who has failed a cumulative total of 12 credit points at any stage of enrolment in the Master of Project Management will be required to show good cause why he or she should be allowed to re-enrol and, if good cause has not been established, the student's enrolment will be transferred to the Graduate Diploma;

4.3 A student who has failed a cumulative total of 18 credit points at any stage of enrolment in the Master of Project Management and/or the Graduate Diploma will be required to show good cause why he or she should be allowed to re-enrol and, if good cause has not been established, the student's enrolment will be transferred to the Graduate Certificate;

4.4 A student who has failed a cumulative total of more than 18 credit points in the Master of Project Management and/pr the Graduate Diploma and/or the Graduate Certificate will be required to show good cause why he or she should be allowed to re-enrol.

4.5 If good cause has not been established, the Dean may, in accordance with clause 16 of the University of Sydney (Coursework) Rule 2000 (as amended):

4.5.1 exclude the student from the degree course; or

4.5.2 permit the student to re-enrol in the degree course subject to restrictions on units of study, which may include: completion of a unit or units of study within a specified time; exclusion from a unit or units of study; and specification of the earliest date on which a student may re-enrol in a unit or units of study.

5. Degree requirements

5. Requirements for the Graduate Certificate in Project Management, Graduate Diploma in Project Management and Master of Project Management:

5.1 A candidate who has been admitted to the Graduate Certificate in Project Management shall:

5.1.1 complete a total of 24 credit points from units of study listed in the Faculty Postgraduate tables comprising a minimum of 12cp foundation UOS, a minimum of 6cp specialist UOS and a minimum of 6cp elective or professional practice UOS.

5.2 A candidate who has been admitted to the Graduate Diploma in Project Management shall:

5.2.1 complete a total of 36 credit points from units of study listed in the Faculty Postgraduate tables comprising a minimum of 12cp foundation UOS, a minimum of 12cp specialist UOS, a minimum of 6cp professional practice UOS and a minimum of 6cp of elective UOS.

5.3 A candidate who has been admitted to the Master of Project Management shall proceed either:

5.3.1 by coursework; or by coursework and project;

5.3.2 A candidate proceeding by coursework only shall:

5.3.2.1 complete coursework prescribed by the Committee to a total value of 48 credit points comprising a minimum of 12cp of foundation UOS, a minimum of 12cp UOS from the area of specialisation, a minimum of 12cp UOS from professional practice UOS, and a minimum of 6cp to a maximum of 12cp of elective UOS;

5.3.3 A candidate proceeding by coursework and project shall:

5.3.3.1 complete coursework prescribed by the Committee to a total value of 48 credit points comprising a minimum of 12cp from foundation UOS, a minimum of 12cp of specialisation, a minimum of 12cp of research practice unit, a minimum of 6cp of elective UOS and a minimum of 6cp of professional practice UOS;

5.3.4 carry out under supervision a project in a field of study approved by the Committee and submit for examination a report on such a project;

5.3.5 lodge with the school/schools two bound copies (typewritten or printed) of the project report.

6. The degree of Master of Project Management may be awarded in the following subject areas and the named testamurs for the degree shall specify the subject area. To qualify for one of these streams, students will have completed 12cp of the specific subject area.

6.1 Project Economics and Scheduling Mangement;

6.2 International Project Management;

6.3 Project Risk Management;

6.4 Strategic PM Implementation.

7. Time limits

7.1 A student shall, unless special permission is granted by the Faculty, complete the requirements of the degree, in the case of a full-time student, not later than two years, and in the case of a part-time student, not later than four years, after the commencement of candidature.

7.2 The Faculty may include in the minimum period of candidature time spent in advanced study and research in the University of Sydney Faculty of Engineering and Information Technologies (or any other institute as approved by the Faculty) prior to the application for admission to candidature.

8. Details of units of study

8.1 The units of study for the Master of Project Management are listed in Table for Master of Project Management of the Faculty of Engineering and Information Technologies Handbook.

8.2 A candidate for the course shall proceed by completing units of study as prescribed by the Faculty.

8.3 A unit of study shall consist of such lectures, seminars, tutorials instructions, essays, exercises, practical work, or project work as may be prescribed.

8.4 All units of study for a particular subject area may not be available every semester.

8.5 The Dean may allow substitution of any unit of study by another unit of study, including units of study from other postgraduate coursework programs in the Faculty and elsewhere in the University.

9. Enrolment in more/less than minimum load

9.1 A candidate proceeding on a full-time basis may enrol in a maximum of 24 credit points per semester.

9.2 A candidate proceeding on a part-time basis may enrol in a minimum of 6 credit points to a maximum of 24 credit points per semester.

10. Cross-institutional study

10.1 Cross-institutional study shall not be available to students enrolled in the Graduate Certificate, Graduate Diploma and Master or Project Management except where the University of Sydney has a formal cooperation agreement with another University.

11. Discontinuation of enrolment

11.1 A student who does not enrol in any semester without first obtaining written permission from the Dean to suspend candidature will be deemed to have discontinued enrolment in the course.

11.2 Students who have discontinued from the course will be required to apply for admission to the course and be subject to admission requirements pertaining at that time.

12. Suspension of candidature

12.1 A student may seek written permission from the Dean to suspend candidature in the course.

12.2 Suspension may be granted for a maximum of two semesters.

13. Re-enrolment after an absence

13.1 A student who plans to re-enrol after a period of suspension must advise the Graduate School of Engineering and IT in writing of their intention by no later than the end of October for Semester One of the following year or the end of May for Semester Two of the same year.

13.2 Permit the student to re-enrol in the degree course subject to restrictions on units of study, which may include: completion of a unit or units of study within a specified time; exclusion from a unit or units of study; and specification of the earliest date on which a studeny may re-enrol in a unit or units of study.

14. Assessment policy

14.1 On completion of the requirements for the course, the Faculty shall determine the results of the candidature.

Doctor of Engineering Practice

1. Definitions

1.1 In these Resolutions:

1.1.1 **Committee** – means the Committee for Postgraduate Studies of the Faculty of Engineering and Information Technologies;

1.1.2 **Dean** &ndash means the Dean of the Faculty of Engineering and Information Technologies;

1.1.3 **degree** – means the degree of Doctor of Engineering Practice;

1.1.4 **school** – means the school in the Faculty of Engineering and Information Technologies in which the candidate is proceeding;

1.1.5 **embedded program** – is a program of study in the graduate certificate/graduate diploma/master's degree by coursework sequence which allows unit of study credit points to count in more than one of the awards;

1.1.6 **Faculty** – means the Faculty of Engineering and Information Technologies;

1.1.7 **unit of study or unit** –is the smallest stand-alone component of a candidate's course that is recordable on a candidate's transcript;

1.1.8 **University** – means the University of Sydney.

2. Admission to candidature

2.1 An applicant for admission to candidature shall:

2.1.1 apply in writing to the Dean;

2.1.2.1 hold, or have fulfilled the requirements for the award of, the degree of Bachelor of Engineering of the University of Sydney with First or Second Class Honours; or

2.1.2.2 hold, or have fulfilled the requirements for the award of, a Master's degree of the Faculty of Engineering of the University of Sydney that has been completed by research; or

2.1.2.3 hold, or have fulfilled the requirements for the award of, a master's degree of the Faculty of Engineering of the University of Sydney that has been completed by coursework with at least a Credit grade average; or

2.1.2.4 hold qualifications from another faculty of the University of Sydney or from another tertiary institution considered by the Dean to be the equivalent of those prescribed in sections 2.1.2.1-2.1.2.3 above;

2.1.3 submit with the application:

2.1.3.1 an outline of the proposed course of advanced study and research, including the general area of the proposed thesis;

2.1.3.2 evidence of at least three years' recent, full-time experience In Engineering or Project Management as the Dean shall consider appropriate for postgraduate study at this level; and

2.1.3.3 such evidence of adequate training and ability to pursue the proposed program of study as the Dean may require.

2.2 An applicant for admission to either part-time candidature or candidature by distance education/flexible learning shall, in addition to the above, also submit with the application a written undertaking that he or she:

2.2.1 will have sufficient time available to complete the requirements for the degree in accordance with these Resolutions; and

2.2.2 will be able to attend at the University at such times and on such occasions for purposes of consultation and participation in schoolal activities as may be required by the head of the relevant school or the Dean.

3. Probationary acceptance

3.1 A candidate shall be accepted on a probationary basis tor a period not exceeding two semesters, and, upon completion of this probationary period. the Dean

3.1.1 shall review the candidate's work; and

3.1.2 shall either confirm the candidate's status or terminate the candidature.

3.2 In the case oft a candidate accepted on a probationary basis, the candidature shall be deemed to have commenced from the date of such acceptance.

4. Availability

4.1 Admission to candidature may be limited by quota.

4.2 In determining the quota the University will take Into account:

4.2.1 availability of resources, including space, library, equipment and computing facilities; and

4.2.2 availability of adequate and appropriate supervision.

4.3 In considering an applicant for admission to candidature, the Dean may take account of the quota and will select in preference applicants who are most meritorious in terms of the eligibility for admission criteria.

5. Degree requirements

5.1 In order to complete the requirements for the degree, a candidate shall complete a total of 144 credit points comprising the following advanced coursework and research:

5.1.1 approved postgraduate units of study totalling 48 credit points; and

5.1.2 a doctoral seminar program and a thesis totalling 96 credit points.

6. Units of study

6.1 The postgraduate units of study approved by the Committee are those offered for the coursework masters degrees in the Faculty.

6.2 The Dean may permit a candidate to include within the required 48 credit points of units of studv up to a maximum of 24 credit points for postgraduate units of' study offered by another faculty in the University or by another tertiary institution, subject to the approval of that other body.

6.3 Notwithstanding any permission to include units of study offered by another faculty in accordance with section 2 above or any credit granted for previous study in accordance with section 10.1.2 below, a candidate must complete at least 24 credit points of units of study offered for the coursework master's degrees in the Faculty.

7. Seminar program and supervised research

7.1 In the doctoral seminar program a candidate must present three research colloquia to his or her peers in the form of a thesis proposal and two 'work in progress' seminars, one of which might be analogous to an oral defence of the nearly-completed thesis.

7.2.1 A candidate must carry out, under supervision, a research project in a field of study approved by the Dean.

7.2.2 The research project will normally comprise the investigation of a specific aspect or specific aspects of either the candidate's own and/or others' professional practice.

7.2.3 While normally only one research project is undertaken, the Dean may permit a candidate to undertake research in a series of different projects that must be related and form a coherent body of research.

8. The thesis

8.1 On completing the course of advanced study and research. a candidate shall present a thesis embodying the results of the work undertaken in the research project, that shall be a substantially original contribution to the subject concerned.

8.2 The candidate shall state, generally in the preface and specifically in notes;

8.2.1 the sources from which the information is derived;

8.2.2 the extent to which use has been made of the work of others; and

8.2.3 the portion of the work the candidate claims as original.

8.3 The thesis shall normally be approximately 60,000 words (that is, about 200 pages) and shall in no circumstances be longer than 80,000 words.

8.4 The topic of the thesis must have the prior approval of the Dean.

8.5 A candidate may also submit in support of the candidature any publication of which the candidate is the sole or joint author.

8.5.1 In such a case the candidate must produce evidence to identify satisfactorily the sections of the work for which the candidate is responsible.

8.6 A candidate may not present as the thesis any work that has been presented tor a degree or diploma at this or another University, but the candidate will not be precluded from incorporating such in the thesis, provided that, in presenting the thesis, the candidate indicates the part of the work which has been so incorporated.

8.7 The thesis shall be written In English.

8.8 A candidate shall submit to the relevant school four copies of the thesis and four copies of a summary of about 300 words in length.

8.9 The copies of the thesis submitted for examination will be either printed copies or, where prior approval has been obtained from the relevant head of school, in the form of CDs, as provided in the Resolutions of the Academic Board relating to the form of the thesis for the degree of Doctor of Philosophy.

8.10 The thesis shall be accompanied by a certificate from the supervisor stating whether, in the supervisor's opinion, the form of presentation of the thesis is satisfactory.

8.11 When the degree has been awarded, a hard copy of the thesis printed on archival paper and incorporating any required emendations and revisions shall be lodged in the University Library, except as provided in section 20 below.

9. Length of candidature

9.1 A candidate may proceed either on a full-time or part-time basis.

9.2 Except with the express approval of the Dean:

9.2.1 a full-time candidate shall complete the degree requirements:

9.2.1.1 no earlier than the end of the sixth semester of candidature; and

9.2.1.2 no later than the end of the eighth semester of candidature; and

9.2.2 a part-time candidate shall complete the degree requirements:
9.2.2.1 no earlier than the end of the eighth semester of candidature; and
9.2.2.2 no later than the end of the sixteenth Semester of candidature.
9.3 Where a candidate is granted credit for previous studies in accordance with section 10 below, the candidate's minimum and maximum length of candidature may be adjusted accordingly.
9.4 Where a candidate is granted a period of suspension of candidature, this period will not count as part of the time-limits prescribed above in section 9.2.
9.5 Where a candidate is granted permission to change from full- to part-time candidature, or the reverse, the minimum and maximum lengths of candidature will be amended pro-rate.

10. Credit transfer

10.1 Coursework component
10.1.1 A candidate who, at the date of admission to candidature, has completed postgraduate coursework (whether a degree for that work has been awarded or not) may apply for credit transfer towards the degree.
10.1.2 On the recommendation of the relevant head of school, the Dean may grant a candidate credit for previous studies provided that:
10.1.2.1 the coursework for which credit is sought is deemed by the Dean to have been completed with a high level of competency and to be relevant to the candidate's total program of study; and
10.1.2.2 no more than 24 credit points shall normally be so credited, unless the units of study for which credit is sought were completed in an embedded program at this University, in which case there shall be no restriction on the amount of credit that may be granted.
10.2 Research component
10.2.1 A candidate who, at the date of admission to candidature, has completed not less than one semester as a candidate for a degree of master in the Faculty of Engineering and Information Technologies or in another faculty in the University of Sydney, may be permitted by the Dean to transfer credit for the whole or any part of that candidature towards the DEngPrac degree, provided that:
10.2.1.1 the period of candidature for the degree of master for which credit is sought shall have been in a program of full-time or part-time advanced study and research under a supervisor appointed by the faculty and directly related to the candidate's proposed course of advanced study and research for the DEngPrac degree; and
10.2.1.2 the candidate shall have abandoned candidature for that degree of master.
10.2.2 A candidate who, at the date of admission to candidature, has completed not less than one semester as a candidate for the degree of Doctor of Philosophy in the University of Sydney may be permitted by the Dean to transfer credit for the whole or any part of that candidature towards the DEngPrac degree, provided that:
10.2.2.1 the period of candidature for the PhD degree for which credit is sought shall have been in a program directly related to the candidate's proposed course of advanced study and research for the DEngPrac degree; and
10.2.2.2 the candidate shall have abandoned candidature for the PhD degree.
10.2.3 A candidate who, at the date of admission, has completed not less than one semester as a candidate for a higher degree in another university or institution may be credited for the whole or any part of that period of candidature towards the DEngPrac degree, provided that:
10.2.3.1 the period of candidature for the higher degree for which credit is sought shall have been in a program of full-time or part-time advanced study and research under a supervisor appointed by the other university or institution concerned and is directly related to the candidate's proposed course of advanced study and research for the DEngPrac degree;
10.2.3.2 the candidate shall have abandoned candidature for the higher degree of the other university or institution concerned for which credit is sought; and
10.2.3.3 the amount of credit which may be so granted shall not exceed two semesters.

11. Control of candidature

11.2 Where a candidate is employed by an institution other than the University, the Dean may. require a statement from that employer acknowledging that the candidature will be under the control of the University.
12. Location of candidature
12.1 Subject to the approval of the supervisor, relevant head of school and the Dean, a candidate shall pursue the program of advanced study and research:
12.1.1 within the University, including its research centres;
12.1.2 on fieldwork either in the field or in libraries, museums or other repositories;
12.1.3 within industrial laboratories or research institutions or other institutions considered by the Dean to provide adequate facilities for that candidature; or
12.1.4 within a professional working environment considered to be appropriate by the Dean.
12.2 A candidate shall be regarded as engaging in work within the University if he or she is undertaking approved distance ana/or off-campus study, this being a mode of study in which the student would not be in regular physical attendance on a designated campus of the University.
12.3 A candidate must, however, be able to attend the University at such times and on such occasions for the purposes of consultation and participation in prescribed academic and educational activities, as may be required by the relevant head of school.
12.4 Except in respect of a candidate undertaking approved distance and/or off-campus study, a candidate pursuing candidature outside Australia must also complete a cumulative minimum period of two semesters of candidature within the University.

13. Supervision

13.1 Appointment of supervisor
13.1.1 The Dean, on the recommendation of the relevant head of school, shall appoint a suitably qualified supervisor for each candidate to take primary responsibility for the conduct of the candidature.
13.1.2 The Dean, on the recommendation of the relevant head of school, shall normally appoint one or more associate supervisors for each candidate to assist in the supervision of that candidature.
13.2 Qualifications of supervisors
13.2.1 A person appointed as a supervisor must be:
13.2.1.1 a member of the academic staff;
13.2.1.2 a member of the senior research staff;
13.2.1.3 a person upon whom the Senate has conferred an academic title or a clinical academic title; or
13.2.1.4 such other member of the staff of the University as may be considered appropriate in a particular case by the Graduate Studies Committee of the Academic Board.
13.3 Qualifications of associate supervisors
13.3.1 A person appointed as an associate supervisor must:
13.3.1.1 hold the qualifications referred to in section 13.2; or
13.3.1.2 have been appointed as an honorary associate of the University.

14. Progress

14.1 Annual review
14.1.1 At the end of each year of candidature, each candidate shall complete and submit an annual progress report form to provide evidence of progress to the satisfaction of the supervisor, the relevant head of school and the Dean.
14.1.2 The supervisor shall comment on the candidate's report, and the form will then be referred back to the candidate who shall sign the report to indicate that he or she has sighted the supervisor's comments.
14.1.3.1 The form shall then be referred to the head of the relevant school, who, on the basis of the evidence provided, shall recommend the conditions of candidature to apply for the following year.
14.1.3.2 The head may require the candidate to provide further evidence of progress at the end of one semester or such other period as the head considers appropriate.
14.1.4 The progress report form is then forwarded to the Dean for consideration and comment.
14.2 Interview at the end of the first year of candidature

14.2.1 In addition to the requirement for the submission of an annual progress report, at the end of the first year of candidature each candidate's progress will be reviewed at an interview to be organised by the relevant school.

14.2.2.1 The review shall include an assessment of the research project including the resources being made available, the candidate's progress (including seminar performance) and the supervisory arrangements.

14.2.2.2 If both the supervisor and the relevant head of school participate in the review, another member of staff - usually the schoolal postgraduate coordinator - shall normally also participate in the review.

14.2.2.3 There shall also be a segment where the candidate has the opportunity to discuss in confidence his or her progress in the absence of the supervisor.

14.2.3.1 An outcome will be considered by the head of school, if not directly involved, and the Dean.

14.3.1.2 Where difficulties have been identified, the report will include an agreed course of action which may include discontinuation of candidature.

14.3 Lack of evidence of satisfactory progress

14.3.1 If a candidate fails to submit evidence of progress or if the relevant head of school considers that the evidence submitted does not indicate satisfactory progress, the Dean may, on the head's recommendation:

14.3.1.1 call upon the candidate to show good cause why that candidature should not be terminated by reason of unsatisfactory progress towards completion of the degree; and

14.3.1.2 where, in the opinion of the Dean, the candidate does not show good cause, the Dean may terminate that candidature or may impose conditions on the continuation of that candidature.

14.3.2.1 For the purposes of these Resolutions, good cause means circumstances beyond the reasonable control of a candidate, which may include serious ill-health or misadventure, but does not include demands of employers, pressure of employment or time devoted to non-University activities, unless these are relevant to serious ill-health or misadventure.

14.3.2.2 In all cases the onus is on the candidate to provide the University with satisfactory evidence to establish good cause.

15. Discontinuation of enrolment

15.1 A candidate who wishes to discontinue enrolment in the degree or in a unit of study must apply to the relevant head of school and will be presumed to have discontinued enrolment from the date of that application, unless evidence is produced showing:

15.1.1 that the discontinuation occurred at an earlier date; and

15.1.2 that there was good reason why the application could not be made at the earlier time.

15.2 A candidate who discontinues enrolment in a unit of study shall have that discontinuation recorded as Withdrawn (W) or Discontinued not to count as failure (DNF) where that discontinuation occurs within the timeframes specified by the University or where the candidate meets other conditions as specified by the relevant head of school.

15.3 A candidate who discontinues candidature for the degree shall have that discontinuation recorded as Withdrawn (W) or Not enrolled or Not continuing where that discontinuation occurs:

15.3.1 within the time-frames specified by the University or

15.3.2 where the candidate meets other conditions as specified by the relevant head of school.

15.4 A candidate who discontinues candidature and who seeks to re-enrol as a candidate for the degree must apply for re-admission in accordance with procedures determined by the Committee.

16. Suspension of candidature

16.1 A candidate must be enrolled in each semester m which he or she is actively completing the requirements for the degree.

16.2 A candidate who wishes to suspend candidature must first obtain approval from the Dean.

16.3 The candidature of a candidate who has not re-enrolled and who has not obtained approval from the Dean for suspension will be deemed to have lapsed.

16.4.1 A student whose candidature has lapsed must apply for re-admission in accordance with procedures determined by the Committee.

16.4.2 if re-admitted to candidature, the candidate shall complete the degree requirements under such conditions as determined by the Dean.

16.5 A candidate who enrols after suspending candidature shall complete the requirements for the degree under such conditions as determined by the Dean.

17. Examination

17.1 Except as prescribed in these resolutions, the examination procedures shall be in accordance with the policies and procedures prescribed by the Academic Board for the degree of Doctor of Philosophy.

18. Appointment of Examiners

18.1 On receiving the thesis and having considered the certificate of the supervisor, the Dean shall consult with the relevant head of school and, if the Dean sees fit, appoint examiners.

18.2 If the Dean resolves to appoint examiners, three independent examiners shall be appointed.

18.3 Of the examiners so appointed:

18.3.1 at least two examiners shall be external to the University;

18.3.2 the supervisor may not be appointed as an examiner;

18.3.3 an industry-based associate professor may not be appointed as an external examiner; and

18.3.4 each examiner shall hold a professional doctorate or PhD level qualification and/or be a member of staff at a recognised university at the level of professor or associate professor.

18.4 The Dean shall report the names of the examiners appointed to the PhD Award Subcommittee of the Graduate Studies Committee of the Academic Board, which may appoint one or more additional examiners.

18.5 In any case where the Dean, having received the thesis and having considered the report of the supervisor, resolves not to appoint examiners, the Dean shall report the circumstances to the PhD Award Subcommittee of the Graduate Studies Committee of the Academic Board.

19. Determination of the result of the candidature

19.1 The Head of Department will refer the results of the coursework and the examiners' reports on the thesis, together with a recommendation concerning the award of the degree, to the Faculty Board.

19.2 The Head's recommendation for the thesis shall then be treated as for a PhD (section 3 of the Resolutions for PhD), in that the award of the degree can be made if the Head recommends typographical corrections or minor emendations.

19.3 If the Head recommends that changes asked for by the examiners not be carried out, or there is disagreement among the examiners, then the Faculty shall forward a report (along with the Head's report and the student's comments on the examiner's reports) to the PhD Award Subcommittee of the Academic Board's Graduate Studies Committee, which shall determine the result of the candidature.

20. Public availability of thesis

20.1 It is the policy of the Senate that a candidate for a higher degree should not normally be permitted to undertake a program of advanced study and research which is likely to result in the lodgement of a thesis that cannot be available for use immediately, to be read, photocopied or microfilmed, except as provided in sections 20.3 and 20.4below.

20.2 An applicant for admission to candidature for a higher degree shall be required to acknowledge awareness of this policy when applying for such admission.

20.3 Use of confidential material and access to a restricted thesis

20.3.1 If, at any time between application for admission to candidature and the lodgement of the thesis, it shall appear to the supervisor and to the relevant head of school that successful prosecution of the candidature will require the use of confidential material which the candidate would not be at liberty fully to disclose in the thesis, the matter shall be reported as soon as practicable to the Dean.

20.3.2 The Dean may, if the Dean thinks fit, recommend to the Graduate Studies Committee of the Academic Board that the candidate be granted:

20.3.2.1 permission to include in an appendix to the thesis such material as is essential to the thesis but which, for a limited period, may not be available for general inspection; and

20.3.2.2 exemption, in respect of such an appendix, from the requirement to give the undertaking specified in section 20.2 above.

20.3.3 Subject to the provisions in section 20.3.4 below, if the Graduate Studies Committee of the Academic Board resolves to grant such permission and exemption, the University Librarian shall restrict access, for a period to be specified by the Graduate Studies Committee of the Academic Board, to any appendix referred to in section 20.3.2 above.

20.3.3.1 This period of restriction shall not exceed five years unless there are exceptional reasons for an extension of the period.

20.3.4 The University Librarian may grant access to an appendix to a thesis to which access has been restricted in accordance with section 20.3.3 above, to a scholar who:

20.3.4.1 demonstrates bona fide concern with the material in that appendix; and

20.3.4.2 has the written consent of either the author of the thesis; or the head of the relevant school in a case where the author cannot be contacted, notwithstanding that all reasonable steps have been taken to contact the author.

20.3.5 Notwithstanding any other provision of these resolutions, the examiners of a thesis, including any Faculty committee or any committee of the Academic Board which is directly concerned with the examination of such thesis, shall have access to the thesis and any appendix to the thesis for the purposes of any examination or re-examination.

20.4 Deferment of public availability of thesis

20.4.1 The Senate recognises that there are certain circumstances where deferment of the public availability of the thesis is appropriate.

20.4.2 In a case where a candidate or potential candidate is to be associated with a project in collaboration with industry that has potential for concern over exploitation of intellectual property, the Dean, if satisfied that the circumstances warrant it, may recommend to the Graduate Studies Committee of the Academic Board that:

20.4.2.1 the candidate or prospective candidate be granted exemption from the requirement to give the undertaking specified in section 20.2 above; and

20.4.2.2 authorisation be given to delay lodgement of the thesis in the Library for a period that, except in exceptional circumstances, shall not exceed 18 months from the date of the award of the degree.

20.4.3 The Chair of the Graduate Studies Committee of the Academic Board may approve such applications on behalf of the Graduate Studies Committee, where the Chair is satisfied that they are appropriate.

20.4.4 If, at any time between application for admission to candidate and the lodgement of the thesis, it shall appear to the candidate, supervisor and to the relevant head of school that there are reasons to believe that the candidate's interests would be at risk if the thesis were Immediately made available, the candidate may apply in writing for deferment of the availability of that thesis in the University Library for a specific period of time.

20.4.4.1 Any such application should set out clearly the reasons for the request and include supporting evidence, as appropriate.

20.4.5 The Dean, if satisfied that such a deferment is necessary to protect the interests of the candidate, may:

20.4.5.1 give authorisation for the thesis not to be lodged in the Library for a period not exceeding six months from the date of award of the degree; and may also

20.4.5.2 recommend to the Graduate Studies Committee of the Academic Board that a longer period of deferment, or an extension of the original deferment, be approved provided that, except in exceptional circumstances, the total period shall not exceed 18 months.

21. Heads of school

21.1 A head of school may delegate to a specified member of the academic staff his or her responsibilities under these resolutions by:

21.1.1 countersigning a specific recommendation in respect of a particular candidature; or

21.1.2 making, and forwarding to the Registrar, a written statement of delegation of those powers.

Graduate Certificate in Greenhouse Gas Mitigation

1. Eligibility for admission

1.1 Admission to candidature for the Graduate Certificate in Greenhouse Gas Mitigation may be granted:

1.1.1 to an applicant who has completed the requirements for a degree of Bachelor of Engineering or other appropriate degree at the University of Sydney; or

1.1.2 to a graduate in an appropriate discipline of another university or tertiary institution.

2. Availability

2.1 Admission to the Graduate Certificate in Greenhouse Gas Mitigation may be limited by quota.

2.2 In determining the quota the University will take into account:

2.2.1 availability of resources, including space, library, equipment and computing facilities: and

2.2.2 availability of adequate and appropriate supervision.

2.3 In considering an application for admission to candidature the Faculty will take account of the quota and will select in preference applicants who are most meritorious in terms of past academic and professional achievements.

3. Method of progression

3.1 A candidate for the Graduate Certificate in Greenhouse Gas Mitigation shall proceed by coursework.

4. Time limits

4.1 A candidate shall complete the requirements of the Graduate Certificate in Greenhouse Gas Mitigation within a minimum length of candidature of six months and a maximum length of candidature of 24 months.

4.1.1 This period excludes the periods during which the candidature is suspended and is shorter when credit for prior learning is granted; but

4.1.2 under no circumstances can the candidature period be less than six months.

5. Credit

5.1 A candidate who before admission to candidature has spent time in postgraduate study in the University of Sydney or in another university or institution and has completed work considered by the Faculty to be equivalent to units of study prescribed for the Graduate Certificate in Greenhouse Gas Mitigation, may receive credit towards satisfying the requirements for the Graduate Certificate in Greenhouse Gas Mitigation, provided that no more than half the requirements are so met.

6. Requirements for the Graduate Certificate in Greenhouse Gas Mitigation

6.1 A candidate shall complete such units of study as may be prescribed by the Faculty.

6.2 For the Graduate Certificate in Greenhouse Gas Mitigation 24 credit points are required to be completed from Table of Units of study, appended to these resolutions.

7. Examination

7.1 A candidate may be tested by written and oral examination, assignments, exercises and practical work or any combination of these.

7.2 On completion of the requirements for the Graduate Certificate in Greenhouse Gas Mitigation the results of the examination shall be reported to the Faculty which shall determine the result of the candidature.

8. Progress

8.1 The Faculty may call upon any candidate to show cause why that candidature should not be terminated by reason of unsatisfactory progress towards completion of the Graduate Certificate in Greenhouse Gas Mitigation; and where, in the opinion of the Faculty, the candidate does not show good cause, terminate the candidature.

6. Postgraduate coursework degrees

The Faculty of Engineering and Information Technologies offers coursework degrees at master's, graduate diploma and graduate certificate level.

In the Schools of Aerospace, Mechanical and Mechatronic Engineering, Chemical and Biomolecular Engineering, Civil Engineering and Electrical and Information Engineering:

- Master of Engineering (ME)
- Master of Professional Engineering (MPE)
- Graduate Diploma in Engineering (GradDipE)
- Graduate Certificate in Engineering (GradCertE)

In the School of Information Technology:

- Master of Information Technology (MIT)
- Master of Information Technology Management (MITM)
- Graduate Diploma in Computing (GDC)

In the School of Civil Engineering:

- Master of Project Management (MPM)
- Graduate Diploma of Project Management (GDPM)
- Graduate Certificate in Project Management (GCPM)

Conversion Masters' Programs

The Faculty of Engineering and Information Technologies offers a three year Conversion Master's Program, consisting of a Graduate Diploma or Graduate Certificate in Engineering and the Master of Professional Engineering.

This program is aimed at students who have a non-Engineering background, such as an undergraduate degree in Science, or an overseas Engineering qualification. The complete three year program is designed so that students initially enrol in the foundation components of an Engineering specialisation, covering areas that were not part of their original undergraduate degree. This is done in the first year of enolment in a Graduate Certificate or Diploma.

Once the foundation subjects have been completed and entry requirements met, students can then go on to the Master of Professional Engineering degree. This two year degree covers the specialisation and professional practice components of the selected Engineering stream.

Students applying for the Conversion Master's Program must satisfy the entry requirements set out in the tables for the Master or Professional Engineering for each specialisation.

Where students have completed the required entry subjects in a prior Bachelor's degree, advanced standing of up to one year may be awarded toward the program. Every application is assessed individually and an enrolment program is devised for each student to make sure that all students reach an equivalent level of theoretical, practical, professional and specialisation skills prior to commencement of the MPE.

Students must fulfill the entry requirements as follows:

1. Minimum Entry condition.

Must have completed a minimum of 48 credit points, or equivalent, of Science related units of study in their Bachelor's degree relevant to the Engineering specialisation chosen;

2. Foundation Subjects.
2.1 Must have completed 48 credit points of foundation engineering units of study in their Bachelor's degree relating to the field of engineering they wish to specialise in; or

2.2 must complete 48 credit points of foundation engineering units of study in a Graduate Diploma or Graduate Certificate in Engineering at the University of Sydney.

The complete Conversion Master's Program consists of 144 credit points, and 3.0 years duration of full-time study or equivalent in part-time study.

As a requirement of the Conversion Master's Program, students complete a capstone project, which may either be a 24 credit point research dissertation or a 12 credit point research project. Students will work with an academic supervisor on a current research - or industry based - project and write a thesis on their research outcomes. Students at the Master's level will develop the experience and professional skills required to critically evaluate the research undertaken while working on their capstone project.

The MPE degree is available in the following specialisations:

in the School of Aerospace, Mechanical and Mechatronic Engineering

Aerospace, Biomedical and Mechanical Engineering

in the School of Chemical and Biomolecular Engineering

Chemical and Biomolecular Engineering

in the School of Civil Engineering

Civil, Environmental Fluids, Geotechnical and Structural Engineering

in the School of Electrical and Information Engineering

Electrical, Network, Power, Software and Wireless Engineering.

Master of Engineering, Master of Information Technology, Master of Information Technology Management and Master of Project Management

The Faculty of Engineering and Information Technologies offers a range of Masters programs.

These programs consists of 48 credits (8 units of study), 1.0 years duration full-time study or the equivalent in part-time study.

The ME is available in the disciplines of Civil, Chemical and Biomolecular, Electrical and Information Engineering and Aerospace Mechanical and Mechatronic Engineering. The ME is available as a general or specialised degree.

Graduate Certificate in Engineering and Graduate Diploma in Engineering

The Graduate Certificate in Engineering and Graduate Diploma in Engineering have two pathways:

1. For students wishing to articulate into a Master of Engineering; or

2. For students enrolling in the Conversion Master's Program.

Articulation into the Master of Engineering

Students enrol in units of study as per the Unit of Study tables listed in the following pages.

Conversion Master's Program

Students completing a Graduate Diploma or Graduate Certificate in Engineering as part of the Conversion Master's Program will be given specific academic advice as to which units of study they should enrol in. Students should see the Program Director in the relevant School. Units chosen must cover the entry requirements for the MPE specialisation chosen.

Coursework degree tables

Requirements and specifications for all the degrees listed above are shown in the following subsections of chapter 6:

6a. School of Aerospace, Mechanical and Mechatronic Engineering

6b. School of Chemical and Biomolecular Engineering

6c. School of Civil Engineering

6d. School of Electrical and Information Engineering

6e. School of Information Technologies

6f. Graduate programs in Project Management

6g. Master of Professional Engineering

6a. School of Aerospace, Mechanical and Mechatronic Engineering

Master of Engineering

1. The Master of Engineering (ME) is a coursework degree of 48 credits, 1 year in duration (full-time enrolment) or 2 years (part-time enrolment).
2. The ME is offered in areas of study within the schools of Civil, Chemical and Biomolecular, Electrical and Information Engineering and Aerospace Mechanical, and Mechatronic Engineering.
3. For the general ME degree, at least 24 credits must be completed from the units of study offered by a single school. Relevant units are shown in the ME specialisation tables below.
4. For an ME awarded in a specialist area, units of study must be completed as specified in the ME specialisation tables below.
5. The director of the Graduate School of Engineering and Information Technology may (under special circumstances) permit students to enrol in up to 18 credits of units of study given by schools outside the faculty or given by other institutions.

Master of Engineering specialisations

Unit of study	***Credit points***	***A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition***	***Session***
School of Aerospace, Mechanical and Mechatronic Engineering			
As well as a general Master of Engineering degree, the School of Aerospace, Mechanical and Mechatronic Engineering offers the ME degree in the following specialisations. 1. ME (Mechanical) 2. ME(Aerospace) 3. ME(Automation and Manufacturing Systems) not offered in 2010. 4.ME(Biomedical) The requirements for these ME specialisations are shown in the following tables.			
Master of Engineering (Mechanical)			
Specialist Core Units 1. Candidates must complete a total of 36 credit points from the specialist tables below. 2. Candidates must complete a minimum of 24 credit points of specialist units from the following specialist table.			
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
AERO5301 **Applied Finite Element Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 1
MECH5305 **Smart Materials**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent	Semester 1
MECH5701 **Computers in Real Time Control and Inst**	6	**N** MECH4730 Computers in Real-Time Control and Inst MECH4710 Microprocessors in Engineered Products	Semester 1
MECH5720 **Sensors and Signals**	6	**A** Strong MATLAB skills **N** MECH4720 Sensors and Signals	Semester 1
MECH5410 **Advanced Design and Analysis 1**	3	**A** ENGG1802 - Eng Mechanics, balance of forces and moments AMME2301 - Mechanics of Solids, 2 and 3 dimensional stress and strain AMME2500 - Engineering Dynamics - dynamic forces and moments. MECH2400 - Mechanical Design 1, approach to design problems and report writing, and preparation of engineering drawing MECH3460 - Mechanical design 2, means of applying fatigue analysis to a wide range of machine components *Note: Department permission required for enrolment*	Semester 1
MTRX5700 **Experimental Robotics**	6	**P** AMME3500 or (MECH3500 and MECH3800); MTRX3700 or MECH3700	Semester 1
MECH5310 **Advanced Engineering Materials**	6	**N** MECH4310 Advanced Materials	Semester 2
MECH5255 **Air Conditioning and Refrigeration (Adv)**	6	**A** Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. **P** MECH3260 or equivalent **N** MECH4255 Air Conditioning and Refrigeration	Semester 2
MECH5275 **Advanced Renewable Energy**	6	**A** The students will require an understanding of the basic principles of fluid mechanics, thermodynamics and heat transfer, and the application of these principles to energy conversion systems. In particular, students should be able to analyse fluid flow in turbomachinery; perform first and second law thermodynamic analysis of energy conversion systems; and perform calculations of radiative, conductive and convective heat transfer.	Semester 2
MECH5265 **Advanced Combustion**	6	**P** MECH5262 or equivalent **N** MECH4265 Combustion	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AMME5271 **Computational Nanotechnology**	6	**A** Students are required to have an understanding of basic principles of Newtonian mechanics, physics and chemistry, fluid mechanics and solid mechanics. General knowledge of how to operate a computer and work with different software is also required.	Semester 2
AMME5602 **Product Life Cycle Design**	6	**A** Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.	Semester 1 Semester 2
AERO5760 **Spacecraft and Satellite Design**	6		Semester 2

Candidates must complete a maximum of 12 credit points from the following specialist table.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AERO5200 **Advanced Aerodynamics**	6	**A** BE in the area of Aerospace Engineering or related Engineering field.	Semester 1
AMME5981 **Computational Biomedical Engineering**	6	**A** Fundamental Materials, Mechanics of Solids, Engineering Dynamics, Biomedical Design and Technology.	Semester 1
AMME5990 **Biomedical Engineering Tech 1**	6	**A** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.	Semester 1
AERO5400 **Advanced Aircraft Design Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 2
AERO5500 **Flight Mechanics Test and Evaluation Adv**	6	**A** BE in area of Aerospace Engineering or related Engineering Field.	Semester 2
AMME5921 **Biomedical Engineering Tech 2**	6	**A** A bachelors degree, ideally in the engineering or science field, is advisory, but not essential.	Semester 2
AMME5971 **Applied Tissue Engineering**	6	**A** Biology, chemistry at a junior level and intermediate physiology or equivalent	Semester 2
AMME5961 **Biomaterials Engineering**	6	**A** Chemistry, biology, materials engineering, and engineering design at least at the Junior level.	Semester 2

Professional Pathway Units

1. Candidates must complete 12 credit points from the following table of professional pathway units.
2. Additional specialist units or elective units from the postgraduate tables may be taken if these units have already been completed.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AERO5660 **Safety Systems Management**	6		Semester 1
AMME5601 **Professional Engineering**	6	**A** Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management	Semester 1

Research Pathway

1. School permission is required to complete this pathway.
2. Admission to this pathway is determined by a candidate obtaining a distinction average in their first 24 credits of their ME studies.
3. Candidates must complete ENGG5219 OR ENGG5220 AND ENGG5221.

Master of Engineering (Aerospace)

Specialist Core Units

1. Candidates are required to complete 36 credit points of specialist core units and specialist elective units.
2. Candidates must complete 24 credit points of specialist core units from the following table.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AERO5301 **Applied Finite Element Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 1
AERO5200 **Advanced Aerodynamics**	6	**A** BE in the area of Aerospace Engineering or related Engineering field.	Semester 1
AERO5400 **Advanced Aircraft Design Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 2
AERO5500 **Flight Mechanics Test and Evaluation Adv**	6	**A** BE in area of Aerospace Engineering or related Engineering Field.	Semester 2

Specialist Elective Units

An additional 12 credit points of specialist elective units of study must be chosen from the following list.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AERO5010 **Optimisation Methods in Engineering**	6	**A** BE in the area of Aerospace or related Engineering field.	Semester 2
AERO5660 **Safety Systems Management**	6		Semester 1
AERO5760 **Spacecraft and Satellite Design**	6		Semester 2
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
MECH5304 **Materials Failure**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent *An elective unit of study for the degree of Master of Engineering*	Semester 1a
MECH5305 **Smart Materials**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
MECH5310 **Advanced Engineering Materials**	6	**N** MECH4310 Advanced Materials	Semester 2
MECH5720 **Sensors and Signals**	6	**A** Strong MATLAB skills **N** MECH4720 Sensors and Signals	Semester 1
Pathway Units			
Candidates must complete the following units.			
AERO5901 **Project 1 and Seminar in Aerospace Eng**	6	**A** BE in area of Aerospace Engineering or related Engineering fields. *Note: Department permission required for enrolment*	Semester 1 Semester 2
AERO5902 **Project 2 and Seminar in Aerospace Eng**	6	**A** BE in area of Aerospace Engineering or related Engineering field. **P** AERO5901 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Research Pathway			
1. School permission is required to complete this pathway. 2. Admission to this pathway is determined by a candidate obtaining a distinction average in their first 24 credits of their ME studies. 3. Candidates must complete ENGG5219 OR ENGG5220 AND ENGG5221.			
Master of Engineering (Biomedical)			
Specialist Core Units			
1. Candidates are required to complete 36 credit points of specialist core units and specialist elective units. 2. Candidates must complete 24 credit points of specialist core units from the following table.			
AMME5921 **Biomedical Engineering Tech 2**	6	**A** A bachelors degree, ideally in the engineering or science field, is advisory, but not essential.	Semester 2
AMME5961 **Biomaterials Engineering**	6	**A** Chemistry, biology, materials engineering, and engineering design at least at the Junior level.	Semester 2
AMME5981 **Computational Biomedical Engineering**	6	**A** Fundamental Materials, Mechanics of Solids, Engineering Dynamics, Biomedical Design and Technology.	Semester 1
AMME5990 **Biomedical Engineering Tech 1**	6	**A** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.	Semester 1
Specialist Elective Units			
An additional 12 credit points of specialist elective units of study must be chosen from the following list.			
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
AMME5971 **Applied Tissue Engineering**	6	**A** Biology, chemistry at a junior level and intermediate physiology or equivalent	Semester 2
MECH5310 **Advanced Engineering Materials**	6	**N** MECH4310 Advanced Materials	Semester 2
AMME5602 **Product Life Cycle Design**	6	**A** Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.	Semester 1 Semester 2
Professional Pathway Units			
1. Candidates must complete 12 credit points of professional pathway units offered from the table below. 2. Additional specialist units or elective units from the postgraduate tables may be taken if these units have already been completed.			
AERO5660 **Safety Systems Management**	6		Semester 1
AMME5601 **Professional Engineering**	6	**A** Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management	Semester 1
Research Pathway			
1. School permission is required to complete this pathway 2. Admission to this pathway is determined by obtaining a distinction (WAM75 or higher) average in the first 24 credits of their ME studies. 3. Candidates must complete ENGG5219 OR ENGG5220 AND ENGG5221.			

6b. School of Chemical and Biomolecular Engineering

Master of Engineering

1. The Master of Engineering (ME) is a coursework degree of 48 credits, 1 year in duration (full-time enrolment) or 2 years (part-time enrolment).
2. The ME is offered in areas of study within the schools of Civil, Chemical and Biomolecular, Electrical and Information Engineering and Aerospace Mechanical, and Mechatronic Engineering.
3. For the general ME degree, at least 24 credits must be completed from the units of study offered by a single school. Relevant units are shown in the ME specialisation tables below.
4. For an ME awarded in a specialist area, units of study must be completed as specified in the ME specialisation tables below.
5. The director of the Graduate School of Engineering and Information Technology may (under special circumstances) permit students to enrol in up to 18 credits of units of study given by schools outside the faculty or given by other institutions.

Master of Engineering specialisations

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
School of Chemical and Biomolecular Engineering			
As well as the general ME degree, the School of Chemical and Biomolecular Engineering offers the ME in the following specialisations. 1. Master of Engineering (Environmental) 2. Master of Engineering (Biophysical Processes) 3. Master of Engineering (Sustainable Processing) 4. To qualify for a Chemical Engineering specialisation in Biophysical Processes, Environmental or Sustainable Processing, 12 credit points of relevant specialist units must be completed.			
Fundamental Units			
Candidates may be required to complete 12 credit points of fundamental units of study determined by the Director of the program.			
CHNG5001 **Process Systems Engineering**	6	**A** Enrolment in this unit of study assumes that the equivalent to all (six) core chemical engineering UoS in third year have been successfully completed. **P** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains *This UoS is an advanced elective in chemical engineering. The concepts and enabling technologies taught in this course are relevant to the real world practice of chemical engineering across a range of industries.*	Semester 2
CHNG5603 **Analysis, Modelling, Control: BioPhy Sys**	6	**A** It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus MATH 1003 Integral Calculus and Modeling	Semester 1
CHNG5601 **Membrane Science**	6		Semester 1
Master of Engineering (Environmental)			
Specialist Units			
1. Candidates must complete 12 credit points from the following specialist units.			
CHNG5004 **Particles and Surfaces**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year and all unit operations have been successfully completed.	Semester 1
CHNG5005 **Wastewater Eng - Systems and Practice**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.	Semester 2
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
Master of Engineering (Biophysical Processes)			
Specialist Units			
Candidates must complete 12 credit points from the following specialist units.			
CHNG5602 **Cellular Biophysics**	6		Semester 1
CHNG5604 **Membrane Science Laboratory**	6		Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
CHNG5605 **Bio-Products: Laboratory to Marketplace**	6		Semester 2
Master of Engineering (Sustainable Processing)			
Specialist Units Candidates must complete 12 credit points from the following specialist units.			
CHNG5003 **Green Engineering**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed.	Semester 2
CHNG5005 **Wastewater Eng - Systems and Practice**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.	Semester 2
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
Elective Units 1. Candidates must complete 12 credit points of elective units. 2. Electives may be taken from fundamental units, specialist units, project management units or professional practice units of study listed in the postgraduate tables in the Faculty of Engineering and IT Handbook.			
Professional Pathway Units Candidates must complete 12 credit points of professional pathway units from the specialist units in the tables above.			
Research Pathway 1. School permission is required to complete this pathway. 2. Admission to this pathway is determined by obtaining a distinction (WAM75 or higher) average in the first 24 credits of their ME studies. 3. Candidates must complete ENGG5219 OR ENGG5220 AND ENGG5221.			

6c. School of Civil Engineering

Master of Engineering

1. The Master of Engineering (ME) is a coursework degree of 48 credits, 1 year in duration (full-time enrolment) or 2 years (part-time enrolment).
2. The ME is offered in areas of study within the schools of Civil, Chemical and Biomolecular, Electrical and Information Engineering and Aerospace Mechanical, and Mechatronic Engineering.
3. For the general ME degree, at least 24 credits must be completed from the units of study offered by a single school. Relevant units are shown in the ME specialisation tables below.
4. For an ME awarded in a specialist area, units of study must be completed as specified in the ME specialisation tables below.
5. The director of the Graduate School of Engineering and Information Technology may (under special circumstances) permit students to enrol in up to 18 credits of units of study given by schools outside the faculty or given by other institutions.

Master of Engineering specialisations

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
School of Civil Engineering As well as the general ME degree, the School of Civil Engineering offers the ME in the following specialisations. 1. Master of Engineering (Geotechnical) 2. Master of Engineering (Structures) 3. Master of Engineering (Environmental Fluids) 4. To qualify for a Civil Engineering specialisation (Structural, Geotechnical, or Environmental Fluids) 12 credit points of the relevant Fundamental Units and 24 credits points of the relevant Specialist Units must be completed. Requirements for these specialisations are shown in the following tables.			
Master of Engineering (Structures)			
Fundamental Units Candidates may need to complete 12 credit points of fundamental units from the table below.			
CIVL5266 **Steel Structures - Stability**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5269 **Concrete Structures - Strength & Service**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5458 **Numerical Methods in Civil Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
Specialist Units Candidates must complete 12 credit points of specialist units from the table below.			
CIVL5257 **Concrete Structures: Prestressed**	6	**P** BE or equivalent.	Semester 1
CIVL5264 **Composite Steel-Concrete Structures**	6	**P** BE or equivalent	Semester 2
CIVL5267 **Steel Structures - Advanced Design**	6	**P** BE or equivalent.	Semester 1
CIVL5268 **Structural Dynamics**	6	**P** BE or equivalent.	Semester 2
Elective Units 1. Candidates must complete 12 credit points of elective units. 2. Electives may be taken from Fundamental Units, Specialist Units, Project Management Units or Professional Practice units of study listed in the Postgraduate Tables in the Faculty of Engineering and IT Handbook.			
Master of Engineering (Geotechnical)			
Fundamental Units Candidates may need to complete 12 credit points of fundamental units from the table below.			
CIVL5351 **Environmental Geotechnics**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
CIVL5452 **Foundation Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5458 **Numerical Methods in Civil Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
Specialist Units Candidates must complete 12 credit points of specialist units from the table below.			
CIVL5450 **Analysis and Design of Pile Foundations**	6	**A** BE or equivalent.	Semester 1
CIVL5451 **Computer Methods in Geotechnical Eng**	6	**P** BE or equivalent.	Semester 1
CIVL5454 **Rock Engineering**	6	**A** Undergraduate geology and soil mechanics. **P** BE or equivalent.	Semester 2
CIVL5455 **Engineering Behaviour of Soils**	6	**P** BE or equivalent.	Semester 2
Elective Units 1. Candidates must complete 12 credit points of elective units. 2. Electives may be taken from Fundamental Units, Specialist Units, Project Management Units or Professional Practice units of study listed in the Postgraduate Tables in the Faculty of Engineering and IT Handbook.			
Master of Engineering (Environmental Fluids)			
Fundamental Units Candidates may need to complete 12 credit points of fundamental units from the table below.			
CIVL5351 **Environmental Geotechnics**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
Specialist Units Candidates must complete 12 credit points of specialist units from the table below.			
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
CIVL5666 **Open Channel Flow & Hydraulic Structures**	6	**P** BE or equivalent.	Semester 2
CIVL5669 **Applied Fluid Engineering Computing**	6	**P** BE or eqquivalent.	Semester 2
CIVL5668 **Wind Engineering for Design-Fundamentals**	6	**P** BE or equivalent.	Semester 1
Elective Units 1. Candidates must complete 12 credit points of elective units. 2. Electives may be taken from Fundamental Units, Specialist Units, Project Management Units or Professional Practice units of study listed in the Postgraduate Tables in the Faculty of Engineering and IT Handbook.			
Research Pathway 1. School permission is required to complete this pathway. 2. Admission to this pathway is determined by obtaining a distinction (WAM 75 or higher) average in the first 24 credits of their ME studies. 3.Candidates must complete 12 credits of study from ENGG5219 Engineering Project OR ENGG5220 Engineering Project A AND ENGG5221 Engineering Project B.			

6d. School of Electrical and Information Engineering

Master of Engineering

1. The Master of Engineering (ME) is a coursework degree of 48 credits, 1 year in duration (full-time enrolment) or 2 years (part-time enrolment).
2. The ME is offered in areas of study within the schools of Civil, Chemical and Biomolecular, Electrical and Information Engineering and Aerospace Mechanical, and Mechatronic Engineering.
3. For the general ME degree, at least 24 credits must be completed from the units of study offered by a single school. Relevant units are shown in the ME specialisation tables below.
4. For an ME awarded in a specialist area, units of study must be completed as specified in the ME specialisation tables below.
5. The director of the Graduate School of Engineering and Information Technology may (under special circumstances) permit students to enrol in up to 18 credits of units of study given by schools outside the faculty or given by other institutions.

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
School of Electrical and Information Engineering			
In addition to the general Master of Engineering degree, the School of Electrical and Information Engineering offers the ME in the following specialisations. 1. Master of Engineering (Wireless Engineering) 2. Master of Enginering (Network Engineering) 3. Master of Engineering (Power Engineering) 4. To qualify for an Electrical and Information Engineering Specialisation (Wireless, Network, Power) 12 credit points of the relevant Fundamental units and 12 credit points of the relevant Specialist units must be completed.			
Master of Engineering (Wireless Engineering)			
Fundamental Units Candidates may need to complete 12 credit points of fundamental units from the table below.			
ELEC5101 **Antennas and Propagation**	6	**N** ELEC5522 Antennas and Propagation.	Semester 2
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5510 **Satellite Communication Systems**	6	**A** Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. **N** ELEC5502 Satellite Communications Systems.	Semester 2
Specialist Units Candidates must complete 12 credit points of specialist units from the table below.			
ELEC5507 **Error Control Coding**	6	**A** Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. **N** ELEC4503 Error Control Coding	Semester 1
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5403 **Radio Frequency Engineering**	6	**A** Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design , ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design. **N** ELEC5521 Radio Frequency Engineering.	Semester 1
ELEC5515 **Gigabits Wireless Systems**	6	**A** This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.	Semester 2
Elective Units Candidates must complete 12 credit points from the Table of Recommended Elective units below.			
Master of Engineering (Network Engineering)			
Fundamental Units Candidates may need to complete 12 credit points of fundamental units from the table below.			
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC5511 **Optical Communication Systems**	6	**A** (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics).	Semester 1
ELEC5512 **Optical Networks**	6	**A** ELEC3503 Introduction to Digital Communications **N** ELEC5506 Optical Networks.	Semester 2
Specialist Units Candidates must complete 12 credit points of specialist units from the table below.			
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5514 **Networked Embedded Systems**	6	**A** ELEC3607, ELEC3305, ELEC3506 and ELEC5508	Semester 2
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
Elective Units Candidates must complete 12 credit points from the Table of Recommended Elective units below.			
Master of Engineering (Power Engineering)			
Fundamental Units Candidates may need to complete 12 credit points of fundamental units from the table below.			
ELEC5204 **Power Systems Analysis and Protection**	6	**A** The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment. **N** ELEC4201 Electrical Power Systems.	Semester 1
ELEC5206 **Sustainable Energy Systems**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory.	Semester 2
Specialist Units Candidates must complete 12 credit points of specialist units from the table below.			
ELEC5203 **Topics in Power Engineering**	6	**A** (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives or ELEC3204 Power Electronics and Drives).	Semester 1
ELEC5205 **High Voltage Engineering**	6	**A** The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals. **P** ELEC3105 or equivalent *Recommended: ELEC5204 Power Systems*	Semester 2
ELEC5303 **Computer Control System Design**	6	**A** This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. **N** ELEC4301 Computer Controlled System Design.	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
Elective Units Candidates must complete 12 credit points from the Table of Recommended Elective Units below.			
Recommended Elective Units of Study			
ELEC5402 **Digital Integrated Circuit Design**	6	**A** Electronic circuit design and physics of electronic devices. **N** ELEC4402 Integrated Circuit Design.	Semester 1
ELEC5618 **Software Quality Engineering**	6	**N** SOFT3302 Software Quality Assurance	Semester 1
ELEC5619 **Object Oriented Application Frameworks**	6	**A** Java programming, and some web development experience are essential. Databases strongly recommended	Semester 2
ELEC5613 **Image Processing and Computer Vision**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems.	Semester 1
ELEC5615 **Advanced Computer Architecture**	6	**A** ELEC3305 Digital Signal Processing, ELEC3505 Communications, ELEC4503 Error Control Coding	Semester 2
ELEC5620 **Model Based Software Engineering**	6	**A** A programming language, basic maths	Semester 2
ELEC5701 **Commercial Engineering Practice**	6	**N** ENGG4003 Commercial Engineering Practice.	Semester 2
ELEC5101 **Antennas and Propagation**	6	**N** ELEC5522 Antennas and Propagation.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5510 **Satellite Communication Systems**	6	**A** Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. **N** ELEC5502 Satellite Communications Systems.	Semester 2
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5511 **Optical Communication Systems**	6	**A** (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics).	Semester 1
ELEC5512 **Optical Networks**	6	**A** ELEC3503 Introduction to Digital Communications **N** ELEC5506 Optical Networks.	Semester 2
ELEC5204 **Power Systems Analysis and Protection**	6	**A** The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment. **N** ELEC4201 Electrical Power Systems.	Semester 1
ELEC5206 **Sustainable Energy Systems**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory.	Semester 2
ELEC5507 **Error Control Coding**	6	**A** Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. **N** ELEC4503 Error Control Coding	Semester 1
ELEC5403 **Radio Frequency Engineering**	6	**A** Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design , ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design. **N** ELEC5521 Radio Frequency Engineering.	Semester 1
ELEC5515 **Gigabits Wireless Systems**	6	**A** This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.	Semester 2
ELEC5514 **Networked Embedded Systems**	6	**A** ELEC3607, ELEC3305, ELEC3506 and ELEC5508	Semester 2
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5203 **Topics in Power Engineering**	6	**A** (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives or ELEC3204 Power Electronics and Drives).	Semester 1
ELEC5205 **High Voltage Engineering**	6	**A** The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals. **P** ELEC3105 or equivalent *Recommended: ELEC5204 Power Systems*	Semester 2
ELEC5303 **Computer Control System Design**	6	**A** This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. **N** ELEC4301 Computer Controlled System Design.	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
COMP5416 **Advanced Network Technologies**	6	**A** ELEC3506 or equivalent	Semester 2

Professional Pathway

Candidates must complete 12 credit points of units from the Table of Recommended Elective Units above.

Research Pathway

1. School permission is required to complete this pathway.
2. Admission to this pathway is determined by obtaining a distinction(WAM 75 or higher) average in the first 24 credits of their ME studies.
3. Candidates must complete ENGG5219 Engineering Project OR ENGG5220 Engineering Project A AND ENGG5221 Engineering Project B.

6e. School of Information Technologies

The School of Information Technologies offers the postgraduate degree programs outlined in the table below.

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
School of Information Technology			
Master of Information Technology			
Core and elective units of study for the Master of Information Technology, Diploma in Information Technology and Graduate Certificate in Information Technology as shown in the following tables. Candidates for the degree of Master of Information Technology are required to complete 48 credit points from the units of study set out below, and complete a defined major. Enrolment is subject to the following constraints: 1. A total of 48 credit points must be completed 2. A maximum of 24 credit points can be selected from foundational units of study 3. At least 24 credit points should come from specialist units of study or IT project units of study 4. Every student must complete a defined major in the Master of Information Technology, which requires them to complete at least 18 credit points of core units in the designated major and INFO5990 5. After completing 24 credit points of course work, students who achieve Credit average results or above in their coursework may select 12 credit points of IT project units of study among their specialist units 6. After completing 24 credit points of course work, students who have Distinction average results or above may be eligible for the research path subject to the approval of the Head of the School of Information Technologies and the Dean 7. Students who pursue the research path must study INFO5993 and select 18 credit points from IT research project units of study 8. A maximum of 18 credit points may be selected with the approval of the Program Director, from units outside the Schol of IT, of which no more than 12 credits may be from outside the Faculty of Engineering and IT.			
Foundational units			
COMP5028 **Object-Oriented Design**	6	**A** Intermediate level of object oriented programming such as Java **N** INFO3220	Semester 1
COMP5114 **Digital Media Fundamentals**	6		Semester 1 Semester 2
COMP5116 **Internet Protocols**	6	**N** ELEC5740	Semester 1 Semester 2
COMP5138 **Database Management Systems**	6	**A** Intermediate level of object oriented programming such as Java.	Semester 1 Semester 2
COMP5206 **Introduction to Information Systems**	6	**N** INFO5210	Semester 1 Semester 2
COMP5211 **Algorithms**	6		Semester 1 Semester 2
COMP5214 **Software Development in Java**	6		Semester 2
INFO5001 **System Analysis and Modelling**	6	**A** Experience with a data model as in COMP5212 or COMP5214 or COMP5028 or COMP5138 **N** INFO2110, ELEC3610 and ELEC5743	Semester 2
Specialist units			
COMP5045 **Computational Geometry**	6	**A** Data structures, analysis of algorithms **N** COMP4045	Semester 1
COMP5046 **Statistical Natural Language Processing**	6	**A** Concepts of Linguistics, elementary statistics, AI techniques. **N** COMP4046	Semester 1
COMP5047 **Pervasive Computing**	6	**A** Networking concepts, operating system concepts, programming expertise. **N** NETS4047	Semester 2
COMP5048 **Information Visualisation**	6	**A** Discrete mathematics, algorithms and complexity. **N** COMP4048	Semester 2
COMP5318 **Knowledge Discovery and Data Mining**	6	**A** COMP5138 and familiarity with basic statistics	Semester 1
COMP5338 **Advanced Data Models**	6	**A** COMP5138 or equivalent	Semester 2
COMP5347 **e-Commerce Technology**	6	**A** COMP5028 Object Oriented Analysis and Design	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5348 **Enterprise Scale Software Architecture**	6	**A** INFO3220 or COMP5028 or equivalent.	Semester 1
COMP5415 **Multimedia Authoring and Production**	6		Semester 2
COMP5416 **Advanced Network Technologies**	6	**A** ELEC3506 or equivalent	Semester 2
COMP5424 **Information Technology in Biomedicine**	6	**A** Basic programming skills	Semester 1
COMP5425 **Multimedia Storage, Retrieval & Delivery**	6	**A** Algorithms (equivalent to COMP5211).	Semester 1
COMP5426 **Parallel and Distributed Computing**	6	**A** Equivalent of COMP5116	Semester 1
COMP5456 **Computational Methods for Life Sciences**	6	**N** COMP3456	Semester 2
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
COMP5705 **Information Technology Short Project**	6	**N** COMP5702, COMP5704 *Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Main Winter Main
COMP5706 **IT Industry Placement Project**	6	**N** COMP5702, COMP5703, COMP5704 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ELEC5303 **Computer Control System Design**	6	**A** This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. **N** ELEC4301 Computer Controlled System Design.	Semester 2
ELEC5402 **Digital Integrated Circuit Design**	6	**A** Electronic circuit design and physics of electronic devices. **N** ELEC4402 Integrated Circuit Design.	Semester 1
ELEC5507 **Error Control Coding**	6	**A** Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. **N** ELEC4503 Error Control Coding	Semester 1
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5510 **Satellite Communication Systems**	6	**A** Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. **N** ELEC5502 Satellite Communications Systems.	Semester 2
ELEC5511 **Optical Communication Systems**	6	**A** (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics).	Semester 1
ELEC5512 **Optical Networks**	6	**A** ELEC3503 Introduction to Digital Communications **N** ELEC5506 Optical Networks.	Semester 2
ELEC5613 **Image Processing and Computer Vision**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems.	Semester 1
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5615 **Advanced Computer Architecture**	6	**A** ELEC3305 Digital Signal Processing, ELEC3505 Communications, ELEC4503 Error Control Coding	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
ELEC5619 **Object Oriented Application Frameworks**	6	**A** Java programming, and some web development experience are essential. Databases strongly recommended	Semester 2
HIMT5057 **Introduction to Health Informatics** *This unit of study is not available in 2010*	6		Semester 1
HIMT5058 **Health Informatics Applications**	6		Semester 1
HIMT5060 **Integration for Health Informatics**	6		Semester 2
HIMT5069 **Health Care Systems**	6		Semester 1 Semester 2
INFO5010 **IT Advanced Topic A**	6	**P** Permission of Head of School **N** INFO4010 *Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Late

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO5011 **IT Advanced Topic B**	6	**P** Permission of Head of School **N** INFO4011 *Note: Department permission required for enrolment*	Semester 1 Semester 2
INFO5301 **Information Security Management**	6	**A** Basic IT knowledge of databases and networks.	Semester 1
INFO5990 **Professional Practice in IT**	6		Semester 1 Semester 2
INFO5991 **Services Science Management and Eng**	6	**A** INFO5990	Semester 1 Semester 2
INFO6007 **Project Management in IT**	6	**A** INFS6000 or COMP5206 or INFO5990 **N** INFS6014 IT Project Management, PMGT5871	Semester 1 Semester 2
INFS6012 **Business Process Integration**	6	**P** INFS5000 or INFS6000	Semester 1
INFS6017 **Strategic Information & Knowledge Mgmt**	6		Semester 2
PMGT6867 **Quantitative Methods: Project Management**	6		Semester 1 Semester 2

Research path units

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5702 **IT Research Project A**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
COMP5704 **IT Research Project B**	6	*Note: Department permission required for enrolment*	Semester 1 Semester 2
INFO5993 **IT Research Methods**	6	**A** Elementary statistics **N** INFO4990 *Note: Department permission required for enrolment*	Semester 1 Semester 2

Majors for the Master of Information Technology

Computer Networks major

To achieve a major in Computer Networks, a student must complete INFO5990 and 18 credit points of study units from this list.

Students in the Research Path must complete INFO5993 instead of INFO5990.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5047 **Pervasive Computing**	6	**A** Networking concepts, operating system concepts, programming expertise. **N** NETS4047	Semester 2
COMP5116 **Internet Protocols**	6	**N** ELEC5740	Semester 1 Semester 2
COMP5416 **Advanced Network Technologies**	6	**A** ELEC3506 or equivalent	Semester 2
COMP5426 **Parallel and Distributed Computing**	6	**A** Equivalent of COMP5116	Semester 1
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research path units of study COMP5702, COMP5704			
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1

Multimedia Technology major

To achieve a major in Multimedia Technology, a student must complete INFO5990 and 18 credit points of study units from this list.

Students in the Research Path must complete INFO5993 instead of INFO5990.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5114 **Digital Media Fundamentals**	6		Semester 1 Semester 2
COMP5415 **Multimedia Authoring and Production**	6		Semester 2
COMP5425 **Multimedia Storage, Retrieval & Delivery**	6	**A** Algorithms (equivalent to COMP5211).	Semester 1
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research Path units of study COMP5702, COMP5704			
ELEC5613 **Image Processing and Computer Vision**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems.	Semester 1

One core unit of study from the Computer Science major (6 credit points) may also be included in the Multimedia Technology major.

Database Management Systems major

To achieve a major in Database Management Systems, a student must complete INFO5990 and 18 credit points of study units from this list.

Students in the Research Path must complete INFO5993 instead of INFO5990.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5046 Statistical Natural Language Processing	6	**A** Concepts of Linguistics, elementary statistics, AI techniques. **N** COMP4046	Semester 1
COMP5138 Database Management Systems	6	**A** Intermediate level of object oriented programming such as Java.	Semester 1 Semester 2
COMP5318 Knowledge Discovery and Data Mining	6	**A** COMP5138 and familiarity with basic statistics	Semester 1
COMP5338 Advanced Data Models	6	**A** COMP5138 or equivalent	Semester 2
COMP5425 Multimedia Storage, Retrieval & Delivery	6	**A** Algorithms (equivalent to COMP5211).	Semester 1
COMP5703 Information Technology Project	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research Path units of study COMP5702, COMP5704			
Software Engineering major			
To achieve a major in Software Engineering, a student must complete INFO5990 and 18 credit points of study units from this list. Students may count either COMP5028 or COMP5214 or INFO5110 towards this major, but not more than one of these foundational units. Students in the Research Path must complete INFO5993 instead of INFO5990.			
COMP5028 Object-Oriented Design	6	**A** Intermediate level of object oriented programming such as Java **N** INFO3220	Semester 1
COMP5214 Software Development in Java	6		Semester 2
COMP5347 e-Commerce Technology	6	**A** COMP5028 Object Oriented Analysis and Design	Semester 1
COMP5348 Enterprise Scale Software Architecture	6	**A** INFO3220 or COMP5028 or equivalent.	Semester 1
COMP5703 Information Technology Project	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research path units of study COMP5702, COMP5704			
ELEC5616 Computer and Network Security	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
ELEC5619 Object Oriented Application Frameworks	6	**A** Java programming, and some web development experience are essential. Databases strongly recommended	Semester 2
INFO5001 System Analysis and Modelling	6	**A** Experience with a data model as in COMP5212 or COMP5214 or COMP5028 or COMP5138 **N** INFO2110, ELEC3610 and ELEC5743	Semester 2
One core unit of study from the Computer Science major (6 credit points) may also be included in the Software Engineering major.			
Computer Science major			
To achieve a major in Computer Science, a student must complete INFO5990 and 18 credit points of study units from this list. Students in the Research Path must complete INFO5993 instead of INFO5990.			
COMP5045 Computational Geometry	6	**A** Data structures, analysis of algorithms **N** COMP4045	Semester 1
COMP5046 Statistical Natural Language Processing	6	**A** Concepts of Linguistics, elementary statistics, AI techniques. **N** COMP4046	Semester 1
COMP5047 Pervasive Computing	6	**A** Networking concepts, operating system concepts, programming expertise. **N** NETS4047	Semester 2
COMP5048 Information Visualisation	6	**A** Discrete mathematics, algorithms and complexity. **N** COMP4048	Semester 2
COMP5211 Algorithms	6		Semester 1 Semester 2
COMP5456 Computational Methods for Life Sciences	6	**N** COMP3456	Semester 2
COMP5703 Information Technology Project	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research path units of study COMP5702, COMP5704			
Telecommunications Engineering major			
To achieve a major in Telecommunications Engineering, a student must complete INFO5990 and 18 credit points of study units from this list. A maximum of 18 credit points of ELEC units of study can be completed in this major. Students in the Research Path must complete INFO5993 instead of INFO5990.			
COMP5116 Internet Protocols	6	**N** ELEC5740	Semester 1 Semester 2
COMP5416 Advanced Network Technologies	6	**A** ELEC3506 or equivalent	Semester 2
COMP5703 Information Technology Project	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Research path units of study COMP5702, COMP5704			
ELEC5507 **Error Control Coding**	6	**A** Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. **N** ELEC4503 Error Control Coding	Semester 1
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5510 **Satellite Communication Systems**	6	**A** Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. **N** ELEC5502 Satellite Communications Systems.	Semester 2
ELEC5511 **Optical Communication Systems**	6	**A** (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics).	Semester 1
ELEC5512 **Optical Networks**	6	**A** ELEC3503 Introduction to Digital Communications **N** ELEC5506 Optical Networks.	Semester 2
Computer Engineering major			
To achieve a major in Computer Engineering, a student must complete INFO5990 and 18 credit points of study units from this list. A maximum of 18 credit points of ELEC units of study can be completed. Students in the Research Path must complete INFO5993 instead of INFO5990.			
COMP5116 **Internet Protocols**	6	**N** ELEC5740	Semester 1 Semester 2
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research Path units of study COMP5702, COMP5704			
ELEC5303 **Computer Control System Design**	6	**A** This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. **N** ELEC4301 Computer Controlled System Design.	Semester 2
ELEC5402 **Digital Integrated Circuit Design**	6	**A** Electronic circuit design and physics of electronic devices. **N** ELEC4402 Integrated Circuit Design.	Semester 1
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5615 **Advanced Computer Architecture**	6	**A** ELEC3305 Digital Signal Processing, ELEC3505 Communications, ELEC4503 Error Control Coding	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1
Business Information Systems major			
To achieve a major in Business Information Systems a student must complete INFO5990 18 credit points of study units from this list, including COMP5206. Students in the Research Path must complete INFO5993 instead of INFO5990.			
COMP5206 **Introduction to Information Systems**	6	**N** INFO5210	Semester 1 Semester 2
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research path units of study COMP5702, COMP5704			
INFO5301 **Information Security Management**	6	**A** Basic IT knowledge of databases and networks.	Semester 1
INFO5991 **Services Science Management and Eng**	6	**A** INFO5990	Semester 1 Semester 2
INFS6012 **Business Process Integration**	6	**P** INFS5000 or INFS6000	Semester 1
INFS6017 **Strategic Information & Knowledge Mgmt**	6		Semester 2
Project Management major			
To achieve a major in Project Management, a student must complete INFO5990 and 18 credit points of study units from this list, including INFO6007. Students in the Research Path must complete INFO5993 instead of INFO5990.			
COMP5348 **Enterprise Scale Software Architecture**	6	**A** INFO3220 or COMP5028 or equivalent.	Semester 1
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research path units of study COMP5702, COMP5704			
INFO5001 **System Analysis and Modelling**	6	**A** Experience with a data model as in COMP5212 or COMP5214 or COMP5028 or COMP5138 **N** INFO2110, ELEC3610 and ELEC5743	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO5991 **Services Science Management and Eng**	6	**A** INFO5990	Semester 1 Semester 2
INFO6007 **Project Management in IT**	6	**A** INFS6000 or COMP5206 or INFO5990 **N** INFS6014 IT Project Management, PMGT5871	Semester 1 Semester 2
PMGT6867 **Quantitative Methods: Project Management**	6		Semester 1 Semester 2

Health Informatics major

To achieve a major in Health Informatics, a student must complete INFO5990 and 18 credit points of study units from this list, including HIMT5057 or COMP5424. A maximum of 12 credit points of HMIT-coded units of study can be completed in this major.

Students in the Research Path must complete INFO5993 instead of INFO5990.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5046 **Statistical Natural Language Processing**	6	**A** Concepts of Linguistics, elementary statistics, AI techniques. **N** COMP4046	Semester 1
COMP5206 **Introduction to Information Systems**	6	**N** INFO5210	Semester 1 Semester 2
COMP5424 **Information Technology in Biomedicine**	6	**A** Basic programming skills	Semester 1
COMP5456 **Computational Methods for Life Sciences**	6	**N** COMP3456	Semester 2
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
Research path units of study COMP 5702, COMP5704			
HIMT5057 **Introduction to Health Informatics** *This unit of study is not available in 2010*	6		Semester 1
HIMT5058 **Health Informatics Applications**	6		Semester 1
HIMT5060 **Integration for Health Informatics**	6		Semester 2
HIMT5069 **Health Care Systems**	6		Semester 1 Semester 2
INFO6007 **Project Management in IT**	6	**A** INFS6000 or COMP5206 or INFO5990 **N** INFS6014 IT Project Management, PMGT5871	Semester 1 Semester 2

Master of Information Technology Management

Core and elective units of study for the Master of Information Technology Management, Diploma in Information Technology Management and the Graduate Certificate in Information Technology Management are shown in the following Tables.

Candidates for the degree of Master of Information Technology Management are required to complete 48 credit points from the units of study set out below.

Enrolment is subject to the following constraints:

1. A total of 48 credit points must be completed;
2. At least 30 credit points must come from core units of study;
3. INFO5990 Professional Practice in IT must be completed as a core unit of study;
4. INFO5991 Services Science Managment and Eng must be completed as a core unit of study;
5. INFO5992 Understanding IT Innovations must be completed as a core unit of study;
6. A maximum of 18 credit points of elective units of study can be taken, of which no more than 12 credit points can be chosen from units offered outside the Faculty of Engineering and IT.
7. After completing 24 credit points of coursework, students who achieve Credit average results or above in their coursework may select 12 credit points of Information Technology Project units of study among their core units;
8. After completing 24 credit points of coursework, students who have Distinction average results or above may be eligible for the Research Path subject to the approval of the Head of the School of Information Technologies and the Dean. Students in the Research Path are not required to take INFO5991 or INFO5992.

Core units (mandatory)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
INFO5990 **Professional Practice in IT**	6		Semester 1 Semester 2
INFO5991 **Services Science Management and Eng**	6	**A** INFO5990	Semester 1 Semester 2
INFO5992 **Understanding IT Innovations**	6	**A** INFO5990 **N** PMGT5875	Semester 1 Semester 2

Core units (additional)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5206 **Introduction to Information Systems**	6	**N** INFO5210	Semester 1 Semester 2
COMP5703 **Information Technology Project**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
INFO5301 **Information Security Management**	6	**A** Basic IT knowledge of databases and networks.	Semester 1
INFO6007 **Project Management in IT**	6	**A** INFS6000 or COMP5206 or INFO5990 **N** INFS6014 IT Project Management, PMGT5871	Semester 1 Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ISYS5050 **Knowledge Management Systems**	6	**A** Information systems concepts, database concepts **N** ISYS4050 *Note: Department permission required for enrolment*	Semester 1
Core units (research path)			
COMP5702 **IT Research Project A**	12	*Note: Department permission required for enrolment*	Semester 1 Semester 2
COMP5704 **IT Research Project B**	6	*Note: Department permission required for enrolment*	Semester 1 Semester 2
INFO5993 **IT Research Methods**	6	**A** Elementary statistics **N** INFO4990 *Note: Department permission required for enrolment*	Semester 1 Semester 2
Elective units			
COMP5028 **Object-Oriented Design**	6	**A** Intermediate level of object oriented programming such as Java **N** INFO3220	Semester 1
COMP5114 **Digital Media Fundamentals**	6		Semester 1 Semester 2
COMP5116 **Internet Protocols**	6	**N** ELEC5740	Semester 1 Semester 2
COMP5138 **Database Management Systems**	6	**A** Intermediate level of object oriented programming such as Java.	Semester 1 Semester 2
COMP5213 **Computer and Network Organisation**	6		Semester 1 Semester 2
COMP5705 **Information Technology Short Project**	6	**N** COMP5702, COMP5704 *Note: Department permission required for enrolment*	Semester 1 Semester 2 Summer Main Winter Main
COMP5706 **IT Industry Placement Project**	6	**N** COMP5702, COMP5703, COMP5704 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ECON6004 **Economics of E-Commerce** *This unit of study is not available in 2010*	6	**P** ECON5001 *Students enrolled in award courses other than the Master of Economics must have passed ECON5001 & ECON5002 prior to commencing this unit.*	Semester 1
INFS6012 **Business Process Integration**	6	**P** INFS5000 or INFS6000	Semester 1
INFS6013 **Information Risk, Governance & Assurance**	6	**P** INFS5000 or INFS6000	Semester 1
INFS6016 **Technology Enabled Business Innovation**	6		Semester 2
INFS6017 **Strategic Information & Knowledge Mgmt**	6		Semester 2
INFS6018 **Managing Business Intelligence**	6	**A** INFS6017 **P** INFS5000 or INFS6000	Semester 1
PMGT5871 **Project Process Planning and Control**	6		Semester 1 Semester 2 Summer Early Winter Main
PMGT5876 **Strategic Delivery of Change**	6		Semester 1 Semester 2
PMGT6867 **Quantitative Methods: Project Management**	6		Semester 1 Semester 2

Graduate Diploma in Computing

Candidates for the degree of Graduate Diploma in Computing are required to complete 48 credit points of the units of study set out below.

Enrolment is subject to the following constraints:

1. 18 credit points must be completed before COMP5114 Digital Media Fundamentals can be taken;
2. 18 credit points must be completed before COMP5028 Object Oriented Design can be taken;
3. 18 credit points must be completed before COMP5116 Internet Protocols can be taken;

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
COMP5028 **Object-Oriented Design**	6	**A** Intermediate level of object oriented programming such as Java **N** INFO3220	Semester 1
COMP5114 **Digital Media Fundamentals**	6		Semester 1 Semester 2
COMP5116 **Internet Protocols**	6	**N** ELEC5740	Semester 1 Semester 2
COMP5206 **Introduction to Information Systems**	6	**N** INFO5210	Semester 1 Semester 2
COMP5211 **Algorithms**	6		Semester 1 Semester 2
COMP5212 **Software Construction**	6		Semester 1
COMP5213 **Computer and Network Organisation**	6		Semester 1 Semester 2

Unit of study	***Credit points***	***A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition***	***Session***
COMP5214 **Software Development in Java**	6		Semester 2

6f. Graduate programs in Project Management

The School of Civil Engineering offers the following graduate programs in Project Management.

Master of Project Management
Graduate Diploma in Project Management
Graduate Certificate in Project Management

These programs are available on-campus (check session details) and online (internet-based) delivery

The requirements of each program are shown in the following tables.

Unit of study	***Credit points***	***A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition***	***Session***
Master of Project Management			
Candidates for the degree of Master of Project Management shall complete units of study totalling 48cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 12cpts of Electives and 12cpts of Pathway units. Candidates for the Graduate Diploma in Project Management shall complete units of study totalling 36cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 6cpts of Electives and 6cpts of Professional Practice units. Candidates for the Graduate Certificate in Project Management shall complete units of study totalling 24cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 6cpts Specialisation, 6cpts of Electives or 6cpts of Professional Practice units. For students admitted to the Graduate Diploma, after completing the requirements above, may proceed to the Master of Project Management by achieving Credit average results or above. Students admitted to the Master of Project Management may take the professional practice pathway or the research practice pathway. It is mandatory for all Master's students to complete PMGT5872. The Master of Project Management can be taken as a generic degree or with specialisations in Project Economics and Scheduling Management, International Project Management, Project Risk Management, or Strategic Project Management Implementation.			
Foundation units for Master, Graduate Diploma and Graduate Certficate in Project Management			
Candidates for Grad Cert, Grad Dip and Master of Project Management must complete at least 12 credit points from the foundation units of study listed.			
PMGT5886 **System Dynamics Modelling for PM**	6		Semester 1 Semester 2
PMGT5887 **Computer Applications in PM**	6		Semester 1 Semester 2
PMGT5877 **Management of Project Organisations**	6		Semester 1 Semester 2
PMGT5871 **Project Process Planning and Control**	6		Semester 1 Semester 2 Summer Early Winter Main
Specialisations for the Master of Project Management			
Candidates wishing to have a specialisation within the Master of Project Management will take 12 credit points of units of study from one of the tables listed below. Candidates must complete one of the core units.			
Project Economics and Scheduling Management			
Candidates wishing to specialise in Project Economics and Scheduling Management must complete a minimum of 12 credit points from the Table below, including a core unit.			
PMGT5873 **Project Economics and Finance** Core unit of study for this specialisation	6		Semester 1 Semester 2
PMGT5889 **Integrated Cost and Scheduling Control** Core unit of study for this specialisation	6		Semester 1 Semester 2
PMGT6867 **Quantitative Methods: Project Management**	6		Semester 1 Semester 2
PMGT5893 **Statistical Methods in PM**	6		Semester 2
International Project Management			
Candidates wishing to specialise in International Project Management need to complete a minimum of 12 credit points from the Table below, including the core unit.			
PMGT5888 **Global Project Management** Core unit of study for this specialisation	6		Semester 1 Semester 2 Summer Late

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ENGG5215 **International Eng Strategy & Operations**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
PMGT6867 **Quantitative Methods: Project Management**	6		Semester 1 Semester 2
PMGT5893 **Statistical Methods in PM**	6		Semester 2
Project Risk Management			
Candidates wishing to specialise in Project Risk Management must complete a minimum of 12 credit points from the Table below, including the core unit.			
PMGT5891 **Project Risk Management** Core unit of study for this specialisation	6		Semester 1 Semester 2
ENGG5203 **Quality Engineering and Management**	6		Semester 1 Semester 2
PMGT5893 **Statistical Methods in PM**	6		Semester 2
PMGT6867 **Quantitative Methods: Project Management**	6		Semester 1 Semester 2
Strategic Project Management Implementation			
Candidates wishing to specialise in Strategic Project Management Implementation must complete a minimum of 12 credit points from the Table below, including the core unit.			
PMGT5876 **Strategic Delivery of Change** Core unit of study for this specialisation	6		Semester 1 Semester 2
PMGT6867 **Quantitative Methods: Project Management**	6		Semester 1 Semester 2
PMGT5879 **Strategic Portfolio & Program Management**	6		Semester 1 Semester 2
PMGT5875 **Project Innovation Management**	6		Semester 1 Semester 2 Summer Early
Professional Practice Pathway			
Candidates must complete 12 credit points from the units of study in the following Table. PMGT5872 is mandatory for Masters students.			
ENGG5205 **Professional Practice in PM**	6	**A** Basic engineering or science knowledge. At least 2-3 years of work experience preferred.	Semester 1 Semester 2
PMGT5872 **People and Leadership**	6		Semester 1 Semester 2
PMGT6869 **Advanced Knowledge in Project Management**	6	**P** PMGT6867	Semester 1 Semester 2
PMGT5876 **Strategic Delivery of Change**	6		Semester 1 Semester 2
PMGT5879 **Strategic Portfolio & Program Management**	6		Semester 1 Semester 2
Research Practice Pathway			
PMGT5892 **Project Management Industrial Project**	12	*Note: Department permission required for enrolment* *Students must have a credit average for admission into this unit.*	Semester 1 Semester 2

6g. Master of Professional Engineering

The Faculty of Engineering and Information Technologies offers the following specialist programs as part of this degee as outlined in the tables below.

Unit of study	***Credit points***	***A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition***	***Session***
Aerospace Engineering			
Candidates for the degree Master of Professional Engineering in Aerospace Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be elligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Aerospace Core Units of Study			
First Year			
AERO5210 **Foundations of Aerodynamics**	6	**A** Mathematics and Physics to the level of Bachelor of Science or equivalent. Linear Mathematics and Vector Calculus, Partial Differential Equations (Intro).	Semester 2
AERO5211 **Foundations of Propulsion Systems**	6	**A** Mathematics and Physics to a level of Bachelor of Science or equivalent.	Semester 2
AERO5310 **Foundations of Aerospace Structures**	6	**A** Mathematics and Physics to a level of Bachelor of Science or equivalent. Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series. **P** AMME5301	Semester 1
AERO5410 **Foundations of Aerospace Design**	6	**A** Mathematics, Physics and Solid Mechanics assumed knowledge at the level of Bachelor of Science or equivalent.	Semester 1
AERO5510 **Foundations of Flight Mechanics**	6	**A** Mathematics, Physics and Dynamics assumed knowledge at the level of Bachelor of Science or equivalent. **P** AMME5500 **C** AMME5501	Semester 2
AERO5660 **Safety Systems Management**	6		Semester 1
AMME5501 **Foundations: System Dynamics and Control**	6	**A** AMME5500	Semester 1
Second Year			
AERO5301 **Applied Finite Element Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 1
AERO5400 **Advanced Aircraft Design Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 2
AMME5601 **Professional Engineering**	6	**A** Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management	Semester 1
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students who have achieved a WAM of 75% or higher in their first 48 credits of study are elligible for the Research Pathway and can replace ENGG5220, ENGG5221 with ENGG5222,ENGG5223, Engineering Dissertation A & B			
Aerospace Elective Units of Study			
Candidates must complete 24 credit points from the following aerospace elective units.			
AERO5200 **Advanced Aerodynamics**	6	**A** BE in the area of Aerospace Engineering or related Engineering field.	Semester 1
AERO5500 **Flight Mechanics Test and Evaluation Adv**	6	**A** BE in area of Aerospace Engineering or related Engineering Field.	Semester 2
AERO5760 **Spacecraft and Satellite Design**	6		Semester 2
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
MECH5304 **Materials Failure**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent *An elective unit of study for the degree of Master of Engineering*	Semester 1a
MECH5305 **Smart Materials**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent	Semester 1
MECH5310 **Advanced Engineering Materials**	6	**N** MECH4310 Advanced Materials	Semester 2
MECH5275 **Advanced Renewable Energy**	6	**A** The students will require an understanding of the basic principles of fluid mechanics, thermodynamics and heat transfer, and the application of these principles to energy conversion systems. In particular, students should be able to analyse fluid flow in turbomachinery; perform first and second law thermodynamic analysis of energy conversion systems; and perform calculations of radiative, conductive and convective heat transfer.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Biomedical Engineering			
Candidates for the degree Master of Professional Engineering in Biomedical Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Biomedical Core Units of Study			
First Year			
AMME5501 **Foundations: System Dynamics and Control**	6	**A** AMME5500	Semester 1
AMME5921 **Biomedical Engineering Tech 2**	6	**A** A bachelors degree, ideally in the engineering or science field, is advisory, but not essential.	Semester 2
AMME5971 **Applied Tissue Engineering**	6	**A** Biology, chemistry at a junior level and intermediate physiology or equivalent	Semester 2
ENGG5214 **Management of Technology**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
MECH5261 **Foundations of Fluid Mechanics**	6	**A** Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series; AMME5200	Semester 1
MECH5361 **Foundations of Mechanics of Solids 2**	6	**A** Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series **P** AMME5301 **N** MECH3361	Semester 1
MECH5362 **Foundations of Materials 2**	6	**A** Mechanics of solids: statics, stress, strain **P** AMME5302 **N** MECH3362	Semester 2
MECH5660 **Foundations of Manufacturing Engineering**	6	**A** AMME5200, AMME5301, AMME5302	Semester 1
Second Year			
AMME5981 **Computational Biomedical Engineering**	6	**A** Fundamental Materials, Mechanics of Solids, Engineering Dynamics, Biomedical Design and Technology.	Semester 1
AMME5990 **Biomedical Engineering Tech 1**	6	**A** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.	Semester 1
AMME5961 **Biomaterials Engineering**	6	**A** Chemistry, biology, materials engineering, and engineering design at least at the Junior level.	Semester 2
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A and B and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.			
Biomedical Elective Units of Study			
Candidates must complete 12 credit points from the following biomedical elective units.			
AERO5010 **Optimisation Methods in Engineering**	6	**A** BE in the area of Aerospace or related Engineering field.	Semester 2
AERO5301 **Applied Finite Element Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 1
AERO5660 **Safety Systems Management**	6		Semester 1
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
AMME5271 **Computational Nanotechnology**	6	**A** Students are required to have an understanding of basic principles of Newtonian mechanics, physics and chemistry, fluid mechanics and solid mechanics. General knowledge of how to operate a computer and work with different software is also required.	Semester 2
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
MECH5304 **Materials Failure**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent *An elective unit of study for the degree of Master of Engineering*	Semester 1a
MECH5701 **Computers in Real Time Control and Inst**	6	**N** MECH4730 Computers in Real-Time Control and Inst MECH4710 Microprocessors in Engineered Products	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
MECH5720 **Sensors and Signals**	6	**A** Strong MATLAB skills **N** MECH4720 Sensors and Signals	Semester 1
MECH5275 **Advanced Renewable Energy**	6	**A** The students will require an understanding of the basic principles of fluid mechanics, thermodynamics and heat transfer, and the application of these principles to energy conversion systems. In particular, students should be able to analyse fluid flow in turbomachinery; perform first and second law thermodynamic analysis of energy conversion systems; and perform calculations of radiative, conductive and convective heat transfer.	Semester 2
MECH5255 **Air Conditioning and Refrigeration (Adv)**	6	**A** Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. **P** MECH3260 or equivalent **N** MECH4255 Air Conditioning and Refrigeration	Semester 2
MECH5310 **Advanced Engineering Materials**	6	**N** MECH4310 Advanced Materials	Semester 2
MECH5410 **Advanced Design and Analysis 1**	3	**A** ENGG1802 - Eng Mechanics, balance of forces and moments AMME2301 - Mechanics of Solids, 2 and 3 dimensional stress and strain AMME2500 - Engineering Dynamics - dynamic forces and moments. MECH2400 - Mechanical Design 1, approach to design problems and report writing, and preparation of engineering drawing MECH3460 - Mechanical design 2, means of applying fatigue analysis to a wide range of machine components *Note: Department permission required for enrolment*	Semester 1
MTRX5700 **Experimental Robotics**	6	**P** AMME3500 or (MECH3500 and MECH3800); MTRX3700 or MECH3700	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Chemical and Biomolecular Engineering			
Candidates for the degree Master of Professional Engineering in Chemical and Biomolecular Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Chemical and Biomolecular Core Units of Study			
First Year			
CHNG5801 **Foundations of Process Design**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **P** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability	Semester 1
CHNG5802 **Found: Operation & Improving Ind Systems**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **P** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **N** CHNG3802	Semester 1
CHNG5803 **Found of Chem & Biological Processes**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative and quantitative information **P** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **N** CHNG3803	Semester 1
CHNG5804 **Found of Biochemical Eng**	6	**A** First year mathematics (MATH1001 Differential Calculus; MATH1002 Linear Algebra; MATH1003 Integral Calculus; MATH1005 Statistics; or equivalents). -First year chemistry (CHEM1101 Chemistry 1A; CHEM1102 Chemistry 1B; or equivalents) **N** CHNG3804	Semester 2
CHNG5805 **Foundation of Prod Formulation & Design**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **P** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability	Semester 2
CHNG5806 **Found of Manag of Industrial Syst**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **P** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **N** CHNG3806	Semester 2
A waiver of 24 credit points may be given for candidates with Chemical Engineering qualifications who have completed these units in an undergraduate degree. They may replace these with extra electives or Research Dissertation.			
Second Year			
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
CHNG5112 **Found of Chemical Eng Design A**	6	**A** Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed. **P** CHNG5801 Foundation of Process Design CHNG5802 Foundations of Operating and Improving Industrial Systems CHNG5805 Foundations of Product Formulation and Design CHNG5806 Foundations of Management of Industrial Systems	Semester 1
CHNG5116 **Found of Chemical Eng Design B**	6	**A** Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed. **P** CHNG5112 Chemical Engineering Design A	Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Candidates entering the MPE with a Chemical Engineering undergraduate qualification who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220 & ENGG5221 and 12 credit points of electives with ENGG5222 and ENGG5223 Dissertation A and B or ENGG5218 Dissertation.			
Chemical and Biomolecular Elective Units of Study			
Candidates must complete a minimum of 6 credit points from the following list of Management elective units of study.			
ENGG5201 **Data Quality in Engineering Computing**	6		Semester 2
ENGG5203 **Quality Engineering and Management**	6		Semester 1 Semester 2
ENGG5205 **Professional Practice in PM**	6	**A** Basic engineering or science knowledge. At least 2-3 years of work experience preferred.	Semester 1 Semester 2
Candidates must complete a minimum of 24 credit points from the following list of specialist elective units of study or other electives recommended by the School of Chemical and Biomolecular Engineering.			
CHNG5004 **Particles and Surfaces**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year and all unit operations have been successfully completed.	Semester 1
CHNG5601 **Membrane Science**	6		Semester 1
CHNG5602 **Cellular Biophysics**	6		Semester 1
CHNG5603 **Analysis, Modelling, Control: BioPhy Sys**	6	**A** It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus MATH 1003 Integral Calculus and Modeling	Semester 1
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
CHNG5003 **Green Engineering**	6	**A** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed.	Semester 2
CHNG5005 **Wastewater Eng - Systems and Practice**	6	**A** Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.	Semester 2
CHNG5605 **Bio-Products: Laboratory to Marketplace**	6		Semester 2
CHNG5001 **Process Systems Engineering**	6	**A** Enrolment in this unit of study assumes that the equivalent to all (six) core chemical engineering UoS in third year have been successfully completed. **P** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains *This UoS is an advanced elective in chemical engineering. The concepts and enabling technologies taught in this course are relevant to the real world practice of chemical engineering across a range of industries.*	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Civil Engineering			
Candidates for the degree Master of Professional Engineering in Civil Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Civil Core Units of Study			
First Year			
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL5507 **Foundations of Concrete Structures 1**	6	**A** CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatability of strains, and elastic beam theory. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background*	Semester 1
CIVL5508 **Foundations of Steel Structures 1**	6	**A** There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2230 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3235 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation of stress and strain, and being able to determine stresses and strains in simple sections under axial force, bending moments, shear and torsion; calculating and understanding the physical significance of geometric section properties : centroid, Ix, Iy, Zx, Zy, Sx, Sy, rx, ry, J, Ag; knowledge of the basic elastic-plastic material properties of steel, E, G, fy, fu; and knowledge of loading of structures. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
CIVL5505 **Foundations- Fluid Mech. & Inviscid Flow**	6	**A** Students are expected to have a strong understanding of fundamental physics, statics, equilibrium, forces, and dimensional analysis. Familiarity with simple calculus, partial differential equations, and the analytical and numerical solutions. **P** Bachelors Degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study for 2010. The unit will be replaced in 2011 with Civil 5511 Foundation of Environmental and Fluids Engineering.			
CIVL5509 **Foundations of Struct Concepts & Design**	6	**A** CIVL5501, CIVL5502, ENGG1802. Structural mechanics, first year mathematics. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study for 2010. The unit will be replaced in 2011 with Civil 5512 Foundation of Enginering Design and Construction.			
Second Year			
CIVL5510 **Foundations of Civil Engineering Design**	6	**A** CIVL3205 and CIVL3206 **P** Bachelor degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students entering the MPE with an engineering undergraduate degree who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A and B and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.			
Civil Elective Units of Study			
Candidates must complete 18 credit points from the following elective units of study.			
CIVL5266 **Steel Structures - Stability**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5269 **Concrete Structures - Strength & Service**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5458 **Numerical Methods in Civil Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5351 **Environmental Geotechnics**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5452 **Foundation Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
Civil Advanced Elective Units of Study			
Candidates must complete 24 credit points from the following advanced elective units of study.			

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
CIVL5267 **Steel Structures - Advanced Design**	6	**P** BE or equivalent.	Semester 1
CIVL5268 **Structural Dynamics**	6	**P** BE or equivalent.	Semester 2
CIVL5257 **Concrete Structures: Prestressed**	6	**P** BE or equivalent.	Semester 1
CIVL5264 **Composite Steel-Concrete Structures**	6	**P** BE or equivalent	Semester 2
CIVL5450 **Analysis and Design of Pile Foundations**	6	**A** BE or equivalent.	Semester 1
CIVL5455 **Engineering Behaviour of Soils**	6	**P** BE or equivalent.	Semester 2
CIVL5451 **Computer Methods in Geotechnical Eng**	6	**P** BE or equivalent.	Semester 1
CIVL5454 **Rock Engineering**	6	**A** Undergraduate geology and soil mechanics. **P** BE or equivalent.	Semester 2
CIVL5668 **Wind Engineering for Design-Fundamentals**	6	**P** BE or equivalent.	Semester 1
CIVL5666 **Open Channel Flow & Hydraulic Structures**	6	**P** BE or equivalent.	Semester 2
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
CIVL5669 **Applied Fluid Engineering Computing**	6	**P** BE or eqquivalent.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Electrical Engineering			
Candidates for the degree of Master of Professional Engineering in Electrical Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Electrical Core Units of Study			
First Year			
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
At least 4 of the following 8 units of study:			
ELEC5730 **Foundations of Eng Electromagnetics**	6	**A** Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields. **N** ELEC3102 Engineering Electromagnetics, ELEC3104 Engineering Electromagnetics. *This Unit of Study is only available to Master of Professional Engineering students with a Non-Electrical Engineering degree.*	Semester 1
ELEC5732 **Foundations of Electricity Networks**	6	**A** This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics **N** ELEC3201 Electrical Energy Systems, ELEC3203 Power Transmission Systems. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
ELEC5734 **Foundations Elec Energy & Conversion Sys**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5735 **Foundations of Control**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. ELEC2302 and MATH2061 or equivalent. **N** ELEC3302 Fundamentals of Feedback Control, ELEC3304 Control, Control, AMME3500 System Dynamics and Control. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
ELEC5736 **Foundations of Digital Signal Processing**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals **N** ELEC3303 Digital Signal Processing, ELEC3305 Digital Signal Processing. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5737 **Foundations of Electronic Circuit Design**	6	**A** A background in basic electronics and circuit theory is assumed. **N** ELEC3401 Electronic Devices and Circuits, ELEC3404 Electronic Circuit Design *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5739 **Foundations of Communications**	6	**A** Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. **N** ELEC3503 Introduction to Digital Communications *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5741 **Foundations of Embedded Computing**	6	**A** Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks. **N** ELEC2601 Microcomputer Systems *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
Second Year			
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A & B and the 12 credit points selection from the list of ENGG5214, ENGG5215 and ENGG5216 with ENGG5222 and ENGG5223 Dissertation A & B or ENGG5218 Dissertation.			

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
At least 2 of the following 3 units of study:			
ENGG5214 **Management of Technology**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ENGG5215 **International Eng Strategy & Operations**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
ENGG5216 **Management of Engineering Innovation**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
Electrical Recommended Elective Units. Candidates must complete 36 credit points from the following table of elective units of study.			
ELEC5101 **Antennas and Propagation**	6	**N** ELEC5522 Antennas and Propagation.	Semester 2
ELEC5203 **Topics in Power Engineering**	6	**A** (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives or ELEC3204 Power Electronics and Drives).	Semester 1
ELEC5204 **Power Systems Analysis and Protection**	6	**A** The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment. **N** ELEC4201 Electrical Power Systems.	Semester 1
ELEC5205 **High Voltage Engineering**	6	**A** The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals. **P** ELEC3105 or equivalent *Recommended: ELEC5204 Power Systems*	Semester 2
ELEC5206 **Sustainable Energy Systems**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory.	Semester 2
ELEC5303 **Computer Control System Design**	6	**A** This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. **N** ELEC4301 Computer Controlled System Design.	Semester 2
ELEC5402 **Digital Integrated Circuit Design**	6	**A** Electronic circuit design and physics of electronic devices. **N** ELEC4402 Integrated Circuit Design.	Semester 1
ELEC5403 **Radio Frequency Engineering**	6	**A** Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design , ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design. **N** ELEC5521 Radio Frequency Engineering.	Semester 1
ELEC5507 **Error Control Coding**	6	**A** Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. **N** ELEC4503 Error Control Coding	Semester 1
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5510 **Satellite Communication Systems**	6	**A** Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. **N** ELEC5502 Satellite Communications Systems.	Semester 2
ELEC5511 **Optical Communication Systems**	6	**A** (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics).	Semester 1
ELEC5512 **Optical Networks**	6	**A** ELEC3503 Introduction to Digital Communications **N** ELEC5506 Optical Networks.	Semester 2
ELEC5514 **Networked Embedded Systems**	6	**A** ELEC3607, ELEC3305, ELEC3506 and ELEC5508	Semester 2
ELEC5515 **Gigabits Wireless Systems**	6	**A** This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.	Semester 2
ELEC5613 **Image Processing and Computer Vision**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems.	Semester 1
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5615 **Advanced Computer Architecture**	6	**A** ELEC3305 Digital Signal Processing, ELEC3505 Communications, ELEC4503 Error Control Coding	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
Environmental Fluids Engineering			
Candidates for the degree Master of Professional Engineering in Environmental Fluids Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Environmental Fluids Core Units of Study			
First Year			
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL5507 **Foundations of Concrete Structures 1**	6	**A** CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatability of strains, and elastic beam theory. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background*	Semester 1
CIVL5508 **Foundations of Steel Structures 1**	6	**A** There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2230 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3235 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation of stress and strain, and being able to determine stresses and strains in simple sections under axial force, bending moments, shear and torsion; calculating and understanding the physical significance of geometric section properties : centroid, Ix, Iy, Zx, Zy, Sx, Sy, rx, ry, J, Ag; knowledge of the basic elastic-plastic material properties of steel, E, G, fy, fu; and knowledge of loading of structures. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
CIVL5505 **Foundations- Fluid Mech. & Inviscid Flow**	6	**A** Students are expected to have a strong understanding of fundamental physics, statics, equilibrium, forces, and dimensional analysis. Familiarity with simple calculus, partial differential equations, and the analytical and numerical solutions. **P** Bachelors Degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study for 2010. This unit will be replaced by CIVL5511 Foundation of Environmental and Fluids Engineering.			
CIVL5509 **Foundations of Struct Concepts & Design**	6	**A** CIVL5501, CIVL5502, ENGG1802. Structural mechanics, first year mathematics. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study for 2010. This unit will be replaced by CIVL5512 Foundation of of Engineering Design and Construction.			
Second Year			
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
CIVL5510 **Foundations of Civil Engineering Design**	6	**A** CIVL3205 and CIVL3206 **P** Bachelor degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students entering the MPE with an engineering undergraduate degree who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A and B and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.			
Environmental Fluids Elective Units of Study			
Candidates must complete 12 credit points from the following specialist elective units of study.			
CIVL5351 **Environmental Geotechnics**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
Environmental Fluids Advanced Elective Units of Study			
Candidates must complete 24 credit points from the following advanced elective units of study.			
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
CIVL5666 **Open Channel Flow & Hydraulic Structures**	6	**P** BE or equivalent.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
CIVL5668 **Wind Engineering for Design-Fundamentals**	6	**P** BE or equivalent.	Semester 1
CIVL5669 **Applied Fluid Engineering Computing**	6	**P** BE or eqquivalent.	Semester 2
Candidates must complete 6 credit points from the following civil elective units of study.			
CIVL5257 **Concrete Structures: Prestressed**	6	**P** BE or equivalent.	Semester 1
CIVL5264 **Composite Steel-Concrete Structures**	6	**P** BE or equivalent	Semester 2
CIVL5267 **Steel Structures - Advanced Design**	6	**P** BE or equivalent.	Semester 1
CIVL5268 **Structural Dynamics**	6	**P** BE or equivalent.	Semester 2
CIVL5450 **Analysis and Design of Pile Foundations**	6	**A** BE or equivalent.	Semester 1
CIVL5451 **Computer Methods in Geotechnical Eng**	6	**P** BE or equivalent.	Semester 1
CIVL5454 **Rock Engineering**	6	**A** Undergraduate geology and soil mechanics. **P** BE or equivalent.	Semester 2
CIVL5455 **Engineering Behaviour of Soils**	6	**P** BE or equivalent.	Semester 2
ENGG5601 **Greenhouse Gas Mitigation**	6	*Unit Administration: WebCT*	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Geotechnical Engineering			
Candidates for the degree Master of Professional Engineering in Geotechnical Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Geotechnical Core Units of Study			
First Year			
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL5507 **Foundations of Concrete Structures 1**	6	**A** CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatability of strains, and elastic beam theory. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background*	Semester 1
CIVL5508 **Foundations of Steel Structures 1**	6	**A** There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2230 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3235 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation of stress and strain, and being able to determine stresses and strains in simple sections under axial force, bending moments, shear and torsion; calculating and understanding the physical significance of geometric section properties : centroid, Ix, Iy, Zx, Zy, Sx, Sy, rx, ry, J, Ag; knowledge of the basic elastic-plastic material properties of steel, E, G, fy, fu; and knowledge of loading of structures. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
CIVL5505 **Foundations- Fluid Mech. & Inviscid Flow**	6	**A** Students are expected to have a strong understanding of fundamental physics, statics, equilibrium, forces, and dimensional analysis. Familiarity with simple calculus, partial differential equations, and the analytical and numerical solutions. **P** Bachelors Degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study for 2010. This unit will be replaced by CIVL5511 Foundation of Environmental and Fluids Engineering.			
CIVL5509 **Foundations of Struct Concepts & Design**	6	**A** CIVL5501, CIVL5502, ENGG1802. Structural mechanics, first year mathematics. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study for 2010. This unit will be replaced by CIVL5512 Foundation of of Engineering Design and Construction.			
Second Year			
CIVL5510 **Foundations of Civil Engineering Design**	6	**A** CIVL3205 and CIVL3206 **P** Bachelor degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students entering the MPE with an engineering undergraduate degree who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A and B and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.			
Geotechnical Elective Units of Study			
Candidates must complete 12 credit points from the following specialist elective units of study.			
CIVL5351 **Environmental Geotechnics**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5452 **Foundation Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5458 **Numerical Methods in Civil Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
Geotechnical Advanced Elective Units of Study			
Candidates must complete 24 credit points from the following geotechnical advanced elective units of study.			
CIVL5450 **Analysis and Design of Pile Foundations**	6	**A** BE or equivalent.	Semester 1
CIVL5451 **Computer Methods in Geotechnical Eng**	6	**P** BE or equivalent.	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
CIVL5454 **Rock Engineering**	6	**A** Undergraduate geology and soil mechanics. **P** BE or equivalent.	Semester 2
CIVL5455 **Engineering Behaviour of Soils**	6	**P** BE or equivalent.	Semester 2
Candidates must complete 6 credit points from the following Civil elective units of study.			
CIVL5257 **Concrete Structures: Prestressed**	6	**P** BE or equivalent.	Semester 1
CIVL5264 **Composite Steel-Concrete Structures**	6	**P** BE or equivalent	Semester 2
CIVL5267 **Steel Structures - Advanced Design**	6	**P** BE or equivalent.	Semester 1
CIVL5268 **Structural Dynamics**	6	**P** BE or equivalent.	Semester 2
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
CIVL5666 **Open Channel Flow & Hydraulic Structures**	6	**P** BE or equivalent.	Semester 2
CIVL5668 **Wind Engineering for Design-Fundamentals**	6	**P** BE or equivalent.	Semester 1
CIVL5669 **Applied Fluid Engineering Computing**	6	**P** BE or eqquivalent.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session

Mechanical Engineering

Candidates for the degree Master of Professional Engineering in Mechanical Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

Mechanical Core Units of Study

First Year

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
MECH5261 **Foundations of Fluid Mechanics**	6	**A** Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series; AMME5200	Semester 1
MECH5361 **Foundations of Mechanics of Solids 2**	6	**A** Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series **P** AMME5301 **N** MECH3361	Semester 1
AMME5501 **Foundations: System Dynamics and Control**	6	**A** AMME5500	Semester 1
MECH5660 **Foundations of Manufacturing Engineering**	6	**A** AMME5200, AMME5301, AMME5302	Semester 1
MECH5362 **Foundations of Materials 2**	6	**A** Mechanics of solids: statics, stress, strain **P** AMME5302 **N** MECH3362	Semester 2
MECH5262 **Foundations of Thermal Engineering**	6	**A** Fundamentals of thermodynamics are needed to begin this more advanced course. **P** AMME5200	Semester 2

Second Year

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AERO5660 **Safety Systems Management**	6		Semester 1
AMME5601 **Professional Engineering**	6	**A** Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management	Semester 1
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2

Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A and B and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.

Mechanical Elective Units of Study

Candidates must complete 36 credit points from the following elective units of study.

Thermofluids

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AMME5202 **Advanced Computational Fluid Dynamics**	6	**A** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.	Semester 1
AMME5271 **Computational Nanotechnology**	6	**A** Students are required to have an understanding of basic principles of Newtonian mechanics, physics and chemistry, fluid mechanics and solid mechanics. General knowledge of how to operate a computer and work with different software is also required.	Semester 2
MECH5255 **Air Conditioning and Refrigeration (Adv)**	6	**A** Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. **P** MECH3260 or equivalent **N** MECH4255 Air Conditioning and Refrigeration	Semester 2
MECH5265 **Advanced Combustion**	6	**P** MECH5262 or equivalent **N** MECH4265 Combustion	Semester 2
MECH5275 **Advanced Renewable Energy**	6	**A** The students will require an understanding of the basic principles of fluid mechanics, thermodynamics and heat transfer, and the application of these principles to energy conversion systems. In particular, students should be able to analyse fluid flow in turbomachinery; perform first and second law thermodynamic analysis of energy conversion systems; and perform calculations of radiative, conductive and convective heat transfer.	Semester 2
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1

Materials

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
MECH5304 **Materials Failure**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent *An elective unit of study for the degree of Master of Engineering*	Semester 1a
MECH5305 **Smart Materials**	6	**A** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **P** BE or equivalent	Semester 1
MECH5310 **Advanced Engineering Materials**	6	**N** MECH4310 Advanced Materials	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AMME5961 **Biomaterials Engineering**	6	**A** Chemistry, biology, materials engineering, and engineering design at least at the Junior level.	Semester 2
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
Design and Manufacturing			
AERO5010 **Optimisation Methods in Engineering**	6	**A** BE in the area of Aerospace or related Engineering field.	Semester 2
AERO5301 **Applied Finite Element Analysis**	6	**A** BE in area of Aerospace Engineering or related Engineering field.	Semester 1
AMME5900 **Project 1 in Manufacturing & Automation**	6	**P** BE or equivalent *Note: Department permission required for enrolment*	Semester 1
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
MECH5410 **Advanced Design and Analysis 1**	3	**A** ENGG1802 - Eng Mechanics, balance of forces and moments AMME2301 - Mechanics of Solids, 2 and 3 dimensional stress and strain AMME2500 - Engineering Dynamics - dynamic forces and moments. MECH2400 - Mechanical Design 1, approach to design problems and report writing, and preparation of engineering drawing MECH3460 - Mechanical design 2, means of applying fatigue analysis to a wide range of machine components *Note: Department permission required for enrolment*	Semester 1
AMME5602 **Product Life Cycle Design**	6	**A** Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.	Semester 1 Semester 2
AMME5902 **Project 2 in Manufacturing & Automation**	6		Semester 2
Mechatronics			
MECH5410 **Advanced Design and Analysis 1**	3	**A** ENGG1802 - Eng Mechanics, balance of forces and moments AMME2301 - Mechanics of Solids, 2 and 3 dimensional stress and strain AMME2500 - Engineering Dynamics - dynamic forces and moments. MECH2400 - Mechanical Design 1, approach to design problems and report writing, and preparation of engineering drawing MECH3460 - Mechanical design 2, means of applying fatigue analysis to a wide range of machine components *Note: Department permission required for enrolment*	Semester 1
MECH5701 **Computers in Real Time Control and Inst**	6	**N** MECH4730 Computers in Real-Time Control and Inst MECH4710 Microprocessors in Engineered Products	Semester 1
MECH5720 **Sensors and Signals**	6	**A** Strong MATLAB skills **N** MECH4720 Sensors and Signals	Semester 1
MTRX5700 **Experimental Robotics**	6	**P** AMME3500 or (MECH3500 and MECH3800); MTRX3700 or MECH3700	Semester 1
AERO5760 **Spacecraft and Satellite Design**	6		Semester 2
AMME5602 **Product Life Cycle Design**	6	**A** Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.	Semester 1 Semester 2
AMME5900 **Project 1 in Manufacturing & Automation**	6	**P** BE or equivalent *Note: Department permission required for enrolment*	Semester 1
AMME5902 **Project 2 in Manufacturing & Automation**	6		Semester 2
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session

Network Engineering

Candidates for the degree of Master of Professional Engineering in Network Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

Network Core Units of Study

First Year

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ELEC5736 **Foundations of Digital Signal Processing**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals **N** ELEC3303 Digital Signal Processing, ELEC3305 Digital Signal Processing. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5739 **Foundations of Communications**	6	**A** Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. **N** ELEC3503 Introduction to Digital Communications *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5740 **Foundations of Data Comm & the Internet**	6	**N** ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
ELEC5744 **Foundations of Digital Comm Systems**	6	**A** ELEC3505 Communications or equivalent **N** ELEC4502 Digital Communication Sys *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1

Second Year

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2

Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A & B and the 12 credit points selection from the list of ENGG5214, ENGG5215 and ENGG5216 with ENGG5222 and ENGG5223 Dissertation A & B or ENGG5218 Dissertation.

At least 2 of the following 3 units of study:

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ENGG5214 **Management of Technology**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ENGG5215 **International Eng Strategy & Operations**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
ENGG5216 **Management of Engineering Innovation**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2

Network Recommended Elective Units.

Candidates must complete 36 credit points from the following table of elective units of study.

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1
ELEC5512 **Optical Networks**	6	**A** ELEC3503 Introduction to Digital Communications **N** ELEC5506 Optical Networks.	Semester 2
ELEC5514 **Networked Embedded Systems**	6	**A** ELEC3607, ELEC3305, ELEC3506 and ELEC5508	Semester 2
ELEC5515 **Gigabits Wireless Systems**	6	**A** This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Power Engineering			
Candidates for the degree of Master of Professional Engineering in Power Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing addition credit points of recommended eletive units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Power Core Units of Study			
First Year			
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ELEC5732 **Foundations of Electricity Networks**	6	**A** This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics **N** ELEC3201 Electrical Energy Systems, ELEC3203 Power Transmission Systems. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
ELEC5733 **Foundations of Power Electronics & Apps**	6	**A** Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc. **N** ELEC3202 Power Electronics and Drives, ELEC3204 Power Electronics and Drives *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5734 **Foundations Elec Energy & Conversion Sys**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5735 **Foundations of Control**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. ELEC2302 and MATH2061 or equivalent. **N** ELEC3302 Fundamentals of Feedback Control, ELEC3304 Control, Control, AMME3500 System Dynamics and Control. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
Second Year			
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220,ENGG5221 Engineering Project A & B and 12 credit points selectionfrom the list of ENGG5214, ENGG5215 and ENGG5216 with ENGG5222 and ENGG5223 Dissertation A & B or ENGG5218 Dissertation.			
At least 2 of the following 3 units of study:			
ENGG5214 **Management of Technology**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ENGG5215 **International Eng Strategy & Operations**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
ENGG5216 **Management of Engineering Innovation**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
Power Recommended Elective Units.			
Candidates must complete 36 credit points from the following table of elective units of study.			
ELEC5203 **Topics in Power Engineering**	6	**A** (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives or ELEC3204 Power Electronics and Drives).	Semester 1
ELEC5204 **Power Systems Analysis and Protection**	6	**A** The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment. **N** ELEC4201 Electrical Power Systems.	Semester 1
ELEC5205 **High Voltage Engineering**	6	**A** The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals. **P** ELEC3105 or equivalent *Recommended: ELEC5204 Power Systems*	Semester 2
ELEC5206 **Sustainable Energy Systems**	6	**A** Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory.	Semester 2

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
ELEC5303 **Computer Control System Design**	6	**A** This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. **N** ELEC4301 Computer Controlled System Design.	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Software Engineering			
Candidates for the degree of Master of Professional Engineering in Software Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Software Core Units of Study			
First Year			
INFO5990 **Professional Practice in IT**	6		Semester 1 Semester 2
COMP5028 **Object-Oriented Design**	6	**A** Intermediate level of object oriented programming such as Java **N** INFO3220	Semester 1
COMP5615 **Software Engineering Project**	6	**P** INFO6007 **N** COMP3615 and INFO3600 *Note: Department permission required for enrolment*	Semester 2
ELEC5742 **Foundations: Internet Software Platforms**	6	**A** INFO1103, INFO2110 and INFO2120 or equivalent **N** EBUS4001 E-Business Engineering *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
COMP5047 **Pervasive Computing**	6	**A** Networking concepts, operating system concepts, programming expertise. **N** NETS4047	Semester 2
COMP5348 **Enterprise Scale Software Architecture**	6	**A** INFO3220 or COMP5028 or equivalent.	Semester 1
Second Year			
ELEC5618 **Software Quality Engineering**	6	**N** SOFT3302 Software Quality Assurance	Semester 1
ELEC5619 **Object Oriented Application Frameworks**	6	**A** Java programming, and some web development experience are essential. Databases strongly recommended	Semester 2
ELEC5620 **Model Based Software Engineering**	6	**A** A programming language, basic maths	Semester 2
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220,ENGG5221 Engineering Project A & B and the 12 credit points selection from the list of ENGG5214, ENGG5215, ENGG5216 and INFO6007 with ENGG5222 and ENGG5223 Dissertation A & B or ENGG5218 Dissertation.			
At least 2 of the following 4 units of study:			
ENGG5214 **Management of Technology**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ENGG5215 **International Eng Strategy & Operations**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
ENGG5216 **Management of Engineering Innovation**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
INFO6007 **Project Management in IT**	6	**A** INFS6000 or COMP5206 or INFO5990 **N** INFS6014 IT Project Management, PMGT5871	Semester 1 Semester 2
Software Recommended Elective Units.			
Candidates must complete 18 credit points from the following table of elective units of study.			
COMP5338 **Advanced Data Models**	6	**A** COMP5138 or equivalent	Semester 2
COMP5426 **Parallel and Distributed Computing**	6	**A** Equivalent of COMP5116	Semester 1
ELEC5613 **Image Processing and Computer Vision**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems.	Semester 1
ELEC5614 **Real Time Computing**	6	**A** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **N** ELEC4602 Real Time Computing.	Semester 2
ELEC5615 **Advanced Computer Architecture**	6	**A** ELEC3305 Digital Signal Processing, ELEC3505 Communications, ELEC4503 Error Control Coding	Semester 2
ELEC5616 **Computer and Network Security**	6	**A** A programming language, basic maths. **N** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv).	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Structural Engineering			
Candidates for the degree Master of Professional Engineering in Structural Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Structural Core Units of Study			
First Year			
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
CIVL5507 **Foundations of Concrete Structures 1**	6	**A** CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatability of strains, and elastic beam theory. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background*	Semester 1
CIVL5508 **Foundations of Steel Structures 1**	6	**A** There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2230 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3235 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation of stress and strain, and being able to determine stresses and strains in simple sections under axial force, bending moments, shear and torsion; calculating and understanding the physical significance of geometric section properties : centroid, Ix, Iy, Zx, Zy, Sx, Sy, rx, ry, J, Ag; knowledge of the basic elastic-plastic material properties of steel, E, G, fy, fu; and knowledge of loading of structures. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
CIVL5505 **Foundations- Fluid Mech. & Inviscid Flow**	6	**A** Students are expected to have a strong understanding of fundamental physics, statics, equilibrium, forces, and dimensional analysis. Familiarity with simple calculus, partial differential equations, and the analytical and numerical solutions. **P** Bachelors Degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study. The unit will be replaced in 2011 with CIVL5511 Foundation of Environmental and Fluids Engineering.			
CIVL5509 **Foundations of Struct Concepts & Design**	6	**A** CIVL5501, CIVL5502, ENGG1802. Structural mechanics, first year mathematics. **P** Bachelors degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
This unit is a transitional unit of study. The unit will be replaced in 2011 with CIVL5512 Foundation of Engineering Design and Construction.			
Second Year			
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
CIVL5510 **Foundations of Civil Engineering Design**	6	**A** CIVL3205 and CIVL3206 **P** Bachelor degree *This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.*	Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students entering the MPE with an engineering undergraduate degree who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A and B and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.			
Structural Elective Units of Study			
Candidates must complete 12 credit points from the following specialist elective units of study.			
CIVL5266 **Steel Structures - Stability**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
CIVL5269 **Concrete Structures - Strength & Service**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 2
CIVL5458 **Numerical Methods in Civil Engineering**	6	**P** BE or equivalent. *Note: Department permission required for enrolment*	Semester 1
Structural Advanced Elective Units of Study			
Candidates must complete 24 credit points from the following specialist advanced elective units of study			
CIVL5257 **Concrete Structures: Prestressed**	6	**P** BE or equivalent.	Semester 1
CIVL5264 **Composite Steel-Concrete Structures**	6	**P** BE or equivalent	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
CIVL5267 **Steel Structures - Advanced Design**	6	**P** BE or equivalent.	Semester 1
CIVL5268 **Structural Dynamics**	6	**P** BE or equivalent.	Semester 2
Candidates must complete 6 credit points from the following Civil elective units of study.			
CIVL5450 **Analysis and Design of Pile Foundations**	6	**A** BE or equivalent.	Semester 1
CIVL5451 **Computer Methods in Geotechnical Eng**	6	**P** BE or equivalent.	Semester 1
CIVL5454 **Rock Engineering**	6	**A** Undergraduate geology and soil mechanics. **P** BE or equivalent.	Semester 2
CIVL5455 **Engineering Behaviour of Soils**	6	**P** BE or equivalent.	Semester 2
CIVL5665 **Advanced Water Resources Management**	6	**A** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **P** BE or equivalent.	Semester 1
CIVL5666 **Open Channel Flow & Hydraulic Structures**	6	**P** BE or equivalent.	Semester 2
CIVL5668 **Wind Engineering for Design-Fundamentals**	6	**P** BE or equivalent.	Semester 1
CIVL5669 **Applied Fluid Engineering Computing**	6	**P** BE or eqquivalent.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Wireless Engineering			
Candidates for the degree of Master of Professional Engineering in Wireless Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.			
Wireless Core Units of Study			
First Year			
ENGG5202 **Sustainable Design, Eng and Mgt**	6	**A** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.	Semester 1
ENGG5204 **Engineering Professional Practice**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ELEC5736 **Foundations of Digital Signal Processing**	6	**A** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals **N** ELEC3303 Digital Signal Processing, ELEC3305 Digital Signal Processing. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5739 **Foundations of Communications**	6	**A** Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. **N** ELEC3503 Introduction to Digital Communications *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
ELEC5740 **Foundations of Data Comm & the Internet**	6	**N** ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks. *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 2
ELEC5744 **Foundations of Digital Comm Systems**	6	**A** ELEC3505 Communications or equivalent **N** ELEC4502 Digital Communication Sys *This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.*	Semester 1
Second Year			
ENGG5217 **Industrial Placement**		**P** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5220 **Engineering Project A**	6	**P** 48 credits from MPE degree program **N** ENGG5222, ENGG5223 *Note: Department permission required for enrolment*	Semester 1 Semester 2
ENGG5221 **Engineering Project B**	6	**P** ENGG5220 **N** ENGG5222, ENGG5223	Semester 1 Semester 2
Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A & B and the 12 credit points selection from the list of ENGG5214, ENGG5215 and ENGG5216 with ENGG5222 and ENGG5223 Dissertation A & B or ENGG5218 Dissertation.			
At least 2 of the following 3 units of study:			
ENGG5214 **Management of Technology**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 2*	Semester 1 Semester 2
ENGG5215 **International Eng Strategy & Operations**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
ENGG5216 **Management of Engineering Innovation**	6	**A** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. *Note: Department permission required for enrolment in the following sessions: Semester 1*	Semester 1 Semester 2
Wireless Recommended Elective Units.			
Candidates must complete 36 credit points from the following table of elective units of study.			
ELEC5101 **Antennas and Propagation**	6	**N** ELEC5522 Antennas and Propagation.	Semester 2
ELEC5403 **Radio Frequency Engineering**	6	**A** Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design , ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design. **N** ELEC5521 Radio Frequency Engineering.	Semester 1
ELEC5507 **Error Control Coding**	6	**A** Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. **N** ELEC4503 Error Control Coding	Semester 1
ELEC5508 **Wireless Engineering**	6	**A** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **N** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks.	Semester 2
ELEC5509 **Mobile Networks**	6	**A** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **N** ELEC5501 Advanced Communication Networks.	Semester 1

Unit of study	*Credit points*	*A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition*	*Session*
ELEC5510 **Satellite Communication Systems**	6	**A** Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. **N** ELEC5502 Satellite Communications Systems.	Semester 2
ELEC5515 **Gigabits Wireless Systems**	6	**A** This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.	Semester 2

7. Postgraduate units of study

Engineering and Information Technologies postgraduate units of study

Complete unit of study descriptions giving details of assessment, learning outcomes, graduate attribute mappings and semester schedule are published on the Faculty of Engineering and Information Technologies course information web site : http://cusp.eng.usyd.edu.au/engineering/

School of Aerospace, Mechanical and Mechatronic Engineering

AERO5010
Optimisation Methods in Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** Project work - own time. **Assumed knowledge:** BE in the area of Aerospace or related Engineering field. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit is intended primarily to graduate students and senior undergraduate students with some background in linear algebra, and with basic knowledge of FORTRAN, C++ or Matlab. After completion of this unit, students will have a much deeper understanding of methods used in modern design optimisation for linear and non-linear problems. Such problems are becoming increasingly common and important in engineering and scientific work. The unit will explore the limitations, advantages and caveats associated with optimisation in engineering applications. Students will develop their own optimisation methods for linear, non-linear, and multi-objective computational and experimental applications.

AERO5200
Advanced Aerodynamics

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** BE in the area of Aerospace Engineering or related Engineering field. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives/Expected Outcomes: To develop a specialist knowledge in the fields of computational, non-linear and unsteady aerodynamics. To develop familiarity with the techniques for predicting airflow/structure interactions for aerospace 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. Solution of aerospace flow problems using finite element methods. Unsteady supersonic one-dimensional flow. Hypersonic flow; real gas effects. Introduction to the use of CFD for transonic flow. Rarefied gas dynamics. Direct simulation method (DSMC); near-continuum solutions. Simulation techniques for numerical solutions of non-linear continuum flow.

AERO5210
Foundations of Aerodynamics

Credit points: 6 **Session:** Semester 2 **Classes:** Three 1hr lectures, one 2hr Tut/Lab/Demo per week and three 3 hour Laboratory sessions per semester **Assumed knowledge:** Mathematics and Physics to the level of Bachelor of Science or equivalent. Linear Mathematics and Vector Calculus, Partial Differential Equations (Intro). **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop in students a knowledge of the complex behaviour of airflow in the case of two dimensional aerofoil sections and three dimensional wings. To encourage hands-on experimentation with wind-tunnel tests to allow an understanding of these concepts and their range of applicability. At the end of this unit students will be able to: predict flow properties for general aircraft wing sections to obtain lift, drag and pitching moment; extrapolate section results to predict full three dimensional wing behaviour; undertake experiments and analyse data to verify theoretical predictions; construct simple computer algorithms that will allow more complex geometries to be solved; understand the limitations of theory and the effect of second order parameters (Reynolds number, Mach Number) to the primary flow properties. Course content will include: construction and designation of two dimensional aerofoil sections; point vortex model of aerofoil; Joukowski transformation theory; thin aerofoil theory; linear lift properties for sections; limiting effects such as stall; calculation of pitching moment coefficient; methods for estimation of boundary flow and friction drag calculations; viscous-inviscid panel method numerical solutions; modelling of three dimension wing flows; lifting line theory and vortex lattice method.; effects of downwash, aspect ratio, sweep angle and asymmetry.

AERO5211
Foundations of Propulsion Systems

Credit points: 6 **Session:** Semester 2 **Classes:** Three 1hr lectures and one 2hr tutorial per week **Assumed knowledge:** Mathematics and Physics to a level of Bachelor of Science or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims 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. This unit of study teaches the students the techniques used to propel aircraft and rockets. The students will learn to analyse various propulsion systems in use: propellers, gas turbines, rocket motors. Course content will include: 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.

AERO5301
Applied Finite Element Analysis

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hours of workgroup session per week **Assumed knowledge:** BE in area of Aerospace Engineering or related Engineering field. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The finite element method. Philosophy. Matrix algebra. Matrix analysis of structures. Generalisation of the finite element method in elasticity for static, dynamic and thermal analysis. Rod elements. Beams. Triangular elements for plane stress. Natural coordinate systems. Introduction to plate and shell theory. Theories and analysis in structural stability. Three dimensional elements. Modelling strategies. Isoparametric elements, accuracy and convergence. Applications of finite element modelling in solid mechanics. Practical modelling of real structures will be done; a 'hands-on' approach will be taken.

AERO5310
Foundations of Aerospace Structures

Credit points: 6 **Session:** Semester 1 **Classes:** One 2hr lecture and one 1hr lecture per week. One 2hr Tutorial per week **Prerequisites:** AMME5301 **Assumed knowledge:** Mathematics and Physics to a level of Bachelor of Science or equivalent. Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop a student's understanding of the theoretical basis of advanced aerospace structural analysis; and introduce students to the solution of real-world aircraft structural problems. This UoS will develop the following attributes: An understanding of the derivation of the fundamental equations of elasticity and their application in certain analytical problems; An understanding of plate theory and the ability to use this to obtain analytical solutions for plate bending and buckling problems; An understanding of energy-method solution techniques for structural problems; An understanding of the basic principals behind stressed-skin aircraft construction and the practical analysis of typical aircraft components, including the limitations of such techniques.

At the end of this unit students will have an understanding of: 2-D and 3-D elasticity: general equations and solution techniques; Energy methods in structural analysis, including the principles of virtual work and total potential and complimentary energies; Fundamental theory of plates, including in-plane and bending loads as well as buckling and shear instabilities; Solution techniques for plate problems including: Navier solutions for rectangular plates; Combined bending and in-plane loading problems; Energy methods for plate-bending; and Plate buckling for compression and shear loadings; Bending of beams with unsymmetrical cross-sections; Basic principals and theory of stressed-skin structural analysis; Determination of direct stresses and shear flows in arbitrary thin-walled beams under arbitrary loading conditions including: Unsymmetrical sections, Open and closed sections, Single and multi-cell closed sections, Tapered sections, Continuous and idealized sections; The analysis of common aircraft components including fuselages, wings, skin-panels, stringers, ribs, frames and cut-outs; The effects of end constraints and shear-lag on the solutions developed as well as an overall appreciation of the limitations of the solution methods presented.

AERO5400
Advanced Aircraft Design Analysis

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of lectures per week. **Assumed knowledge:** BE in area of Aerospace Engineering or related Engineering field. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This Unit aims to provide familiarity and understanding with practical aircraft design processes expected in industry, including the evaluation and case studies of existing aircraft designs. Students will gain a better understanding of relevant issues particularly related to the design of aircraft with a level of confidence to lead them to develop new designs or modifications, having a good balance between theory and real-world applications. Good familiarity with unique and stringent international aviation regulations and certification processes will be expected with respect to the design of aircraft. Topics coved by the lectures will include aircraft specifications; aircraft selection and evaluation; aircraft configuration design; design considerations for aerodynamics, structures, systems, manufacture, testing, certification, life-cycle-cost, operations; the use of computational aircraft design tools, in particular DARcorp's Advanced Aircraft Analysis (AAA); and introduction to multidisdiplinary design optimisation methods. Projects will be based on case study analyses and evaluation of aircraft types to operational specifications and requirements.

AERO5410
Foundations of Aerospace Design

Credit points: 6 **Session:** Semester 1 **Classes:** Two 1hr lectures and one 3hr project class per week. **Assumed knowledge:** Mathematics, Physics and Solid Mechanics assumed knowledge at the level of Bachelor of Science or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the theory and practice of aircraft structural component design. In doing so it will emphasize all the considerations, trade-offs and decisions inherent in this process and thus enable students to gain an understanding of why aircraft structures are designed in the way they are with respect to structural, manufacturing and cost considerations.

At the end of this unit students will be able to understand the design process, especially as it applies to aircraft structural component design; Have a familiarity with some of the practice of aircraft component structural design; An increasing familiarity with typical aircraft structural paradigms and how they work and can be analysed along with the primary failure modes that need to be considered; An understanding of the importance of different failure modes for different components and how these relate to load-conditions and understanding of some off the legal and ethical requirements of aircraft design engineers; A basic understanding of the regulatory framework in which aircraft design is conducted.

AERO5500
Flight Mechanics Test and Evaluation Adv

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 2hrs of laboratory per semester. **Assumed knowledge:** BE in area of Aerospace Engineering or related Engineering Field. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of aircraft longitudinal equilibrium, static stability, dynamic stability and response. Students will develop an understanding of the importance and significance of flight stability, will gain skills in dynamic system analysis and will learn mathematical tools used for prediction of aircraft flight behaviour. Students will gain skills in problem solving in the area of flight vehicle motion, and learn the fundamentals of flight simulation. At the end of this unit students will be able to understand: aircraft flight conditions and equilibrium; the effects of aerodynamic and propulsive controls on equilibrium conditions; the significance of flight stability and its impact of aircraft operations and pilot workload; the meaning of aerodynamic stability derivatives and their sources; the effects of aerodynamic derivatives on flight stability; the impact of flight stability and trim on all atmospheric flight vehicles, including launch and re-entry of space vehicles. Students will also be able to model aircraft flight characteristics using computational techniques and analyse the aircraft equations of rigid-body motion and to extract stability characteristics. Course content will include static longitudinal aircraft stability: origin of symmetric forces and moments; static and manoeuvring longitudinal stability, equilibrium and control of rigid aircraft; aerodynamic load effects of wings, stabilisers, fuselages and power plants; trailing edge aerodynamic controls; trimmed equilibrium condition; static margin; effect on static stability of free and reversible controls. Introduction to test and evaluation of aircraft handling qualities.

AERO5510
Foundations of Flight Mechanics

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** AMME5500 **Corequisites:** AMME5501 **Assumed knowledge:** Mathematics, Physics and Dynamics assumed knowledge at the level of Bachelor of Science or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of aircraft longitudinal equilibrium, static stability, dynamic stability and response. Students will develop an understanding of the importance and significance of flight stability, will gain skills in dynamic system analysis and will learn mathematical tools used for prediction of aircraft flight behaviour. Students will gain skills in problem solving in the area of flight vehicle motion, and learn the fundamentals of flight simulation.

At the end of this unit students will be able to understand: aircraft flight conditions and equilibrium; the effects of aerodynamic and propulsive controls on equilibrium conditions; the significance of flight stability and its impact of aircraft operations and pilot workload; the meaning of aerodynamic stability derivatives and their sources; the effects of aerodynamic derivatives on flight stability; the impact of flight stability and trim on all atmospheric flight vehicles, including launch and re-entry of space vehicles. Students will also be able to model aircraft flight characteristics using computational techniques and analyse the aircraft equations of rigid-body motion and to extract stability characteristics.

Course content will include static longitudinal aircraft stability: origin of symmetric forces and moments; static and manoeuvring longitudinal stability, equilibrium and control of rigid aircraft; aerodynamic load effects of wings, stabilisers, fuselages and power plants; trailing edge aerodynamic controls; trimmed equilibrium condition; static margin; effect on static stability of free and reversible controls.

AERO5660
Safety Systems Management

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objective : To develop an understanding of the current state of aerospace manufacturing, operations and maintenance for the Australian aviation industry. Students will gain skills in aerospace engineering risk management.

Syllabus: Principles and practice of aviation and airline risk management. Discussion and analysis of airline operations. Flight safety and airworthiness standards. Risk and reliability management. Project Management focusing on risk analysis and mitigation.

AERO5760
Spacecraft and Satellite Design

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of project work in class per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course aims to introduce the students to the engineering aspects of spacecraft and mission design, covering the space environment and spacecraft sub-systems, including thermal control, power systems, attitude decision and control system, tracking, telemetry & telecommand, and on-board data handling.

AERO5750
Unmanned Air Vehicle Systems

This unit of study is not available in 2010

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hour lecture plus 2 hour tutorial/lab per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Objectives/Expected Outcomes: To develop specialist knowledge and understanding of Unmanned Air Vehicle (UAV) systems. To be able to assess, evaluate and perform preliminary design analysis on complete UAV systems.

Syllabus summary: This course will focus on understanding UAVs from a system perspective. It will consider a variety of key UAV subsystems and look at how these interact to determine the overall effectiveness of a particular UAV system for a given mission. Based on this understanding it will also look at the evaluation and design of a complete UAV system for a given mission specification. Some of the primary UAV subsystems that will be considered in this course are as follows.

"Airframe and Propulsion: The role of the basic airframe/propulsion subsystem of the UAV in setting operational mission bounds for different classes of UAVs, from micro UAVs, through to larger vehicles.

"Flight Control and Avionics: Typical UAV primary flight control systems; Sensor requirements to support different levels of operation (eg auto-land vs remote-control landing etc.,); Redundancy requirements.

"Navigation: Navigation requirements; inertial navigation; aiding via use of GPS; strategies to combat GPS failures.

"Typical Payloads: Electro-Optical (EO); Infra-Red (IR); Electronic Warfare (EW); Electronic Surveillance (ES); Radar and others. Payload stabilization and pointing accuracy requirements.

"Air-Ground Communication Link: Typical Civilian and Military communication links. Range, Security, Bandwidth, Cost issues.

"Ground Station: Air-vehicle monitoring; payload monitoring; data dissemination; control of multiple vehicles.

The course will also consider other general issues associated with modern UAV systems including multi-vehicle systems, certification of UAV systems and others. As part of the course students will spend 1 day operating a UAV system, with their own mission guidance/mission control software on board.

Textbooks
References:
To be nominated.

AERO5901
Project 1 and Seminar in Aerospace Eng

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal calsses **Assumed knowledge:** BE in area of Aerospace Engineering or related Engineering fields. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Projects 1 & 2 and seminar in Aerospace Engineering aim to develop an understanding of carrying out aerospace engineering projects, enhance students' ability in handling complex engineering cases and in technical organisation and communication, and to provide students an opportunity to understand project research. Engineering skills to be developed include the capacity to define a research question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. The project is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Project 1 and seminar in Aerospace Engineering covers first steps of thesis research starting with development of research proposal. Project 2 and seminar in Aerospace Engineering covers the second of stage writing up and presenting the research results. Students are required to write a thesis based on a research project in aerospace engineering. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility studies or the design, construction and testing of equipment. Direction of thesis work may be determined by the supervisor or be of an original nature, but in either case the student is responsible for the execution of the practical work and the general layout and content of the thesis itself. The final thesis must be the student's individual work, although research is sometimes conducted in the framework of a group project shared with others. Students undertaking research on this basis will need to take care in ensuring the individual quality of their own research work and the final thesis submission. The thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors. It is not expected that a thesis at this level will represent a significant contribution to new knowledge; nor is it expected that theses will resolve great intellectual problems. The timeframe available for the thesis is simply too short to permit students to tackle complex or difficult problems. Indeed, a key aim of the project is to specify a research topic that arouses sufficient intellectual curiosity, and presents an appropriate range and diversity of technical and conceptual challenges, while remaining manageable and allowing achievable outcomes within the time and resources available. It is important that the topic be of sufficient scope and complexity to allow a student to learn their craft and demonstrate their research skills. Equally imperative is that the task not be so demanding as to elude completion.

AERO5902
Project 2 and Seminar in Aerospace Eng

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal classes **Prerequisites:** AERO5901 **Assumed knowledge:** BE in area of Aerospace Engineering or related Engineering field. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

A student enrolled in AERO5901 Project 1 & Seminar in Aerospace Engineering in his/her first semester should continue with the smae project in the second semester. Projects 1 & 2 and seminar in Aerospace Engineering aim to develop an understanding of carrying out aerospace engineering projects, enhance students' ability in handling complex engineering cases and in technical organisation and communication, and to provide students an opportunity to understand project research. Engineering skills to be developed include the capacity to define a research question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. The project is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Project 1 and seminar in Aerospace Engineering covers first steps of thesis research starting with development of research proposal. Project 2 and seminar in Aerospace Engineering covers the second of stage writing up and presenting the research results. Students are required to write a thesis based on a research project in aerospace engineering. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility studies or the design, construction and testing of equipment. Direction of project work may be determined by the supervisor or be of an original nature, but in either case the student is responsible for the execution of the practical work and the general layout and content of the thesis itself. The final thesis must be the student's individual work, although research is sometimes conducted in the framework of a group project shared with others. Students undertaking research on this basis will need to take care in ensuring the individual quality of their own research work and the final thesis submission. The thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors. It is not expected that a thesis at this level will represent a significant contribution to new knowledge; nor is it expected that theses will resolve great intellectual problems. The timeframe available for the thesis is simply too short to permit students to tackle complex or difficult problems. Indeed, a key aim of the project is to specify a research topic that arouses sufficient intellectual curiosity, and presents an appropriate range and diversity of technical and conceptual challenges, while remaining manageable and allowing achievable outcomes within the time and resources available. It is important that the topic be of sufficient scope and complexity to allow a student to learn their craft and demonstrate their research skills. Equally imperative is that the task not be so demanding as to elude completion.

AMME5200
Foundations of Thermodynamics and Fluids

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 3hr per week; Tutorials : 2 hours per week **Assumed knowledge:** Students are expected to be familiar with basic, first year, integral calculus, differential calculus and linear algebra. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach the basic laws of thermodynamics and the fundamentals of fluid statics and dynamics. At the end of this unit students will have: an understanding of the basic laws of thermodynamics and basic equations governing the statics and dynamics of fluids; the ability to analyze the thermodynamics of a simple open or closed engineering system; the ability to analyze and determine the forces governing static fluid; the ability to evaluate the relevant flow parameters for fluid flow in internal engineering systems such as pipes and pumps (velocities, losses, etc.) and external systems such as flow over wings and airfoils (lift and drag). Course content will include concepts of heat and work, properties of substances, first law of thermodynamics, control mass and control volume analysis, thermal efficiency, entropy, second law of thermodynamics, reversible and irreversible processes, isentropic efficiency, power and refrigeration cycles; basic concepts of pressure, force, acceleration, continuity, streamline and stream function, viscosity, non-dimensional parameters; Fluid statics: governing hydrostatic equations, buoyancy; Fluid dynamics: governing conservation equations; Potential flow, vorticity and circulation; Bernouilli and Euler equations; A brief introduction to flow measuring devices, pipe flow, flow over surfaces, lift and drag.

AMME5202
Advanced Computational Fluid Dynamics

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures : 1 hour per week; Tutorials : 1 hour per week; Laboratory Sessions : 2 hours per week **Assumed knowledge:** Partial differential equations; Finite difference methods;Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives: To provide students with the necessary skills to use commercial Computational Fluid Dynamics packages and to carry out research in the area of Computational Fluid Dynamics. Expected outcomes: Students will have a good understanding of the basic theory of Computational Fluid Dynamics, including discretisation, accuracy and stability. They will be capable of writing a simple solver and using a sophisticated commercial CFD package. Syllabus summary: A course of lectures, tutorials and laboratories designed to provide the student with the necessary tools for using a sophisticated commercial CFD package. A set of laboratory tasks will take the student through a series of increasingly complex flow simulations, requiring an understanding of the basic theory of computational fluid dynamics (CFD). The laboratory tasks will be complemented by a series of lectures in which the basic theory is covered, including: governing equations; finite difference methods accuracy and stability for the advection equation, diffusion equation; direct and iterative solution techniques; solution of the full Navier-Stokes equations; turbulent flow; Cartesian tensors; turbulence models.

AMME5218
Research Dissertation

Credit points: 24 **Session:** Semester 1, Semester 2 **Classes:** Project work carried out in own time **Prerequisites:** The completion of 48 CP from the MPE degree program **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The aim of this unit of study is to obtain an understanding of how to define, plan, undertake and report on an open-ended piece of supervised research or design work. Students will discuss the thesis topic with the supervisor and generate a suitable thesis plan with proposed outcomes. They will then conduct a literature survey and background research. Students are asked to write a detailed report on a major research or design project. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility studies or the design, construction and testing of equipment. In the normal course of events some or all of the theoretical, developmental and experimental aspects of design or research work will be covered in this unit of study. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is responsible for the execution of his or her practical work and the general layout and content of the Thesis document. During the course of this unit of study, students will learn how to examine published and experimental data, set objectives, organize a program of work and analyse results. They will also be expected to evaluate these results in relation to existing knowledge. The Thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors in seminar.

AMME5271
Computational Nanotechnology

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 2 hours per week; Tutorials : 3 hours per week **Assumed knowledge:** Students are required to have an understanding of basic principles of Newtonian mechanics, physics and chemistry, fluid mechanics and solid mechanics. General knowledge of how to operate a computer and work with different software is also required. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course introduces atomistic computational techniques used in modern engineering to understand phenomena and predict material properties, behaviour, structure and interactions at nano-scale. The advancement of nanotechnology and manipulation of matter at the molecular level have provided ways for developing new materials with desired properties. The miniaturization at the nanometre scale requires an understanding of material behaviour which could be much different from that of the bulk. Computational nanotechnology plays a growingly important role in understanding mechanical properties at such a small scale. The aim is to demonstrate how atomistic level simulations can be used to predict the properties of matter under various conditions of load, deformation and flow. The course covers areas mainly related to fluid as well as solid properties, whereas, the methodologies learned can be applied to diverse areas in nanotechnology such as, liquid-solid interfaces, surface engineering, nanorheology, nanotribology and biological systems. This is a course with a modern perspective for engineers who wish to keep abreast with advanced computational tools for material characterization at the atomic scale.

AMME5301
Foundations of Mechanics of Solids 1

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures : 3 hours per week; Tutorials : 2 hours per week **Assumed knowledge:** Physics, statics, Differential Calculus, Linear Algebra, Integral Calculus and Modelling. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach the fundamentals of analysing stress and deformation in elemental structures/components in aerospace, mechanical and biomedical engineering (bars, beams, frames, cell box beams and tubes) under simple and combined loading of tension, compression, bending and torsion. The vibration will also be addressed. At the end of this unit students will have gained knowledge of: equilibrium of deformable structures; basic concept of deformation compatibility; stress and strain in bars, beams and their structures subjected to tension, compression, bending, torsion and combined loading; statically determinate and indeterminate structures; energy methods for bar and beam structures; simple buckling; simple vibration; deformation of simple frames and cell box beams; simple two-dimensional stress and Mohr's circle; problem-based applications in aerospace, mechanical and biomedical engineering.

AMME5302
Foundations of Materials 1

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 3 hours per week; Tutorials : 2 hour per week. **Assumed knowledge:** Fundamental physics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to cover four key focus areas: Atomic structure of the solid state: atomic bonding, crystal structures, crystal imperfections, and diffusion; Mechanical properties and microstructure: the relationship between properties and microstructure, and the effects of heat treatment on properties and microstructure; Electrical, magnetic, thermal, and optical properties of materials; Manufacture and applications of materials: metals, ceramics, polymers. At the end of this unit students will have gained an understanding of: the ways in which atoms are arranged in the solid state; the ways in which their arrangement and the imperfections of their arrangement affect the macroscopic properties of a material; gain an understanding of the various types of properties of materials, how to measure and calculate them, and how to use these skills in engineering design and failure analysis; gain an understanding of the means by which the properties of materials can be manipulated via heat treatment, alloying, and other means. Course content will include: Atomic Structure/Crystallography; Microstructure - Composites/Monolithics; Dislocation Theory; Diffusion; Phase Equilibrium and Heat Treatment; Suspension Rheology; Physical Properties.

AMME5500
Foundations of Engineering Dynamics

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures : 3 hours per week; Tutorials : 2 hours per week; Lab Sessions 6 hours per semester. **Assumed knowledge:** Physics, statics, Particle dynamics, Differential Calculus, Linear Algebra, Integral Calculus and Modelling **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to teach: Dynamics of Rigid Bodies: Analysis of Planar mechanisms; Kinematics of rigid bodies; Kinetics of rigid bodies. Students will also develop their skills in: how to model and analyse dynamic systems and the application of theory to real systems through practical/laboratory sessions. At the end of this unit students will have developed skills in modelling and analysing planar mechanisms and rigid body dynamic systems. Course content will include planar mechanisms, linkages, mobility; instant centres of rotation, Kennedy's theorem; velocity and acceleration polygons; kinematics of rigid bodies, frames of reference, velocity and acceleration, rotating frame of reference, relative velocity and acceleration, gyroscopic acceleration; kinetics of rigid bodies, linear momentum and Euler's first law; angular momentum and Euler's second law; centre of mass; moments of inertia, parallel axis and parallel plane theorems, principal axes and principal moments of inertia, rotation about an axis; impulse and momentum; work and energy, kinetic and potential energies; applications to orbital and gyroscopic motion; introduction to Lagrangian methods.

AMME5501
Foundations: System Dynamics and Control

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures : 2 hours per week; Tutorials : 3 hours per week **Assumed knowledge:** AMME5500 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to introduce the methods used for the analysis and design of linear feedback control systems. There are three key focus areas: An understanding of how mechanical systems respond to control inputs and disturbances, and how one can analyse and interpret these responses mathematically and graphically; To be able to represent these mechanical systems in a feedback control system as well as being able to determine what desired specifications of the system would be achievable, practical and important when the system is under control; An understanding of how different theoretical and practical techniques help engineers in designing control systems, and which technique best helps in solving a given problem. Course content will include concentration 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 Matlab 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. Labs will be undertaken using a variety of physical plants to highlight the nature of control systems engineering. A number of case studies based on practical examples will also be presented.

AMME5601
Professional Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures : 3 hours per week; Tutorials : 2 hours per week **Assumed knowledge:** Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to create an awareness of the issues surrounding management of projects and in general management in engineering plants; impart knowledge resulting in a more global approach to the practice of engineering and engineering management; provide a vehicle for improving communication skills. The course also aims, when taken together with other courses offered by the School, to substantially meet the requirement of the Institution of Engineers, Australia, for undergraduate training in management theory. On completion of this unit students should be able to: plan small projects, and contribute effectively to planning of larger projects; understand what is required of you in your role in the conduct and management of an engineering project; perform well in that role from the outset, with your performance limited only by your experience; prepare an interesting presentation on aspects of your work for your peers or senior managers; recognise the range of expertise you may need to call on in your role as an engineer working on a project (e.g. in the safety and environmental fields); Have an awareness of ethical and other issues which can arise in the workplace; be aware of the impact of Global Warming, Climate Change and related issues threatening sustainability and have some appreciation of the role for engineers in proposing solutions; be familiar with ergonomic design principals; understand what the experts are saying, and to be able to contribute effectively to that discussion, so making effective use of that expertise.

AMME5602
Product Life Cycle Design

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Project Work in Class : 5 hours per week **Assumed knowledge:** Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

A core unit of study for the degree of Master of Engineering Studies covering the following aspects: Interfaces of product's functional requirements and product's design attributes; Mapping of product's design attributes into the manufacturing requirements; The business constraints of bringing new products into the market place; Product life cycle management.

AMME5900
Project 1 in Manufacturing & Automation

Credit points: 6 **Session:** Semester 1 **Classes:** Project Work done in own time. **Prerequisites:** BE or equivalent **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

A core unit of study for the degree of Master of Engineering Studies (Automation and Manufacturing Systems).

Expected outcomes: Students will understand the major issues in project investigation on manufacturing and automation with improved ability and skill of systematic organisation of projects and technical communications.

Syllabus summary: Each student enrolled needs to consult with the prospective supervisor(s) to apply for a project topic in manufacturing and automation. The student can also propose his/her own topic in the field when the supervisor(s) permit(s) him/her to do so and agree(s) to offer consistent supervision. Under the guidance of the supervisor(s), the student will learn how to develop a proposal, how to do the project investigation and how to prepare and carry out the technical communications (writing and oral). In any of these scenarios, the student is directly responsible for the progress and quality of the results. At the end of the semester, the student is required to submit a written project report and to give a seminar presenting the aims and achievements of the project.Unit Administration: WebCT

AMME5901
Anatomy and Physiology for Engineers

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 2.5 hours per week; Laboratory : 12 hours per semester. **Assumed knowledge:** Biology **Campus:** Cumberland **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to gain familiarity with anatomical and physiological terms and understanding their meaning. Students should gain an understanding of the gross anatomy of the major systems in the human body and their importance in the design of biomedical devices. Students should gain an understanding of the major physiological principles which govern the operation of the human body. At the end of this unit students will be able to: identify the gross anatomical features of the human body; describe the normal function of the major body systems (nervous, circulatory, respiratory, musculoskeletal, digestive and renal); determine how these functions relate to cellular function; determine how a biomedical engineering device affects the normal anatomy and function of the body. Course content will include: Bone tissue; Skeletal system; Joints; Muscle Tissue; Bones & joints anatomy (prac); Muscle Mechanics; Muscle anatomy (prac); Nerve Tissue; Muscles & nerves prac; CVS Heart; Blood vessels; Respiratory System 1; Respiratory System 2; Homeostasis; CVS and Respiratory anatomy (prac); Physiology; Respiratory Physiology; Cardio-respiratory physiology (prac); Renal Anatomy; Renal Physiology; Abdominal Renal Digestive Anatomy; Digestive Physiology; Oral Presentation.

AMME5902
Project 2 in Manufacturing & Automation

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures: 2 hours pwer week; Tutorials: 2 hours per week; Laboratory: 3 hours per semester. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

A core unit of study for the degree of Master of Engineering Studies (Automation and Manufacturing Systems).

Objectives: To develop an understanding of carrying out manufacturing and automation projects, enhance students' ability in handling complex engineering cases and in technical organisation and communication, and to provide students an opportunity to understand project research.

Expected outcomes: Students will understand the major issues in project investigation on manufacturing and automation with improved ability and skill of systematic organisation of projects and technical communications.

Syllabus summary: A student enrolled in AMME5900 Project 1 in Manufacturing & Automation in his/her first semester can continue on Project 2. If the student prefers to select different project topic, he/she needs to consult with the prospective supervisor(s) to apply for a new project topic in manufacturing and automation. The student can also propose his/her own topic in the field when the supervisor(s) permit(s) him/her to do so and agree(s) to offer consistent supervision. Under the guidance of the supervisor(s), the student will learn how to develop a proposal, how to do the project investigation and how to prepare and carry out the technical communications (writing and oral). In any of the above scenarios, the student is directly responsible for the progress and quality of the results. At the end of the semester, the student is required to submit a written project report and give a seminar presenting the aims and achievements of the project.

AMME5921
Biomedical Engineering Tech 2

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 4 hours per week **Assumed knowledge:** A bachelors degree, ideally in the engineering or science field, is advisory, but not essential. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides an introduction to the field of biomedical engineering, from the point of view of the engineering and the global biomedical industry itself. After completion of this unit, students will have a clear understanding of what biomedical engineering is, both from the engineering perspective and the commercial/industry perspective.

AMME5961
Biomaterials Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures : 3 hours per week **Assumed knowledge:** Chemistry, biology, materials engineering, and engineering design at least at the Junior level. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To gain a basic understanding of the major areas of interest in the biomaterials field, learn to apply basic engineering principles to biomedical systems, and understand the challenges and difficulties of biomedical systems. To participate in a project-based-learning approach to the topic of design with Biomaterials.

AMME5971
Applied Tissue Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures: 2 hours per week; Tutorials: 2 hours per week **Assumed knowledge:** Biology, chemistry at a junior level and intermediate physiology or equivalent **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Elective Unit of Study: With the severe worldwide shortage of donor organs and the ubiquitous problem of donor organ rejection, there is a strong need for developing technologies for engineering replacement organs and other body parts. Recent developments in biochemistry and cell biology have begun to make this possible, and as a consequence, the very new field of tissue engineering has been making dramatic progress in the last few years.

This UoS will provide an introduction to the principles of tissue engineering, as well as an up to date overview of recent progress in the field of tissue engineering is and where it is going. This UoS assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of tissue engineering. The objectives are:

Objectives:

1. To gain a basic understanding of the major areas of interest in tissue engineering

2. To learn to apply basic engineering principles to tissue engineering systems

3. To understand the challenges and difficulties of tissue engineering.

4. Understand the ethical issues of stem cell applications.

5. Practical classes in the preparation and evaluation of scaffolds for tissue regeneration.

6. Enable student to access web-based resources in tissue engineering (for example: Harvard-MIT Principles and Practice of Tissue Engineering).

7. Research basic skills in Tissue Engineering

Learning outcomes:

1. To develop a theoretical understanding of the basic concepts of tissue engineering and be exposed to the various specific disciplines of this field. The students will develop specific expertise through the lectures given by invited speakers at the forefront of their research.

2. To achieve effective communications the class will be divided into small groups where each group will present their findings on their assigned project/paper for discussion with the whole class on their results, ideas and critically evaluate their scientific findings

3. The students will each complete an individual assignment on the applications of tissue engineering to ophthalmology, dental, skeletal tissue, skin, neural, vascular and cardiology. In their assignment they will discuss the advances and future direction and identify key areas of shortcoming in the specific fields and discuss the general problem and possible solutions

4. Students will gain expertise by conducting a scientific literature review of the current progress in the field of tissue engineering in general. Specifically, they will undertake a thorough scientific search on the latest development in the research conducted in their chosen assignment topic.

5. Team work skills will be developed by participating in group tutorial projects. Each group will then discuss the assigned paper/project in detail, decide on key points and then report back to the entire class

AMME5981
Computational Biomedical Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures: 2 hours per week; Tutorials: 2 hours per week **Assumed knowledge:** Fundamental Materials, Mechanics of Solids, Engineering Dynamics, Biomedical Design and Technology. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This UoS will give students a comprehensive understanding of finite element method, material constitutive modelling, CT/MRI based solid modelling, design analysis and optimisation, and their applications in biomedical engineering. The students are expected to expand their research and development skills in relevant topics, and gain experience and skills in finite element software for the solution to sophisticated problems associated with biomedical engineering.

The objectives are:

1. Understanding of the nature of biomedical engineering problems;

2. Exploring CT/MRI image processing, solid modelling etc;

3. Understanding of finite element methods and developing FE models for biomedical engineering analysis;

4. Understanding biomaterials constitutive modelling;

5. Understanding bone remodelling simulation, fracture mechanics;

6. Developing prosthetic design optimisation;

AMME5990
Biomedical Engineering Tech 1

Credit points: 6 **Session:** Semester 1 **Classes:** Lectures: 2 hours per week; Tutorials: 2 hours per week **Assumed knowledge:** Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Elective Unit of Study: Product development in the biomedical area presents unique challenges that need to be addressed to efficiently satisfy strict regulatory requirements and to successfully advance products to approval for marketing. Biomedical engineers need a broad understanding of these challenges as the main components of product development are complex and interdependent. Development of good manufacturing and quality control processes, preclinical and clinical validation of product safety and efficacy, and regulatory filings, are each progressive and interdependent processes. This UoS will provide a broad understanding of regulatory requirements for biomedical product development, with particular emphasis on the dependence of each component on the development of processes and control systems that conform to Good Manufacturing Practice. This UoS assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of biomedical product development.

The objectives are:

1. To gain a broad understanding of biomedical product development within the regulatory framework.

2. To understand the challenges and difficulties of Good Manufacturing Practice.

3. Understand the purpose and conduct of preclinical and clinical testing.

4. To understand how each of these components fit together to support regulatory filings.

MECH5255
Air Conditioning and Refrigeration (Adv)

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 1 hour of tutorials per week. **Prerequisites:** MECH3260 or equivalent **Prohibitions:** MECH4255 Air Conditioning and Refrigeration **Assumed knowledge:** Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study develops an advanced knowledge of air conditioning systems and refrigeration applications. At the completion of this unit students will be able to determine thermal loads on structures and design an air conditioning or refrigeration system with attention to comfort, control, air distribution and energy consumption. Course content will include: applied psychrometrics, air conditioning systems, design principles, comfort in the built environment. cooling load calculations, heating load calculations, introduction and use of computer-based load estimation packages software, air distribution, fans, ducts, air conditioning controls, advanced refrigeration cycles, evaporators, condensers, cooling towers, compressors, pumps, throttling devices, piping, refrigerants, control, refrigeration equipment, simulation 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 evaluation and management in the built environment. Use of experimental air conditioning systems to test for thermal balances and compare with simulations.

Textbooks

References:

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Handbook of fundamentals, 1997, 2001, 2005.

McQuiston, F. C. and Parker, J. D., "Heating Ventilation and Air Conditioning, Analysis and Design", 4th ED. Wiley 1994.
Stocker, W. F. and Jones, J. W., "Refrigeration and Air Conditioning" 2nd Ed., McGraw Hill, 1985.

MECH5261
Foundations of Fluid Mechanics

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Assumed knowledge:** Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series; AMME5200 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to provide students with a detailed understanding of the theory and practice of fluid mechanics in the context of mechanical engineering. At the end of this unit students will have the ability to critically assess and solve problems commonly found in fluid mechanics practice, such as sizing pumps and piping systems, designing channels, and determining the lift and drag characteristics of submerged bodies. Additionally, they will develop a structured and systematic approach to problem solving. Course content will include: Navier-Stokes equations: derivation, significance and fundamental importance. Pipe flow: Bernoulli, shear losses, minor losses, networks. Pumps: pump types, characteristics, applications. Flow around submersed bodies: lift and drag Boundary layers: derivation of equations, laminar and turbulent, transition, momentum integral method, law of the wall, velocity profiles. Turbulence: concept, properties of turbulent flow, eddy viscosity models, more advanced approaches. Channel flow: flow in a channel, weir, hydraulic jump Gas dynamics: steady one-dimensional flow including friction and heat transfer, sound waves, normal shock, nozzle flow, shock tube.

MECH5262
Foundations of Thermal Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** AMME5200 **Assumed knowledge:** Fundamentals of thermodynamics are needed to begin this more advanced course. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of: the principles of thermodynamic cycles, gas mixtures, combustion and thermochemistry applied to engineering processes, power and refrigeration systems; heat transfer equipment design. To classify heat transfer situations as conduction, convection, radiation, forced or natural convection. To determine the appropriate approach to problems, the type of solution needed, analytical or numerical. To be able to arrive at a solution and predict heat transfer rates and be able to design and size heat transfer equipment.

At the end of this unit students will be able to: apply the principles of thermodynamics and heat transfer to real engineering situations; have the Ability to tackle and solve a range of complex thermodynamics cycles, air conditioning, combustion, chemical equilibrium, problems involving gas mixtures; have the ability to tackle and solve a range of heat transfer problems including finned heat exchangers, cooling by fluids, quenching, insulation and solar radiation.

Course content will include: Thermodynamics: Exergy and entropy, Power: spark ignition, Power: diesel, Power: gas turbine, Power: stirling, Power: steam, Gas mixtures, Clausius-Clapeyron, Humidity, psychrometry, Air-conditioning, Combustion: stoichiometry, gas analysis, Combustion, thermochemistry, adiabatic flame,temperature Combustion, 2nd Law of Thermo., equilibrium, exergy, Heat Transfer: Conduction, thermal circuits, General conduction equation, cylindrical fins, Heat Exchangers, Numerical solutions, Unsteady conduction, Convection, analytical, Forced convection correlations, Natural convection, boiling, Radiation spectrum, blackbody, Radiation properties and laws, Radiation environmental, solar.

MECH5265
Advanced Combustion

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 3 hours of tutorials per week. **Prerequisites:** MECH5262 or equivalent **Prohibitions:** MECH4265 Combustion **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to give students a sound understanding of combustion and some of its applications such as internal combustion engines, gas turbines and fires. At the completion of this unit students will be able to perform an analysis of simple reacting systems, calculate the structure of simple premixed and diffusion flames, and analyse thermal and flow processes in fires and combustion chambers of practical devices. Course content will include: equilibrium compositions, flammability limits, simple chemically reacting systems, detailed chemical kinetics, the basic theory underlying laminar and turbulent combustion for both premixed and non-premixed cases, an introduction to droplet combustion, the concept of mixture fraction for non-premixed flames, combustion in engines and gas turbines as well as the formation of pollutants. Some computational tools in combustion will be introduced. Fire ignition, growth and spread will also be covered with respect to safety in buildings including the hazards related to the formation of smoke and toxic products.

MECH5275
Advanced Renewable Energy

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of tutorials per week. **Assumed knowledge:** The students will require an understanding of the basic principles of fluid mechanics, thermodynamics and heat transfer, and the application of these principles to energy conversion systems. In particular, students should be able to analyse fluid flow in turbomachinery; perform first and second law thermodynamic analysis of energy conversion systems; and perform calculations of radiative, conductive and convective heat transfer. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims

- To develop an understanding of the engineering design and analysis of different devices and technologies for generating power from renewable energy sources including: solar, wind, wave/tidal, geothermal, hydro, and bio-fuels.

- To develop an understanding of the environmental, operational and economic issues associated with each of these technologies.

Learning outcomes

- Students will be able to perform technical analysis of different types of renewable energy generation devices using the principles of fluid mechanics, thermodynamics and heat transfer.

- Students will be able to describe the environmental, economic and operational issues associated with these devices.

- Through the major design project, students will gain an in-depth understanding of the analysis, engineering design and environmental, economic and operational issues associated with a particular renewable energy technology.

MECH5304
Materials Failure

Credit points: 6 **Session:** Semester 1a **Classes:** Block mode, weeks 1 to 4 **Prerequisites:** BE or equivalent **Assumed knowledge:** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: An elective unit of study for the degree of Master of Engineering

This course is divided into two parts: biomaterials and biomechanics: Biomaterials This course will involve the study of biomaterials from two perspectives: firstly, the response of the body towards the biomaterial - an immune response and foreign body reaction; secondly, the response of the biomaterial to the body - corrosion, biodegradation, and mechanical failure. Our study will begin with the response of the body towards the biomaterial. We will begin by looking at the immune system itself and then move on to look at the normal inflammatory response. We will then study in detail the foreign body reaction caused by biomaterials. The final part of this section is the study of protein adsorption onto biomaterials, with a strong focus on the Vroman effect. Then we will move onto the response of the biomaterial to the body. We will begin by a review of biomaterials, their applications, and compositions, and mechanical properties. We will then look at key problems such as corrosion, stress shielding, static fatigue, and mechanical failure. Finally, we will take a practical look at the materials themselves. Beginning with ceramics (bioinert, biodegradable, and bioactive), we will then study polymers (thermoplastic, thermosetting, and biodegradable), and finally metals. Biomechanics Biomechanics is the study of the body from the point of view of it being an engineering structure. There are many aspects to this since the human body contains soft tissues, hard tissues (skeletal system), and articulating joints. We will begin with a general introduction to biomechanics, modelling the human body from the macroscopic level to the microscopic level. We will then study soft tissue mechanics, with respect to both non-linear and viscoelastic descriptions, with a significant focus on the mathematical methods used in relation to the mechanics of the system. We will then look at specific aspects of biomechanics: muscle mechanics, joint mechanics, kinematics and dynamics of human gait (gait analysis), biomechanics of cells, physiological fluid flow, biomechanics of injury, functional and mechanical response of tissues to mechanical loading.

MECH5305
Smart Materials

Credit points: 6 **Session:** Semester 1 **Classes:** 1 hour of lectures, 1 hour of tutorials and 3 hours of laboratory work per week. **Prerequisites:** BE or equivalent **Assumed knowledge:** Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives: Develop an essential understanding of structure-property relationship of smart materials, as well as their applications in practical applications; develop students' capability to design functional structures using smart materials; and provide students an opportunity to learn the new knowledge through project approaches.

Expected outcomes: Gain key knowledge in structure-property relationship of smart materials, establish the capability in design of functional structures using properties of smart materials, and enhance capability and skill of systematic approach through a team approach.

Syllabus summary: This UoS covers the key knowledge of most smart materials such as dielectric, piezoelectric, magneto-electric and shape memory materials. Each student participates in a couple of group projects relevant to characterisation of structure-property relationship of smart materials, design and construction of functional structures with desired performance. Under the guidance of the supervisor, the student will learn how to develop a proposal, how to do the project investigation and how to prepare and carry out the technical communications (writing and oral). In any of these scenarios, the student is directly responsible for the progress and quality of the results. At the end of the semester, the student is required to submit a written project report and to give a seminar presenting the aims and achievements of the project.

Learning Outcomes:

1. Ability to describe and characterize novel functions of smart materials using structure-property relationships
2. Ability to describe and characterize mechanical behaviour of smart materials; Ability to characterize interaction between smart materials and simple structures in actuation and sensing
3. Ability to design and construct simple functional structures using smart materials
4. Presentation and demonstration of functions of smart structures

MECH5310
Advanced Engineering Materials

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 3 hours of tutorials per week. **Prohibitions:** MECH4310 Advanced Materials **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives:

To understand (a) how to define the relationship between properties and microstructures of advanced engineering materials, (b) how to improve mechanical design with the knowledge of mechanics and properties of materials, and (c) how to conduct failure diagnosis of engineering materials.

Syllabus summary: advanced polymer matrix composites, smart/functional materials, high-strength ferrous and non ferrous alloys, superalloys, high performance polymers, eco-materials, thin film science and technology, advanced joining methods, processing-structure-property relationship, damage tolerance, toughening mechanisms, structure integrity and reliability.

Learning Outcomes:

Students should gain the capabilities:

1. Ability to define structure property relationships of advanced engineering materials
2. Ability to conduct failure diagnosis of simplified failure cases of engineering structures
3. Ability to improve the performance of engineering structures through tailoring materials microstructure and manufacturing processes
4. Ability to communicate the project outcomes with group members and other team members
5. Develop research skills for acquiring in-depth knowledge in a particular area of advanced materials engineering for the various assessments.
6. Develop skills for successful project management in a team environment

MECH5361
Foundations of Mechanics of Solids 2

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** AMME5301 **Prohibitions:** MECH3361 **Assumed knowledge:** Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The UoS aims to: teach the fundamentals of analyzing stress and deformation in a solid under complex loading associated with the elemental structures/components in aerospace, mechanical and biomedical engineering; develop the following attributes: understand the fundamental principles of solid mechanics and basic methods for stress and deformation analysis of a solid structure/element in the above mentioned engineering areas; gain the ability to analyze problems in terms of strength and deformation in relation to the design, manufacturing and maintenance of machines, structures, devices and elements in the above mentioned engineering areas.

At the end of this unit students will have a good understanding of the following: applicability of the theories and why so; how and why to do stress analysis; why we need equations of motion/equilibrium; how and why to do strain analysis; why we need compatibility equations; why Hooke's law, why plasticity and how to do elastic and plastic analysis; how and why to do mechanics modeling; how to describe boundary conditions for complex engineering problems; why and how to solve a mechanics model based on a practical problem; why and how to use energy methods for stress and deformation analysis; why and how to introduce plates and shells and how to do analysis for plate and shell structures; why and how to do stress concentration analysis and its relation to fracture and service life of a component/structure; how and why to do fundamental plastic deformation analysis; how and why the finite element method is introduced and used for stress and deformation analysis. The ultimate outcome is that the students have the ability to solve engineering problems by comprehensively using the skills attained above.

Textbooks

Textbook:
Zhang, L.,Solid Mechanics for Engineers, Macmillan/Palgrave, Edn:,2001,
Reference:
Timoshenko & Goodier,Theory of Elasticity, McGraw Hill, Edn:,1951,
Chakrabarty,Theory of Plasticity, McGraw-Hill, Edn:,1987,
Chandrupatla and Belegundu,Introduction to Finite Elements in Engineering, Prentice Hall, Edn:,1991,
Courtney,Mechanical Behaviour of Materials, McGraw Hill, Edn:,1990,
Crandall, et al.,An Introduction to the Mechanics of Solids, McGraw Hill, Edn:,1978,

MECH5362
Foundations of Materials 2

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** AMME5302 **Prohibitions:** MECH3362 **Assumed knowledge:** Mechanics of solids: statics, stress, strain **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to understand the relationship between properties of materials and their microstructures and to improve mechanical design based on knowledge of mechanics and properties of materials.

At the end of this unit students should have the capability to select proper materials for simple engineering design.

Course content will include: 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.

MECH5400
Foundations of Mechanical Design 1

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures, 4 hours of tutorials and 1 hour of computer lab per week **Assumed knowledge:** Engineering Mechanics (statics and dynamics), AMME5301 Mechanics of Solids **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

For students to experience the design process and to develop good engineering skills.

Course Objectives: To develop an understanding of: 1. the need for and use of standard drawings in the communication and definition of parts and assemblies, 2. creativity, 3. the design process, 4. methods used to analyse designs.

MECH5410
Advanced Design and Analysis 1

Credit points: 3 **Session:** Semester 1 **Classes:** 2 hrs of lectures, 2hrs of tutorial per week. **Assumed knowledge:** ENGG1802 - Eng Mechanics, balance of forces and moments AMME2301 - Mechanics of Solids, 2 and 3 dimensional stress and strain AMME2500 - Engineering Dynamics - dynamic forces and moments. MECH2400 - Mechanical Design 1, approach to design problems and report writing, and preparation of engineering drawing MECH3460 - Mechanical design 2, means of applying fatigue analysis to a wide range of machine components **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This UoS utilises assumed theoretical knowledge and skills to elucidate the stresses and strains that exit in the different categories of machine parts. It sets out to make the students familiar with the simplifications that are applied to arrive at the analytic expressions commonly used to analyse each individual categories parts. These simplifications usually begin by assuming that only particular types of loads are carried by teh parts in that category. The resulting analyses provide approximations to the actual stresses. It is possible to have different degrees of simplifications, requiring more or less work, giving better or poorer approximations. Should a part be used to carry loads that were not allowed for in the traditional method then some more appropriate method must be found or developed. An important aspect is to make the student

practiced in a range of modern concepts, techniques and tools, and to be made aware of their strengths and limitations.

This UoS teaches the student how to recognise where and how their theoretical skills can be applied to the practical situations that they may encounter in this field of design.

Options may be provided in the choice of design assignments. Biomedical engineering and vehicle design problems may be provided as options to more general machine design problems.

MECH5660
Foundations of Manufacturing Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Assumed knowledge:** AMME5200, AMME5301, AMME5302 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit aims to teach the fundamentals of manufacturing processes and systems in mechanical, mechatronic and biomedical engineering, including traditional and advanced manufacturing technologies. This unit aims to develop the following attributes: to understand the fundamental principles of manufacturing technologies for the above mentioned engineering areas; to gain the ability to select existing manufacturing processes and systems for direct engineering applications; to develop ability to create innovative new manufacturing technologies for advanced industrial applications; to develop ability to invent new manufacturing systems.

At the end of this unit students will have a good understanding of the following: merits and advantages of individual manufacturing processes and systems; principles of developing new technologies; comprehensive applications and strategic selection of manufacturing processes and systems.

Course content will include: Manufacturing Processes: Common processes and their science (machining, casting, powder metallurgy, metal working, welding, polymer processing and composite manufacture); merits and limitations; NC and CAM; Introduction to advanced processes (sensor and actuator, IC, intelligent robots and biomedical and nano-technological device).

Manufacturing Systems: Economics in manufacturing; flexible manufacturing; just-in-time manufacturing; group technology; materials selection and requirements planning; quality control; introduction to new technology; introduction to e-manufacturing; human factors; plant layout.

Textbooks

Reference:

Amirouche, Farid,Principles of Computer-Aided Design and Manufacturing, Pearson Prentice Hall, Edn:2nd,2004,0 13 064631 8

Black, S.C., Chiles, V., Lissaman A.J. and Martin, S.J.,Principles of Engineering Manufacture, Arnold, Edn:,1996,0 470 23558 6

Chang, Tien-Chien, Wysk, Richard A. and Wang, Hsu-Pin,Computer-Aided Manufacturing, Pearson Prentice Hall, Edn:3rd,2005,0 13 129334 6

De Garmo, Black and Kosher,Materials and Processes in Manufacturing, Prentice-Hall, Edn:,1997,

Kalpakjian,Manufacturing Processes for Engineering Materials, Addison-Wesley, Edn:3rd,1997,

Kalpakjian,Manufacturing Engineering and Technology, Addison-Wesley, Edn:,1995,

Oberg, E. , Jones F.D. and Horton, H.L.,Machinery's Handbook, Industrial Press Inc., Edn:,2000,0 8311 2625 6

Rembold, Blume and Dillmann,Computer-Integrated Manufacturing Technology and Systems, Marcel Dekker, New York, Edn:,1985,

Yusuf Altintas,Manufacturing Automation, Cambridge, Edn:,2000,0-521-65973-6

MECH5701
Computers in Real Time Control and Inst

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 3 hours of tutorials per week **Prohibitions:** MECH4730 Computers in Real-Time Control and Inst MECH4710 Microprocessors in Engineered Products **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Syllabus Summary: Overview of the IBM PC architecture and I/O Interfaces. System Software Design Concepts. Programming for interactive control using C Programming Language. Multitasking systems. Timers, Interrupts, Process and Threads, Interprocess Communication, Asynchronous tasks, data communication. Structured data, use of structures in C for RT control. High Performance Real time operating systems and Cross Development platform.

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 / event driven multitasking systems.

Unit of Study Aims/Goals: There are three key focus areas:

1. An understanding of embedded system software system design.

2. An understanding of the modern Developing tools for Real time embedded systems;

3. An understating of how to organize, design and implement a complex Real time system.

In order to attain these key understandings the aims of this subject are

1. To learn the fundamental principles and requirements of real time software design

2. To understand the basic components of an embedded systems,

3. To learn, appreciate and understand the various stages that need to be completed in a large software system implementation

4. To learn the capabilities of a typical high performance real time operating system

MECH5720
Sensors and Signals

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prohibitions:** MECH4720 Sensors and Signals **Assumed knowledge:** Strong MATLAB skills **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Syllabus Summary : This course starts by providing a background to the signals and transforms required to understand modern sensors. It goes on to provide an overview of the workings of typical active sensors (Radar, Lidar and Sonar). It provides insight into basic sensing methods as well as aspects of interfacing and signal processing. It includes both background material and a number of case studies.

The course covers the following topics:

a) SIGNALS: Complex signals, The Fourier Transform, Modulation, Frequency shifting & Convolution

b) PASSIVE SENSORS: Infrared Radiometers, Imaging Infrared, Passive Microwave Imaging & Image Intensifiers

c) ACTIVE SENSORS THE BASICS: Operational Principles, Time of flight (TOF) Measurement & Imaging, Range Tracking, Doppler Measurement, Phase Measurement

d) SENSORS AND THE ENVIRONMENT: Atmospheric Effects, Target Characteristics, Clutter Characteristics, Multipath

e) ACTIVE SENSORS: ADVANCED TECHNIQUES: Probability of Detection, Angle Measurement and Tracking, Combined Range/Doppler and Angle Tracking, Frequency Modulation and the Fast Fourier Transform, High Range Resolution, Wide Aperture Methods, Synthetic Aperture Methods (SAR)

Objectives: The course aims to provide students with a good practical knowledge of a broad range of sensor technologies, operational principles and relevant signal processing techniques.

Expected Outcomes: A good understanding of active sensors, their outputs and applicable signal processing techniques. An appreciation of the basic sensors that are available to engineers and when they should be used.

MECH5900
Thesis

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** No formal classes **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: 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.

MTRX5700
Experimental Robotics

Credit points: 6 **Session:** Semester 1 **Classes:** 2hrs lectures and 3hrs of laborarory work per week **Prerequisites:** AMME3500 or (MECH3500 and MECH3800); MTRX3700 or MECH3700 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to present a broad overview of the technologies associated with industrial and mobile robots. Major topics covered are sensing, mapping, navigation and control of mobile robots and kinematics and control of industrial robots. The subject consists of a series of lectures on robot fundamentals and case studies on practical robot systems. Material covered in lectures is illustrated through experimental laboratory assignments. The objective of the course is to provide students with the essential skills necessary to be able to develop robotic systems for practical applications. At the end of this unit students will: be familiar with sensor technologies relevant to robotic systems; understand conventions used in robot kinematics and dynamics; understand the dynamics of mobile robotic systems and how they are modeled; have implemented navigation, sensing and control algorithms on a practical robotic system; apply a systematic approach to the design process for robotic systems; understand the practical application of robotic systems in applications such as manufacturing, automobile systems and assembly systems; develop the capacity to think creatively and independently about new design problems; undertake independent research and analysis and to think creatively about engineering problems. Course content will include: history and philosophy of robotics; hardware components and subsystems; robot kinematics and dynamics; sensors, measurements and perception; robotic architectures, multiple robot systems; localization, navigation and obstacle avoidance, robot planning; robot learning; robot vision and vision processing.

School of Chemical and Biomolecular Engineering

CHNG5001
Process Systems Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** Lectures: 1 hour per week, Tutorials: 2 hours per week. **Prerequisites:** CHNG3801 Process Design CHNG3802 Operation, Analysis and Improvement of Industrial Systems CHNG3803 Design Practice 1 - Chemical & Biological Processes CHNG3805 Product Formulation and Design CHNG3806 Management of Industrial Systems CHNG3807 Design Practice 2 - Products and Value Chains **Assumed knowledge:** Enrolment in this unit of study assumes that the equivalent to all (six) core chemical engineering UoS in third year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is an advanced elective in chemical engineering. The concepts and enabling technologies taught in this course are relevant to the real world practice of chemical engineering across a range of industries.

Aims and Objectives

Whatever its purpose, any process requires some level of process monitoring and control to allow it to operate satisfactorily. Once a process is under control, the option exists to further improve performance via the implementation of some level of optimisation.

This UoS will develop skills in integrating process modelling, simulation, design, optimisation and control concepts.

The aims of this UoS are (i) to demonstrate that modelling, process control and optimisation are integral concepts in the overall consideration of industrial plants, (ii) to demonstrate that a unified approach allows a diversity of application fields to be readily handled, and (iii) to allow each student to achieve and demonstrate acceptable competency over the UoS material through a range of individual and group-based activities.

Learning Outcomes

By the end of this UoS a student should have acceptable competence in the following:

1.Process data management skills relevant to systems engineering (statistical analysis, data-based modelling and data reconciliation techniques).

2.Appreciation of the role of process systems engineering in modern manufacturing.

3.Modelling a process and designing an appropriate control system, as well as analysing its performance for a range of process applications using both traditional and software-based techniques.

4.Appreciation of the role of process optimisation in modern manufacturing.

5.Use of both traditional and software-based techniques to design optimisation schemes for a range of process applications. Analyse the performance of such schemes.

6.Appreciate the limitations that exist whenever mathematical models are used as the basis for process control and/or optimisation of a real system.

7.Appreciate the 'vertical integration' that exists from process modelling, through process control, to process optimisation.

CHNG5003
Green Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures, 3 hours of tutorial/project work group per week. **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Green engineering, eco-technology and sustainable technology are all interchangeable terms for the design of products and processes that maximise resource and energy efficiency, minimise (or preferably eliminate) waste and cause no harm to the environment. In modern society, engineers equipped with the skills to develop sustainable technologies are tremendously valuable. This unit of study will examine cutting edge examples of sustainable technologies across a broad range of applications relevant to chemical and biomolecular engineering. The delivery of teaching and learning material will be exclusively in project mode. Students will be expected to critically analyse modern engineering processes and improve them, from the ground up if necessary, so that they satisfy the criteria of eco-design. At the completion of this unit of study students should have developed an appreciation of the underlying principles of green engineering and be able to demonstrate they can apply these skills to new and novel situations. Students are expected to develop an integrated suite of problem-solving skills needed to successfully handle novel (and previously unseen) engineering situations, coupled with an ability to independently research new areas and be critical of what is found, and an ability to cope with experimental data, change and uncertainty through critical thinking.

CHNG5004
Particles and Surfaces

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. 10 hours of lab work per semester. **Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year and all unit operations have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Particles and Surfaces: Mineral Processing. Aims and Objectives: Solid-solid and solid-liquid interactions are an important aspect in mineral processing. The aim of any mineral processing operation is the efficient extraction of the valuable metals or minerals (concentrate) from the waste materials in the ore (gangue). The goal of this course is to understand the various key steps and the corresponding principles required to achieve metal extraction from the ores.

Syllabus summary: This course will elucidate the principles in size reduction or comminution of the ore in liberating the valuable minerals, examine the microscopic details of solid-liquid, solid-gas and solid-solid interactions in mineral processing and their roles in macroscopic phenomena such as adhesion, wetting, adsorption, and mineral reactions such as reduction roasting and leaching. The general understanding of these factors will allow manipulation and improvement of performance in mineral beneficiation, dewatering of mineral slurries and extractive metallurgy.

By the end of this course students should develop a proficiency in characterisation of physical, surface and chemical properties of solids and metal aqueous streams; devising strategies to achieve extraction process objectives, within the constraints imposed by social, economic and physical environments, developing management strategies for treating liquid and solid effluents and becoming familiar with computer software packages in modelling aqueous and solid systems.

CHNG5005
Wastewater Eng - Systems and Practice

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. Lab work. **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives: To acquaint students with issues involved in making decisions in an environmental context. The important example of wastewater treatment and the accompanying technologies will be used to illustrate the main issues which arise. The key issues which need to be considered are : An operational paradigm for the process industries; Why waste is inevitable; The regulatory framework; Hazard rating of process wastes; Physical treatment technologies; Chemical treatment technologies; Biological treatment technologies; Waste containment practices.

By the end of this UOS a student should be able to : gain an operational and legal context for waste and specifically wastewater generation and treatment; develop an awareness and comprehensive understanding of technologies (physical, chemical and biological) which may be used as effective treatments for liquid and some solid waste streams, based on process principles; and explore issues pertaining to management of environmental hazards in the process industry.

CHNG5112
Found of Chemical Eng Design A

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** CHNG5801 Foundation of Process Design CHNG5802 Foundations of Operating and Improving Industrial Systems CHNG5805 Foundations of Product Formulation and Design CHNG5806 Foundations of Management of Industrial Systems **Assumed knowledge:** Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This UoS builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity.

This design activity is spread over two UoS (Chemical Engineering Design A and B) run in first and second semester. The primary aim in the first UoS is to consider the technical issues - with an emphasis on creating and evaluating a range of alternative options that exist at both the unit operation and complete flowsheet levels. The primary emphasis in the subsequent UoS is on evaluating how non-technical considerations affect the final process design and its operation.

In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to designing chemical processes and associated technological developments.

CHNG5116
Found of Chemical Eng Design B

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** CHNG5112 Chemical Engineering Design A **Assumed knowledge:** Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This UoS builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity.

This design activity is spread over two UoS (Chemical Engineering Design A and B) run in first and second semester. The primary aim in the first UoS is to consider the technical issues - with an emphasis on creating and evaluating a range of alternative options that exist at both the unit operation and complete flowsheet levels. The primary emphasis in this UoS is on evaluating how non-technical considerations affect the final process design and its operation.

In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to designing chemical processes and associated technological developments.

CHNG5601
Membrane Science

Credit points: 6 **Session:** Semester 1 **Classes:** 4 hours of lectures and laboratory sessions per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Students will be given a background in the physics of cell membranes.

The students will understand the electrodiffusion of materials through membranes.

Students will be provided with a good background in the electrical properties of cell membranes and gain an understanding of the process of excitation in nerve and muscle.

Expected outcomes: Students will be able to: Understand the physical and physico-chemical basis of processes in cell membranes; Understand the ubiquitous ion channel basis of nerve excitation and transport in cells; Be able to assess the physico-chemical basis of new developments in biotechnology, bionic devices and pharmacological areas and contribute to those developments; Understand the use of electroporation techniques for genetic engineering and animal cloning.

Syllabus summary: Self-assembly, molecular structure and function of cellular membranes. Ion partitioning and electrical properties. Fixed charge membranes, Electrodiffusion, Nernst potentials, osmotic relations, chemio-osmotic hypothesis. Ion channels and other protein nano-machines. Nerve excitation, the Hodgkin-Huxley equations. Excitation in cardiac and other tissues. Membrane stability, electrical breakdown in cell membranes. Biotechnology applications including electroporation techniques for genetic engineering and animal cloning.

CHNG5602
Cellular Biophysics

Credit points: 6 **Session:** Semester 1 **Classes:** 4 hours of lectures/ project work classes per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Students will be given a good background in the physics of biological processes. Students will understand the differences between thermodynamically closed and open systems and its relevance to cells and other biological systems. Students will be provided with an introduction to the thermodynamics of irreversible and evolutionary processes of relevance to biology. Students will be introduced to the statistical mechanics of self assembly and equilibrium structures and its relevance to biology at the molecular level.

CHNG5603
Analysis, Modelling, Control: BioPhy Sys

Credit points: 6 **Session:** Semester 1 **Classes:** Four hours of lectures or tutorials per week. **Assumed knowledge:** It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus MATH 1003 Integral Calculus and Modeling **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This course will give students an insight into the use of (computer-based) statistical techniques in extracting information from experimental data obtained from real life bio-physical systems. The issues and techniques required for mathematical modeling as well as monitoring and/or control scheme for bio-physical systems will be discussed and implemented in diverse range of bioprocesses, including biomaterials and fermentation products.

We will review statistical distribution; tests based on z, t, F variables; calculation of confidence intervals; hypothesis testing; linear and nonlinear regression; analysis of variance; principal component analysis; and use of computer-based statistical tools. The issues associated with dynamic response of bio-physical processes; inferred or estimated variables; control system design and implementation; introduction to model-based control; use of computer-based control system design and analysis tools will be elaborated.

When this course is successfully completed you will acquire knowledge to choose the appropriate statistical techniques within a computer based environment, such as Excel or MATLAB, for a given situation. The students will also obtain potential for monitoring/control scheme based on the key dynamic features of the process. Such information would be beneficial for any future career in Bio-manufacturing companies. Students are encouraged to promote an interactive environment for exchange of information.

CHNG5604
Membrane Science Laboratory

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures or tutorials per week. 4 hours of laboratory sessions per week . **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives: Students will explore experimentally the theoretical concepts learned in the other Biophysics modules. They will gain practical insights into electrodiffusion and other mass transport processes through membranes. Students will understand the construction and functional properties of synthetic separation membranes. Students will explore experimentally the various factors affecting the performance of synthetic separation membranes.

Expected outcomes:

Students will: obtain an enhanced appreciation of the science and technology of membranes; apply concepts learned in the theoretical courses to practical problems; develop membrane-based devices for water purification or waste water management; be in a position to assess and correct problems encountered in membrane based processes.

Syllabus summary:

The course is comprised of a series of some 20 integrated, in depth, laboratory based exercises and analytical problems. Topics include:

Construction and structure of synthetic membranes. Reverse osmosis, nanoflitration and microfiltration membranes. Flux measurements, pore characteristics. Ion exchange membranes. Electrodiffison, membrane potentials, Goldman equation, streaming potentials. Electrodialysis.

CHNG5605
Bio-Products: Laboratory to Marketplace

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of the course are to provide students with an overview of biochemical and pharmaceutical industry. It will give students an insight into drug delivery systems and formulation; how therapeutic drugs work; and a general overview of biochemical and pharmaceutical marketing. The design and management of clinical trials, which are key factors for development of any new therapeutic agent will also be covered in the course. The challenges for commercialisation of innovative methods and/or biochemical and pharmaceutical products and aspects of intellectual property protection will be elaborated. Ultimately the aspects of Good Manufacturing Practice (GMP) and international legislation for marketing pharmaceutical products will be illuminated.

Lectures in this course will be delivered by both University of Sydney staff and by a number of visiting professional representatives from industry and government agencies. We will also arrange a site visit for a bio-manufacturing company as warranted.

When you successfully complete this course you acquire knowledge about drug formulation, pharmaceutical processing including physical processes, legislation governing the bio-manufacturing and commercialisation of biochemicals and pharmaceuticals. The information would be beneficial for your future career in pharmaceutical manufacturing companies.

Students are encouraged to engage in an interactive environment for exchange of information. This course will be assessed by quizzes, assignments, oral presentation and final report.

CHNG5701
Found of Conservation & Transport Proc

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours lectures , 2 hours tutorials per week. 8 hours of laboratory work. **Prohibitions:** CHNG2801 **Assumed knowledge:** Calculus, computations (Matlab, Excel), Mass and Energy Balances **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

In the design and analysis of chemical processes, chemical engineers must understand integrated concepts in conservation of mass and energy, the flow properties of fluids, heat transfer and the mass transfer of chemical species through materials. This is true not only in traditional areas, such as petrochemicals, but also for emerging fields like microreactors and biotechnology. This course is an introduction to the basic concepts in transport phenomena necessary for subsequent courses ranging from unit operations to reactor design and reaction kinetics. The course builds on concepts from elementary physics and chemistry, as well as calculus and differential equations.

This module will provide students with working knowledge of conservation of mass and energy, momentum, mass and energy transfer, and non-reaction rate processes. These aspects are a first step to the understanding of transport phenomena. It considers the classification of fluids and their properties. The integral and differential forms of the fundamental equations - Continuity, Momentum and Energy equations are studied. The concepts of transfer rates of momentum, heat and mass as functions of appropriate driving forces divided by appropriate resistances will be introduced. The way in which such resistances and driving forces are defined will be reviewed. Also covered are dimensional analysis and the differences between molecular diffusion and convection (bulk flow) of mass, heat and momentum.

In addition, there will be considerable time spent during the semester on advanced topics related to the analysis of conservation and transport processes in engineering, and recent associated technological developments.

CHNG5702
Found of Applied Maths for Chem Eng

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Assumed knowledge:** Enrolment in this unit of study assumes that all core science and engineering UoS in first-year (or their equivalent) have been successfully completed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Aims and Objectives

Virtually every aspect of a chemical engineer's professional life will involve some use of mathematical techniques. Not only is the modern chemical engineer expected to be proficient in the use of these techniques, they are also expected to be able to utilise computer-based solutions when analytical solutions are unfeasible. This UoS aims to expose students to an appropriate suite of techniques and enable them to become proficient in the use of mathematics as a tool for the solution of a diversity of chemical engineering problems.

Specifically, this unit consists of two core modules: (A) Statistical methods and (B) Numerical methods. These modules aim at furthering knowledge by extending skills in statistical analysis and Chemical Engineering computations. This unit will also enable the development of a systematic approach to solving mathematically oriented Chemical Engineering problems, which will help with making sound engineering decisions.

In addition, there will be considerable time spent during the semester on advanced topics related to mathematical analysis techniques in engineering and recent associated developments.

CHNG5703
Found of Energy and Fluid Systems

Credit points: 6 **Session:** Semester 1 **Classes:** 8 hours per week of in class project work. **Assumed knowledge:** Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To recognise that chemical engineers are involved in creation of products and processes, in manipulating complex systems, and in managing technical operations To develop an appreciation of the practical application of concepts and tools to real design problems in the process, product and service sectors in which chemical engineers are engaged. To consider this through three project-driven case studies covering a range of integrated analysis scenarios, from the domain of energy and fluid systems. In addition, there will be considerable time spent during the semester on advanced topics related to energy and fluid systems and associated technological developments.

CHNG5704
Found: Chem & Biological Syst Behaviour

Credit points: 6 **Session:** Semester 2 **Classes:** 1-2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** MATH1001, MATH1002, MATH1003, MATH1005, CHEM1101, CHEM1102, CHNG1103 **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

Chemical Engineering requires an understanding of material and energy transformations and how these are driven by molecular interactions. The rate of such transformations is dependent on driving forces and resistances, and these need to be defined in terms of fundamental physical and chemical properties of systems.

This course seeks to provide students with a sound basis of the thermodynamics of chemical and biological systems, and how these, in turn, define limits of behaviour for such real systems. The thermodynamic basis for rate processes is explored, and the role of energy transfer processes in these highlighted, along with criteria for equilibrium and stability. Emphasis is placed on the prediction of physical properties of chemical and biological systems in terms of state variables. The course delivery mechanism is problem-based, and examples from thermal, chemical and biological processes will be considered, covering molecular to macro-systems scale.

In addition, there will be considerable time spent during the semester on advanced topics related to the analysis of the behaviour of chemical and biological systems, and recent associated technological developments.

CHNG5801

Foundations of Process Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

In the design and analysis of diverse processes, chemical engineers must understand the (often complex) interactions that occur between mass and energy conservation, fluid flow, rate-driven processes and thermodynamic equilibria. This course builds on introductory concepts in each of these areas introduced in second year units of study. This unit of study will commence with a study of the thermodynamic criteria that define equilibrium conditions with an emphasis on vapour-liquid and reactive systems. A unified treatment of rate-driven processes will then be provided with examples taken from a number of fields. A classification system (steady-state or dynamic; rates based on bulk conditions or a population balance approach; homogeneous or heterogeneous) will be developed. Kinetic rate laws and their determination from experimental data will be presented. The second component will concentrate on (i) using the above to model a range of process equipment, and (ii) the solution of such models (both steady-state and dynamic) using the appropriate software tools. The final component will focus on how unit operations are integrated into a process flowsheet. Software tools for flowsheet solution will be introduced. The impact of heat integration and recycle streams will be considered. Examples will cover a diversity of process industries. In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to process design and associated technological developments. The overall aims of this unit of study are (i) to demonstrate the 'vertical integration' that exists from engineering concepts through unit operations to complete flowsheets, (ii) to demonstrate that a unified approach allows a diversity of fields to be handled via a consistent, common approach, and (iii) to allow each student to achieve and demonstrate acceptable competency over the UoS material through a range of individual and group-based activities.

CHNG5802

Found: Operation & Improving Ind Systems

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **Prohibitions:** CHNG3802 **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

All industrial processes require some process monitoring and control for satisfactory operation. The efficient use and recovery of energy is vital for industrial processes. The performance of a process may be improved via the implementation of some level of optimisation.

This unit of study commences with a component on process data management before moving on to empirical modelling and data reconciliation techniques. The second component will concentrate on the role of process control covering: the development of linear models, control system analysis, the design and performance of feedback control systems, advanced control systems and the use of control related software.

In parallel, this unit of study also focuses on the efficient use of energy in processes plants.

The final component will focus on process optimisation of batch and continuous processes.

By the end of this UoS a student should achieve competence in the following: process data management skills relevant to engineering (statistical analysis, data-based modelling and data reconciliation techniques); appreciation of the role of process control in modern manufacturing; designing an appropriate feedback control system and analysing its performance for a range of process applications using both traditional and software-based techniques; appreciation of the limitations of feedback control and be able to design a range of common enhancements; appreciation of the role of process optimisation in modern manufacturing; use of both traditional and software-based techniques to design optimisation schemes for a range of process applications and analyse the performance of such schemes; appreciate the limitations that exist whenever mathematical models are used as the basis for process control and/or optimisation; appreciate the 'vertical integration' that exists from modelling, through control, to optimisation.

The overall aims of this UoS are (i) to demonstrate that process control and optimisation are integral concepts in the overall consideration of any modern plant, (ii) to demonstrate that a unified approach allows a diversity of application fields to be readily handled via a consistent approach that is 'vertically integrated' from data analysis, though process control to process optimisation, and (iii) to allow each student to achieve and demonstrate acceptable competency over the UoS material through a range of individual and group-based activities.

CHNG5803

Found of Chem & Biological Processes

Credit points: 6 **Session:** Semester 1 **Classes:** 4 hours of in-class project work per week. **Prerequisites:** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **Prohibitions:** CHNG3803 **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative and quantitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

To recognise that chemical engineers are involved in the creation of products and processes, in manipulating complex systems, and in managing technical operations.

To develop an appreciation of the practical application of concepts and tools to real design problems in the process, product and service sectors in which chemical engineers are engaged.

To consider this through three project-driven case studies covering a range of design scenarios, from the domain of chemical and biological processes.

In addition, there will be considerable time spent during the semester on advanced topics related to chemical and biological processes, and associated technological developments.

CHNG5804

Found of Biochemical Eng

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures, 1 hour of tutorials per week. 10 hours of laboratory work per semester. **Prohibitions:** CHNG3804 **Assumed knowledge:** First year mathematics (MATH1001 Differential Calculus; MATH1002 Linear Algebra; MATH1003 Integral Calculus; MATH1005 Statistics; or equivalents). -First year chemistry (CHEM1101 Chemistry 1A; CHEM1102 Chemistry 1B; or equivalents) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

Biochemical engineering is increasingly playing an important role in technology to modern society. The engineers with knowledge of various aspects of biochemical processes are tremendously valuable. The course will examine cutting edge examples of biochemical technologies across a broad range of applications relevant to chemical engineering. The specific objectives of this course are to understand the history and scope of the biotechnology industry; examine the role of biochemical engineering in the industrial application of biotechnology and its development. We will provide an understanding of the major fundamental aspects of biochemical engineering and implementing the knowledge acquired to some selected industrial applications.

In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to biochemical engineering and associated technological developments.

CHNG5805
Foundation of Prod Formulation & Design

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 1 hours of tutorials per week. **Prerequisites:** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

Many products emerge from their processing not as a continuous stream, but as discrete entities. There are many examples of discrete systems in chemical engineering, such as particulate systems (eg powders, solid particles in fluids), as well as polymeric and biological systems (eg emulsions and cells, respectively). Indeed, on a larger scale, a batch processing system itself can be thought of as a series of discrete but connected entities. This course is an introduction to the basic concepts in discrete systems necessary for a chemical engineer to be able to formulate and design discrete products which have desired properties. In essence it is a course on product formulation and design.

This module will provide students with a working knowledge of the types of discrete systems available, the ways in which particulate systems can be characterized and their applications in industry. These aspects will form the foundation for an introduction of the modelling techniques used for discrete systems, such as population balances and batch scheduling.

In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to the formulation and design of a variety of products, as well as the associated recent technological developments.

CHNG5806
Found of Manag of Industrial Syst

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 3 hours of tutorials per week. **Prerequisites:** CHNG5701 Foundations of Conservation and Transport Processes, CHNG5702 Foundations of Applied Maths for Chemical Engineers, CHNG5704 Foundations of Chemical and Biological Systems Behaviour and CHNG5705 Foundations of Industrial Systems and Sustainability **Prohibitions:** CHNG3806 **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims and Objectives

To develop an appreciation of management practice in process-led and product-driven industries; considering project management, economic evaluation of processes, risk assessment and decision making with multiple objectives and uncertainty.

To develop the requisite tools to support above

To consider approaches to innovation and entrepreneurship

To consider all this in the context of different scales of operation - from single process, to business unit, to enterprise, and across supply and value chains.

To support this analysis through real-problem case studies and projects.

To study, in addition to the above fundamentals, advanced topics related to the management of industrial systems and recent associated developments in this field.

CHNG5901
Project Part A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal classes. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with your supervisor. The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their supervision approval to the Postgraduate Administrator. Only one Project per semester can be taken, however, it can be supplemented with a 2 credit point Seminar in which supplementary work, and an oral presentation related to the Project can be carried out.

CHNG5902
Project Part B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** no formal classes **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with your supervisor. The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their consent to supervise to the Postgraduate Administrator. Only one Project per semester can be taken, however, it can be supplemented with a 2 credit point Seminar in which supplementary work, and an oral presentation related to the Project can be carried out.

CHNG5906
Extended Project

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** no formal classes. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Objectives:

For the student to complete an extended research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued report.

Expected outcomes: By completing this unit of study the student will obtain advance knowlege in their field of research, will be able to conduct comprehensive lliterature review, access to relevant data bases, write technical reports and learn about various analytical techniques. Students will be able to conduct research and aquire skills for independent learning.

Syllabus summary:

In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with the supervisor. The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their supervision approval to the Postgraduate Administrator.

CHNG5907
Extended and Enhanced Project

Credit points: 24 **Session:** Semester 1, Semester 2 **Classes:** no formal classes. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Objectives: To complete an extended and enhanced research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued, in-depth thesis.

Expected outcomes: Students will be able to: Develop research skills and to cope with ambiguity; Select appropriate engineering principles to solve an open-ended problem; Understand that engineering is practised in non-ideal, poorly defined situations. A good engineer is able to successfully solve problems in these situations.

Syllabus summary: In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with the supervisor. The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their supervision approval to the Postgraduate Administrator.

School of Civil Engineering

CIVL5257
Concrete Structures: Prestressed

Credit points: 6 **Session:** Semester 1 **Classes:** 3-hr combined lecture and tutorial per week. **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives: To develop an advanced understanding of the behaviour, analysis and design of prestressed concrete structures.

Outcomes: Students will develop skills in the analysis and design of prestressed concrete beams, columns and slabs, to satisfy the serviceability and strength provisions of the Australian Concrete Structures Standard.

Syllabus Summary: The behaviour and design of prestressed concrete structures and structural elements including beams, columns and slabs. Topics covered will include steel and concrete materials, prestress losses, flexural and shear behaviour at service loads and ultimate loads, short and long term deflections, load balancing, anchorage zones (including strut and tie modelling of anchors), dynamic response of post-tensioned floors, and sustainability considerations for prestressed concrete structures.

Textbooks

Reference books:
Warner et al, Concrete structures (Longman)
Australian Standard AS 3600 Concrete Structures

CIVL5264
Composite Steel-Concrete Structures

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 1 hour of tutorials per week **Prerequisites:** BE or equivalent **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Students will understand the basic principles for the design of steel-concrete composite structures. In particular, they will develop an understanding of the procedures required for the design of composite beams, slabs and columns; they will also be introduced to the concepts of composite connection design. Design guidelines will reflect requirements of the Australian Standards, Eurocodes, British Standards and American Standards.

Textbooks

References:
AS2327.1:2003, Composite structures - Part 1: Simply supported beams. Sydney: Standards Australia, 2003.
Eurocode 4:2004, EC4 Design of composite steel and concrete structures - Part 1.1: general rules and rules for buildings, British Standards Institution, 2004.
Johnson RP and Anderson D. Designers' handbook to Eurocode 4. Thomas Telford, London, 1993.
Johnson RP. Composite structures of steel and concrete. 3rd edn. Blackwell Scientific Publications, Oxford, UK. 2004.
Nethercot D. Composite construction. Routledge, London, 2003.
Oehlers DJ and Bradford MA. Composite steel and concrete structural members: fundamental behaviour. Pergamon Press, Oxford, 1995.

CIVL5266
Steel Structures - Stability

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hrs of lecture and 2hrs of tutorial/laboratory per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Objectives:

This Unit aims to:

- provide fundamental understanding at advanced level of the behaviour and design steel structural members, notably members undergoing cross-sectional and/or global buckling.

- provide fundamental understanding of the methods available for determining buckling loads of structural members and elements, and explain how classical solutions to buckling problems are incorporated in national design standards for steel structures, including AS4100 and AS/NZS4600.

Outcomes:

It is anticipated that at the end of this unit of study students will be familiar with the buckling behaviour of steel structures and will understand the methods available for determining buckling loads of structural members and cross-section. Students will have a good understanding of the stability design provisions for steel structures specified in the standards AS4100 and AS/NZS4600, and will be proficient in using software for calculating buckling loads.

Syllabus Summary:

Stability theory, Plate theory, Stability of plates and plate assemblies, Theory for thin-walled members in torsion and bi-axial bending, Stability of thin-walled members, Stability design to AS4100 and AS/NZS4600, Direct Strength Method.

Textbooks

Lecture notes:
- Lecture notes compiled by Kim Rasmussen and Greg Hancock
Reference Books:
- The Stability of Flat Plates, by PS Bulson, Chatto & Windus, London, 1970.
- Flexural-torsional buckling of steel structures, by NS Trahair, E & FN Spon, 1992.
- NS Trahair, MA Bradford and DA Nethercot, The Behaviour and Design of Steel Structures to BS 5950 Part 1, 3rd Edition, Chapman and Hall, London, 1998.
- GJ Hancock, Design of Cold-Formed Steel Structures to AS/NZS 4600, AISC, 1998.
- GJ Hancock, TM Murray and DS Ellifritt, Cold-Formed steel structures to the AISI Specification, Marcel Dekker, New York, 2001.
- AS 4100: 1998, Steel Structures, Standards Australia, Sydney, 1998.
- AS/NZS 4600: 2005, Cold-formed Steel Structures, Standards Australia, Sydney, 2005.
Relevant Australian Standards
- AS 4100-1998 Steel Structures
- AS 4100-1999 Commentary to AS 4100
- AS/NZS 4600:2005 Cold-formed Steel Structures
Recommended alternative:
- HB 2.2: Australian Standards for Civil Engineering Students, Part 2 - Structural Engineering

CIVL5267
Steel Structures - Advanced Design

Credit points: 6 **Session:** Semester 1 **Classes:** 3-hr combined lecture and tutorial per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives:

This Unit covers the advanced principles of the design of hot-rolled and cold-formed steel structural members and connections. Reference is made to the Australian Standards AS4100 and AS/NZS4600, explaining the underlying theory for the provisions of these standards. The objectives are to provide students with advanced knowledge of steel structural design and confidence to apply the underlying principles to solve a wide range of structural steel problems.

Outcomes:

This Unit will provide students with the following knowledge and skills:

- An understanding of the basic principles of reliability based design on steel structures.

- An understanding of the relationship between structural analysis and design provisions.

- An understanding of the background to the design provisions for hot-rolled and cold-formed steel structures, including the main differences between them.

- Proficiency in applying the provisions of AS4100 and AS/NZS4600 for columns, beams, beam-columns and connections.

Syllabus Summary:

Limit states design philosophy and approaches, Loading standards, Methods of analysis, Flexural members section and member capacity, Compression members section and member capacity, Beam-column member and section capacity, Interrelationship between analysis and design, pinned (shear) and rigid (moment) connections.

Textbooks

Lecture notes:
- Advanced Structural Steel Design, compiled by Greg Hancock & Kim Rasmussen

Reference Books
- NS Trahair, MA Bradford and DA Nethercot, The Behaviour and Design of Steel Structures to BS 5950 Part 1, 3rd Edition, Chapman and Hall, London, 1998.
- GJ Hancock, Design of Cold-Formed Steel Structures to AS/NZS 4600, AISC, 1998.
- GJ Hancock, TM Murray and DS Ellifritt, Cold-Formed steel structures to the AISI Specification, Marcel Dekker, New York, 2001.
- AS 4100: 1998, Steel Structures, Standards Australia, Sydney, 1998.
- AS/NZS 4600: 2005, Cold-formed Steel Structures, Standards Australia, Sydney, 2005.
- Australian Steel Institute (ASI), Design of Structural Steel Connections, suite of various design manuals and handbooks.

Library Classifications
624.17, 624.18, 691.7.

CIVL5268
Structural Dynamics

Credit points: 6 **Session:** Semester 2 **Classes:** 3-hr combined lecture and tutorial per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives:

This Unit introduces the fundamental concepts and theory of dynamic analysis. In a first step, free vibrations are studied and the problem of determining the natural frequency of a system is addressed. This is followed by the study of harmonically excited vibrations. While initially systems with a single degree of freedom (mass) are considered, the theory is generalized to cover multi-degree of freedom systems. The theory is applied to explain how structures are designed against earthquake and wind actions with specific reference to Parts 2 and 4 of the Australian loading standard AS1170 for determining wind and earthquake loads, respectively.

Outcomes:

This Unit will provide students with the following knowledge and skills:

- Understanding of the fundamental concepts and definitions used in structural dynamics

- Ability to calculate the natural frequency of a system using equilibrium or energy methods

- Ability to determine the effect of viscous damping on the response of a freely vibrating system

- Ability to determine the response of a system to a harmonic excitation

- Understanding of the fundamental concepts of earthquake engineering

- Ability to apply AS1170 Part 4 in structural design against earthquake actions

- Understanding of the fundamental concepts of wind engineering

- Ability to apply AS1170 Part 2 in structural design against wind actions

Syllabus Summary:

Natural vibration analysis of single and multi degree of freedom systems, Finite element procedures for dynamic analysis, Energy methods for vibration analysis, Introduction to Earthquake engineering strong ground motion, Seismic response of multi degree of freedom structures, Earthquake analysis methods and AS1170.4, Wind-induced loads and responses of structures, Free, damped, and forced vibration response of single degree-of-freedom systems to wind engineering, Spectral (frequency domain) analysis as applied to wind loading of structures, Wind loads on, and wind-induced dynamic response of tall buildings using AS/NZS1170.2.

Textbooks

Textbooks:
- Australian New Zealand Standard, Structural Design Actions Part 2: Wind Actions, AS/NZS 1170.2-2002, Standards Australia.
- Australian New Zealand Standard, Structural Design Action - wind actions - commentary (supplement to AS/NZS 1170.2:2002), AS/NZS 1170.2 Supp 1:2002, Standards Australia.
- Australian New Zealand Standard, Structural Design Actions Part 4: Earthquake Actions, AS/NZS 1170.4-2002, Standards Australia.
- Hancock, J.G. (1996). Dynamic Structural Analysis, The University of Sydney, Sydney.
- Notes shall also be handed out during class or available for download from WebCT.

Reference books:
- Cook, N.J., The designer's guide to wind loading of building structures, Part 1: Background, damage survey, wind data and structural classification, Butterworth, 1985.
- Cook, N.J., The designer's guide to wind loading of building structures, Part 2: Static Structures, Butterworth, 1985.
- Holmes, J.D., Wind Loading of Structures, Spon Press, 2001.
- Kwok, K.C.S. Wind induced vibrations of structures, Chapter 6, Structures subjected to dynamic loading, stability and strength, Ed. Narayanan R., and Roberts, T.M., Elsevier Applied Science, 1991.
- Lawson, T.V., Wind effects on buildings, Vol. 1 Design Applications, Applied Science Publishers, 1980.
- Lawson, T.V., Wind effects on buildings, Vol. 2 Statistics and Meteorology, Applied Science Publishers, 1980.
- Simiu, E. and Scanlan, R.H., Wind effects on structures, John Wiley and sons, 1996.
- Anil K. Chopra, Dynamics of Structures, Prentice Hall, 2001

CIVL5269
Concrete Structures - Strength & Service

Credit points: 6 **Session:** Semester 2 **Classes:** 4-hr combined lecture and tutorial per week. **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Objectives:

This Unit reviews the fundamental concepts of 'elastic' behaviour of reinforced concrete structures and introduces models of behaviour and methods of analysis related to the time-dependent effects of creep and shrinkage (at service loads). This Unit also examines the non-linear (strain-softening) behaviour of reinforced concrete and the related effects concerning the strength of statically-indeterminate reinforced concrete structures. In particular, this Unit examines the concepts of ductility, moment-redistribution and plastic design (for beams and slabs).

Outcomes:

This Unit will provide students with the following knowledge and skills:

- understanding of the fundamental concepts and theoretical models concerning the time-dependent structural effects of concrete creep and shrinkage

- ability to carry out calculations to estimate 'elastic' load-effects (stresses/strains/deformations) for reinforced concrete structures (at service loads), accounting for the time-dependent effects of concrete creep and shrinkage

- understanding of the fundamental concepts and theoretical models of the strain-softening behaviour of reinforced concrete (in flexure)

- understanding of the fundamental concepts and numerical models of ductility and moment redistribution for reinforced concrete beams

- ability to quantitatively assess the ductility and moment-redistribution capacity of reinforced concrete beams

- understanding of the fundamental concepts and numerical models of plastic behaviour and design for reinforced concrete beams and slabs (including yield-line analysis).

- ability to determine the ultimate plastic load-carrying capacity of statically-indeterminate reinforced-concrete beams and slabs

Textbooks

Textbooks:
Australian Standards - current editions
- AS3600 Concrete Structures Code
- AS HB2.2 Structural Engineering Standards
Reference Books:
- Wight JK & MacGregor JG, Reinforced Concrete: Mechanics and Design, Fifth edition, Pearson Prentice Hall, 2009.
- Warner RF, et al., Concrete Structures, Longman, 1998.

CIVL5351
Environmental Geotechnics

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures/project work per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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 advanced 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. 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 tailings dams, design of dams, water balances, rehabilitation, use of slope stability and seepage software.

CIVL5450
Analysis and Design of Pile Foundations

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lecture/project work in class per week. 3 hours of laboratory work per semester. **Assumed knowledge:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives: To develop an understanding of the modern principles of design of pile foundations and the application of those principles to practice.

Expected outcomes: Students should gain an advanced understanding of the types of pile foundations used in practice, and the procedures for analysis of pile foundations under various types of loading, and gain experience in carrying out pile design for real geotechnical profiles.

Syllabus summary: Types of piles and their uses, effects of pile installation, axial capacity of piles and pile groups, settlement of pile foundations, ultimate lateral capacity, lateral deformations, analysis of pile groups subjected to general loading conditions, piled raft foundations, piles subjected to ground movements, pile load testing, code provisions for pile design.

CIVL5451
Computer Methods in Geotechnical Eng

Credit points: 6 **Session:** Semester 1 **Classes:** 3-hr combined lecture and tutorial per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives and Outcomes

1. To introduce students to major computer modelling techniques used to solve boundary-value and initial-value problems in geotechnical engineering.

2. To develop students' skills at using computer modelling software to solve stress and flow problems in geomechanics.

3. To developed students ability at critically assessing assumptions behind computer models and critically evaluating the quality of numerical results.

Textbooks

Reference Books:
1. Potts DM and Zdravkovic L. 1999. Finite element analysis in geotechnical engineering. Thomas Telford, London.
2. Smith IM and Griffiths DV. 1982. Programming the finite element method, second edition, John Wiley & Sons, Chichester.
3. Zienkiewicz OC. 2005. The finite element method and structural mechanics. 6th edition, Elsevier Butterworth Heinemann, Amsterdam.

CIVL5452
Foundation Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** Lecture, Workload : 3 hours per week, presented in 2 session(s) per week for 11 week(s) of semester. Lectures will be given to provide background information, new concepts, and theoretical and analytical approaches to foundation problems. Tutorial, Workload : 1 hours per week, presented in 1 session(s) per week for 13 week(s) of semester. Tutorial exercises will be conducted throughout the semester, to develop analytical skills in foundation design and to provide indication of exam questions. Independent Study, Workload : 2 hours per week. Study of course material to enable assignments to be completed and concepts understood. **Prerequisites:** BE or equivalent. **Practical field work:** Project Work - in class, Workload : 4 hours per week, presented in 2 session(s) per week for 2 week(s) of semester. Work on design project involving application of computer programs and report writing Project Work - own time, Workload : 5 hours per week, presented in 1 session(s) per week for 2 week(s) of semester. Project will require work outside class time to complete **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The objectives of this unit are to gain an understanding of the design process in foundation engineering, to understand the importance of site investigation and field testing, and to learn how to deal with uncertainty. To achieve these objectives students are asked to design foundations using real data. Students will develop the ability to interpret the results of a site investigation; to use laboratory and field data to design simple foundations; develop an appreciation of the interaction between the soil, foundation system and the supported structure. The syllabus is comprised of field testing, site characterisation, interpretation of field data, design of pile raft and surface footings, support of excavations, soil improvement, and geotechnical report writing.

Textbooks

REFERENCE: Das B.M.,Principles of Foundation Engineering, Thomson, Edn:6th,2007,0-495-08246-5
REFERENCE: Tomlinson, M.J.,Foundation Design and Construction, Pitman, Edn:6th,1995,0-582-22697-X
REFERENCE: Peck, Hanson and Thornburn,Foundation Engineering, John Wiley, Edn:2nd,1973,0-471-67586-5
REFERENCE: Poulos H.G. and Davis E.H.,Pile Foundation Analysis and Design, John Wiley,
Edn:1st,1980,0-471-02084-2
REFERENCE: Fleming, Weltman, Randolph and Elson,Piling Engineering, Halsted Press, Edn:2nd,1994,0419161805

CIVL5454
Rock Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of project work in class per week **Prerequisites:** BE or equivalent. **Assumed knowledge:** Undergraduate geology and soil mechanics. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives: to develop an understanding of the behaviour and design of engineering structures in rock masses.

Expected outcomes: Students will have learnt how to classify and characterise rocks and rock masses for engineering purposes and developed an understanding of basic rock mechanics etc.

Syllabus summary: Introduction to rock mechanics and rock engineering. Index properties and engineering characterisation of rocks and rock masses. Planes of weakness in rock masses. Rock material strength and rock mass strength. Rock deformability. In situ stress conditions in rock masses. Underground openings. Rock slopes.

Textbooks

TEXTBOOK: Hoek, E. and Brown, E.T. ,Underground Excavations in Rock, Institution of Mining and Metallurgy, Edn:,1980,
TEXTBOOK: Brady, B.H.G. and Brown, E.T,Rock Mechanics for Underground Mining, George Allen & Unwin, Edn:,1985,
TEXTBOOK: Hoek, E. and Brady, J.,Rock Slope Engineering, Institution of Mining and Metallurgy, London., Edn:3rd,1981,
TEXTBOOK: Bieniawski, Z,Rock Mechanics Design in Mining and Tuneling, A.A Balkema, Rotterdam., Edn:,1984,

CIVL5455
Engineering Behaviour of Soils

Credit points: 6 **Session:** Semester 2 **Classes:** Independent Study, Workload : 4 hours per week. Independent study is required to master the course concepts, complete tutorial exercises, and prepare for quizzes. Lecture, Workload : 2 hours per week, presented in 1 session(s) per week for 12 week(s) of semester. Lectures will be used to cover the main concepts and explain the relevance of critical state soil mechanics Tutorial, Workload : 1 hours per week, presented in 1 session(s) per week for 12 week(s) of semester. Tutorial exercises will be worked through in class. **Prerequisites:** BE or equivalent. **Practical field work:** Laboratory, Workload : 3 hours per week, presented in 1 session(s) per week for 1 week(s) of semester. Demonstration of soil testing equipment, and carrying out a variety of soil tests. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objective of the course is to provide an introduction to the critical state framework. This framework is used for the basis for developing an understanding of the stress, strain, strength behaviour of all soils, and is used to present a rational approach to the selection of parameters for use in geotechnical design.

Textbooks

REFERENCE: Atkinson J.H. and Bransby P.L.,The mechanics of soils. An introduction to critical state soil mechanics, McGraw-Hill, Edn:,1978.
REFERENCE: Wood D.M., Soil behaviour and critical state soil mechanics, Cambridge University Press, Edn:,1990.
REFERENCE: Mitchell J.K.,Fundamentals of soil behaviour, John Wiley, Edn:2nd,1993.

CIVL5458
Numerical Methods in Civil Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 4 hrs lecture, tutorial and laboratory per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The objective of this unit is to provide students with fundamental knowledge of finite element analysis and how to apply this knowledge to the solution of civil engineering problems at intermediate and advanced levels.

At the end of this unit, students should acquire knowledge of methods of formulating finite element equations, basic element types, the use of finite element methods for solving problems in structural, geotechnical and continuum analysis and the use of finite element software packages. The syllabus comprises introduction to finite element theory, analysis of bars, beams and columns, and assemblages of these structural elements; analysis of elastic continua; problems of plane strain, plane stress and axial symmetry; use, testing and validation of finite element software packages; and extensions to apply this knowledge to problems encountered in engineering practice.

Outcomes:

On completion of this unit, students will have gained the following knowledge and skills:

1.Knowledge of methods of formulating finite element equations. This will provide students with an insight into the principles at the basis of the FE elements available in commercial FE software.

2.Knowledge of basic element types. Students will be able to evaluate the adequacy of different elements in providing accurate and reliable results.

3.Knowledge of the use of finite element methods for solving problems in structural and geotechnical engineering applications. Students will be exposed to some applications to enable them to gain familiarity with FE analyses.

4.Knowledge of the use of finite element programming and modeling.

5.Extended knowledge of the application of FE to solve civil engineering problems.

Textbooks

- Cook RD, Malkus DS, Plesha ME, Witt RJ, Concepts and Applications of Finite Element Analysis , Wiley , 4th Edn,

CIVL5501
Foundations of Materials

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week **Prerequisites:** Bachelor degree. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

Materials are an important part of the civil engineers' work. Indeed, civil engineers who are concerned with the design, construction, and maintenance of facilities need to understand the behaviour and performance of the materials used. And as it happens, mechanical properties which are essential and basic for civil engineers are highly dependent on the structure of materials at various scales. Therefore, it is important that a student in Civil Engineering possesses a fundamental knowledge in materials science. This unit of study aims to provide students with the tools necessary to select the adequate material for a particular application and to assess its mechanical behaviour while in use. This course will focus mainly on materials for civil engineering and construction applications, i.e. metals, concrete and soils.

CIVL5502
Foundations of Structural Mechanics

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week, 2 hours of laboratory work per semester **Prerequisites:** Bachelor degree **Assumed knowledge:** From ENGG1802 Engineering Mechanics, students should be competent in the following areas. 1. The concept of force and momentum equilibrium in two and three dimensions. 2. Drawing free body diagrams. 3. Establishing and solving the equations of equilibrium from the FBD. 4. Setting out solutions logically, clearly and neatly. Students should be competent incertain mathematical skills. 1. Solving algebraic equations. 2. Differentiation and integration (including double integrals). 3. Drawing graphs of polynomials (especially) and other mathematical function. 4. Trigonometry. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The primary objective of this unit is to understand internal actions (forces and moments) in structures (deformable objects) under loads in three key areas: how structures resist external loads by internal actions; the distribution of internal actions within structures; and the deformations, stresses and strains associated with the internal actions. At the end of this unit, students should be able to understand the basic methods of load transfer in structures - tension, compression, bending, shear and torsion (internal actions); apply the equations of equilibrium to determine the distribution of internal actions in a simple structure by drawing BMDs, SFDs, AFDs, and TMDs; understand the significance and methods of calculation of the geometric properties of structural sections (I, Z, S, J etc); understand the effect of internal forces and deformations of bodies through the concept and calculation of strains and stresses; appreciate the behaviour of structures by analysing structures without numerical calculations; display a knowledge of basic material properties, combined stresses and failure criteria; and demonstrate their hands-on experience of the behaviour of structural members via experiments and the ability to prepare written reports on those experiments. Emphasis in the assessment scheme will be placed on understanding structural behaviour and solving problems, rather than remembering formulae or performing complex calculations. The course seeks to utilise and improve the generic skills of students, in areas such as problem solving, neat and logical setting out of solutions, report writing, and team work. The syllabus comprises introduction; equilibrium; internal actions: BMDs, SFDs, AFDs, and TMDs; elasticity, stress and strain, and basic material properties; axial forces: tension and compression; elastic bending of beams; shear force and shear stresses in beams; torsion; deflection of beams; pipes and pressure vessels; trusses; material properties, combined stresses and yield criteria; advanced bending; introduction to buckling and instability.

Textbooks

Reference: JL Meriam and LG Kraig ,Engineering Mechanics - Volume 1

Textbook: Wilkinson T,Structural Mechanics, Pearson Ed, Edn:2e,2007

CIVL5504
Foundations of Soil Mechanics

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 1 hour of tutorial per week. 10 hours of laboratory work per semester. **Prerequisites:** Bachelors degree **Assumed knowledge:** CIVL5502 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

This course provides an elementary introduction to Geotechnical Engineering, and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of: the nature of soils as engineering materials; common soil classification schemes; the importance of water in the soil and the effects of water movement; methods of predicting soil settlements, the stress-strain-strength response of soils, and earth pressures.

At the end of this unit, students will be able to give an engineering classification of any piece of soil, and on this basis predict how it will perform as an engineering material; understand the principle of effective stress, and be able to apply this to calculate the stresses causing soil deformation; calculate quantities of water flowing through the ground, and understand the engineering consequences of water flow; calculate the settlements, and rates of settlement, under structures of various shapes and sizes; explain the advantages and limitations of the different methods of settlement calculation; determine the strength parameters appropriate to a range of stability problems, and understand the difference between total and effective stress approaches; evaluate strength parameters from laboratory data. The syllabus comprises terminology, soil classification, compaction, effective stress, steady state seepage, one-dimensional compression, stresses beneath loaded areas, 1-D settlement analysis, consolidation, numerical analysis of consolidation, 3-D settlement analysis using elasticity, shear strength, introduction to critical state soil mechanics, earth pressure theories.

CIVL5505
Foundations- Fluid Mech. & Inviscid Flow

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week. 8 hours of laboratory work per semester. **Prerequisites:** Bachelors Degree **Assumed knowledge:** Students are expected to have a strong understanding of fundamental physics, statics, equilibrium, forces, and dimensional analysis. Familiarity with simple calculus, partial differential equations, and the analytical and numerical solutions. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The objectives of this unit of study are to develop an understanding of basic fluid concepts within the incompressible flow regime. We assume that the physics of the flow can be described by inviscid fluid equations. Further we identify in which flow zones these equations apply and study the physics of the irrotational flow, streamlines and the velocity potential. Steady and unsteady flow solutions are investigated. Furthermore, flow around fixed and floating cylindrical structures and other objects are studied to estimate the pressures and forces on the structures. We further study free-surface water wave models in deep water applications based on the Laplace and Bernoulli's equations. Solutions are discussed in relation to waves in tanks, ship stability, oscillations in harbours, offshore platforms and other marine structures. We introduce model scale laws and dimensional analysis to undertake basic fluid laboratory studies. Conducting classical experiments and corresponding report write-up training reflecting understanding of the basic theory and interpretation of flow physics are also an important component of this unit of study. Although the unit of study has a focus on a theoretical background to fluid flow, computational as well as experimental approaches in obtaining fluid flow solutions are highlighted in the context of modern analysis and design. This core unit of study together with CIVL3612 forms the basis for further studies in the applied areas of ocean, coastal and wind engineering (CIVL 3613/4616). Students are encouraged to have this in mind, as this becomes important on thesis topic and future competitive career choices.

CIVL5506
Foundations-Eng Construction & Surveying

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 2 hours of tutorials per week. 18 hours of practical exercises per semester. **Prerequisites:** Bachelors Degree **Practical field work:** Notes In recent years - the course has included a 1.5 day camp at Webbs Creek (about 80km from Sydney). The camp is located in a bushland setting. It aims to provide valuable practice in practical field survey and has a secondary aim of providing a basis for social gathering (this aspect being requested in student feedback over recent years) **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The objectives of this unit are to gain an understanding of the fundamentals of engineering construction including - design, control, management, measurement and construction methods for excavation, embankments and other earthworks, hauling and associated operations. - building construction fundamentals, including reinforced concrete, masonry, steel and timber. - drilling and blasting Engineering Survey topics aim (a) to provide basic analogue methods of distance, angle and height measurement and (b) to provide an understanding of three dimensional mapping using basic total station electronic field equipment with associated data capture ability and (c) to give an insight into future trends in the use of GPS and GIS systems.

At the end of this unit, 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 productivity evaluation. Students should have a basic knowledge of vertical construction in reinforced concrete, masonry, steel and timber. Students should also develop proficiency in the design and implementation of mapping systems in Civil Engineering, using analogue and electronic field equipment and associated software packages. The syllabus comprises introduction to the framework under which construction projects are formulated and analysed; construction engineering fundamentals; construction systems related to excavation, hauling and embankment construction, including selection and evaluation of plant and methods as well as the expected output and cost; introduction to construction operations management. Introduction to engineering surveying, distance measurement, angle measurement, levelling, traversing, topographic surveys, electronic surveying equipment, future surveying technologies.

CIVL5507
Foundations of Concrete Structures 1

Credit points: 6 **Session:** Semester 1 **Classes:** 3 hours of lectures and 3 hours of project work in class per week. 2 hours of laboratory demonstration per semester. **Prerequisites:** Bachelors degree **Assumed knowledge:** CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatability of strains, and elastic beam theory. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background

The objectives of this unit are to provide a basic understanding of the behaviour of reinforced concrete members and structures; to provide a basic understanding of standard methods of analysis and design of reinforced concrete behaviour (including an understanding of capabilities and limitations); and to provide basic design training in a simulated professional engineering environment.

The syllabus comprises the behaviour of reinforced concrete members and structures, including: material properties, 'elastic' analysis (stresses/deformations/time-dependence), ultimate strengths of beams (flexure), ultimate strength of columns (short and slender), behaviour or reinforced concrete slabs. The reinforced concrete truss analogy (shear/torsion/and detailing implications). Design of typical elements of a reinforced concrete building, structural modelling, analysis of load-effects (incl.earthquakes), design criteria (for durability, fire-resistance, serviceability and strength), design calculation procedures, reinforcement detailing, structural drawings.

At the end of this unit students will gain proficiency in basic methods of reinforced concrete analysis and design.

CIVL5508
Foundations of Steel Structures 1

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours of lectures and 3 hours of tutorials per week. 2 hours of laboratory work per semester. **Prerequisites:** Bachelors degree **Assumed knowledge:** There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2230 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3235 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation of stress and strain, and being able to determine stresses and strains in simple sections under axial force, bending moments, shear and torsion; calculating and understanding the physical significance of geometric section properties : centroid, Ix, Iy, Zx, Zy, Sx, Sy, rx, ry, J, Ag; knowledge of the basic elastic-plastic material properties of steel, E, G, fy, fu; and knowledge of loading of structures. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

This unit of study is concerned with the behaviour and design of steel structures. Statics provided the fundamentals of equilibrium upon which most structural engineering is based. Structural Concepts and Structural Analysis provided information on the loads (actions) on a structure and how structures resist these actions with a resulting distribution of internal actions (bending moments, shear forces, axial forces; BMDs, SFDs and AFDs). Structural Mechanics considered how these internal actions resulted in stresses and strains in members. Materials considered the microscopic and molecular structure of metals to determine its inherent mechanical properties such as yield stress.

This unit of study will then combine the knowledge of stresses, material properties of steel, structural analysis, and loading, and consider new concepts and modes of failure, such as local and flexural torsional buckling, combined actions and second-order effects to understand the behaviour of steel members and frames, and how this behaviour is accounted for in the design standard AS 4100. Both the units of study "Steel Structures 1" and "Concrete Structures 1" can be considered the culmination of the various elements of structural engineering begun in "Engineering Mechanics" in first year, and is further developed in "Civil Engineering Design" in final year.

More advanced topics, such as plate behaviour, advanced buckling and connection design, are considered in the final year elective subject "Steel Structures 2". It is recognised that not all students intend to become consulting structural engineers.

The unit of study is designed so that students who make an effort to understand the concepts are most capable of passing. Students who are planning a career in the consulting structural engineering profession should be aiming at achieving a Distinction grade or higher.

At the end of this unit, the student should be familiar with the behaviour of steel structures, in particular the various forms of failure for members and connections under tension, compression, bending and combined actions. Most importantly, students should have an understanding of the various types of buckling that occur, and the parameters which affect buckling.They should also have a working knowledge of AS 4100, particularly in respect to the following:

- Ability to determine strength capacities of individual members to AS 4100,

- Competence in designing a simple structure to AS 4100,

- Be able to follow most other structural design specifications, given their similarities to AS 4100.

CIVL5509
Foundations of Struct Concepts & Design

Credit points: 6 **Session:** Semester 2 **Classes:** 4 hours of lectures and 2 hours of tutorials per week. **Prerequisites:** Bachelors degree **Assumed knowledge:** CIVL5501, CIVL5502, ENGG1802. Structural mechanics, first year mathematics. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The objectives of this unit are to understand the mechanical properties of the materials used in civil engineering and to show the relation between the methods of manufacture, the resulting microstructures and the mechanical responses.

CIVL5510
Foundations of Civil Engineering Design

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures and 3 hours of tutorials per week. **Prerequisites:** Bachelor degree **Assumed knowledge:** CIVL3205 and CIVL3206 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The UoS aims to develop students' ability to apply engineering fundamentals and the underlying science and mathematics to engineering problem solving. Students are encouraged to exercise critical decision making in developing solutions to challenges and to develop their own philosophical understanding of the design process. The concept covered in this UoS are: the design cycle from problem definition, through concept development, generation of ideas, analysis of proposals, feasibility evaluation, preferred solution selection to the detailed development and documentation of a final design.

Textbooks
n/a

CIVL5665
Advanced Water Resources Management

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 1 hour of tutorials per week **Prerequisites:** BE or equivalent. **Assumed knowledge:** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to provide an understanding of:

-dispersion in rivers and the coastal ocean

-water supply networks and systems

-wastewater reuse and applications

-surface runoff assessment

-design procedures for storage and service reservoirs

-reservoir safe yield

-physical, biological and chemical treatment methods for wastewater

-management principles for water resources

-irrigation demands

-desalination methods and appropriate applications

-stormwater harvesting

-environmental considerations for water catchment areas

-water conservation principles

CIVL5666
Open Channel Flow & Hydraulic Structures

Credit points: 6 **Session:** Semester 2 **Classes:** 3-hr combined lecture and tutorial per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives:

This unit of study will review the principles of uniform flow in open channels. These will be extended into a study of the principles of slowly varying and rapidly varying flow, the calculation of backwater curves and hydraulic jumps. These principles will then be applied to the design of gutters, inlets, culverts and piers, using existing commercially available software packages commonly used in engineering practice.

Outcomes:

This Unit will provide students with a strong back ground in open channel flow hydraulics, and the basis for the calculation of stream and hydraulic structure performance. Students will gain experience in the use of currently available commercial software for the design of culverts and other structures

Textbooks

Textbooks:
- Sturm, T.W. Open Channel Flow. McGraw Hill 2001

Reference Books:
- Chanson, H.The hydraulics of open channel flow an introduction. Buttworth-Heinmann. 2004 (2nd ed)
- Munson, B.R., Young, D.F., Okiishi, T.H. and Huebsch, W.W. Fundamentals of Fluid Mechanics. Wiley 2009 (6th ed)

CIVL5668
Wind Engineering for Design-Fundamentals

Credit points: 6 **Session:** Semester 1 **Classes:** 3-hr combined lecture and tutorial per week **Prerequisites:** BE or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives:

This unit of study will introduce the fundamentals of meteorology governing wind flow, details of extreme wind events, wind structure, statistical distribution of the wind, the effect of topography and terrain changes on wind profile, investigate the fluid flow around bluff bodies, and detail the design of civil engineering structures for wind loading

Outcomes:

This Unit will provide students with the following knowledge and skills:

On completion of this course students will have an understanding of the governing principles of wind engineering, how to predict the extreme wind speed and analyse anemographs, predict the effect of terrain and topography on velocity and turbulence, understand flow patterns around bodies, how to predict the pressure distribution and wind loading on bodies and structures, and how all the above relates toAS1170.2.

Textbooks

Textbooks:
- Standards Australia.
- Australian New Zealand Standard, Structural Design Action (wind actions) commentary (supplement to AS/NZS 1170.2:2002), AS/NZS 1170.2 Supp 1:2002, Standards Australia.
- Engineering Science Data Units series Wind Engineering (on-line)

Reference Books:
- Wind Engineering Course Notes, Ed. Melbourne, W.H., Department of Mechanical Engineering, Monash University, 1997.
- Cook, N.J., The designer's guide to wind loading of building structures, Part 1: Background, damage survey, wind data and structural classification, Butterworth, 1985.
- Cook, N.J., The designer's guide to wind loading of building structures, Part 2: Static Structures, Butterworth, 1985.
- Holmes, J.D., Wind Loading of Structures, Spon Press, 2001.
- Kwok, K.C.S. Wind induced vibrations of structures, Chapter 6, Structures subjected to dynamic loading, stability and strength, Ed. Narayanan R., and Roberts, T.M., Elsevier Applied Science, 1991.
- Lawson, T.V., Wind effects on buildings, Vol. 1 Design Applications, Applied Science Publishers, 1980.
- Simiu, E. and Scanlan, R.H., Wind effects on structures, John Wiley and sons, 1986.
- Engineering Science Data Units series Wind Engineering (on-line)

Reference Books:
- Wind Engineering Course Notes, Ed. Melbourne, W.H., Department of Mechanical Engineering, Monash University, 1997.
- Cook, N.J., The designer's guide to wind loading of building structures, Part 1: Background, damage survey, wind data and structural classification, Butterworth, 1985.
- Cook, N.J., The designer's guide to wind loading of building structures, Part 2: Static Structures, Butterworth, 1985.
- Holmes, J.D., Wind Loading of Structures, Spon Press, 2001.
- Kwok, K.C.S. Wind induced vibrations of structures, Chapter 6, Structures subjected to dynamic loading, stability and strength, Ed. Narayanan R., and Roberts, T.M., Elsevier Applied Science, 1991.
- Lawson, T.V., Wind effects on buildings, Vol. 1 Design Applications, Applied Science Publishers, 1980.
- Simiu, E. and Scanlan, R.H., Wind effects on structures, John Wiley and sons, 1986.

CIVL5669
Applied Fluid Engineering Computing

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hrs lecture, tutorial and laboratory per week **Prerequisites:** BE or eqquivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives:

The objective of this unit is to provide students with advanced knowledge of Computational Fluid Dynamics (CFD) techniques and skills in solving fluid and thermal flow problems relevant to Civil and Environmental Engineering applications. Students will also gain experience in using a state-of-the-art commercial CFD package and advanced understanding of a range of engineering problems through working on projects.

Outcomes:

On completion of this unit, students will have gained the following knowledge and skills:

1.Advanced understanding of CFD procedures.

2.Understanding of advanced CFD approaches for dealing with turbulent and free surface flows as well as other challenging fluid flow problems.

3.Ability to use a state-of-the-art commercial CFD package to solve engineering problems.

4.Skills to formulate and solve engineering problems using CFD techniques, to assess the problems based on CFD calculations, and to write reports accordingly.

5.Advanced understanding of a range of fluid flow problems relevant to Civil and Environmental Engineering applications.

Textbooks

Reference Books:
1.J.D. Anderson (1995) Computational Fluid Dynamics (1st Edition), McGraw-Hill.
2.B.R. Munson, D.F. Young & T.H. Okiishi (2006) Fundamentals of Fluid Mechanics (5th Edition), Wiley.
3.F.P. Incropera, D.P. DeWitt, T.L. Bergman & A.S. Lavine (2007) Fundamentals of Heat and Mass Transfer (6th Edition), Wiley.
4.J.D. Holmes (2007) Wind Loading of Structures (2nd Edition), Taylor & Francis.
5.C. Dyrbye & S.O. Hansen (1996) Wind Loads on Structures, Wiley.
6.B.M. Sumer & J. Fredsoe (1997) Hydrodynamics around Cylindrical Structures, World Scientific.
7.M.H. Chaudhry (2008) Open-Channel Flow (2nd Edition), Springer.
8.P.D. Bates, S.N. Lane & R.I. Ferguson (Editors, 2005) Computational Fluid Dynamics: Applications in Environmental Hydraulics, Wiley.

CIVL5901
Civil Engineering Project 1

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** project work - own time. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Involves carrying out some original research work on a topic. The results of the research are reported in a project thesis. This can be combined with CIVL5902, to form a 12 credit point research project.

CIVL5902
Civil Engineering Project 2

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** project work - own time **Corequisites:** CIVL5901 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This UoS is a 6 credit point UoS and involves carrying out some original research work on a topic. The results of the research are reported in a project thesis. This can be combined with CIVL5901, to form a 12cr point research project.

CIVL5903
Major Project A

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Project work - own time **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This Unit is associated with the following Civil Engineering courses: MES, MES StructsFound., MES FluidWind, MES Structs, MES Geotech., MES EnvirFluid, DIP Structs, DIP Geotech., DIP StructsFound., CERT GGM.

It involves carrying out original research work on a chosen topic at a more advanced level than is required for the 6 credit point Project. The work can be combined with CIVL5904 to form a 24 credit point Project.

CIVL5904
Major Project B

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** project work - own time **Corequisites:** CIVL5903 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This UoS is a 12 cr point Uos and involves carrying out original research work on a chosen topic at a more advanced level than is required for the 6 credit point project (CIVL5901 and 5902). The work can be combined with CIVL5903 to form a 24 credit point Project

PMGT5871
Project Process Planning and Control

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Early, Winter Main **Classes:** Session 2: Online; Other sessions Block Mode. **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

Project Management processes are what moves the project from initiation through all its phases to a successful conclusion. This course takes the project manager from a detailed understanding of process modelling through to the development and implementation of management processes applicable to various project types and industries and covers approaches to reviewing, monitoring and improving these processes.

PMGT5872
People and Leadership

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Block mode & on-line; Session 2: Block mode **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode or On-line

This is a generic project management unit aimed at increasing capability in people management and leadership of projects. It uses PMBoK as the starting point for developing a far deeper insight into managing the 'people' aspects of projects, programs and portfolios of projects.

The unit references a range of Australian and global Project Management, Management and Consulting Standards. It 'dovetails' theory and practice to optimise results.

The Unit covers diverse traditional and innovative concepts, models and tools.

PMGT5873
Project Economics and Finance

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Block mode; Session 2: On-line **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

This course equips members of project management teams with information and tools to do financial appraisal and optimise decision making. It imparts basic knowledge and competencies required in project appraisal and financial management applicable to all sectors of industry and business. These include services, business investment, R&D, capital projects, local, state and national government departments and agencies.

Topics include:

- Review of the Fundamentals of Project Economics and Financial Techniques

- Implementation of Fundamental Principles including EUAC, NPV, IRR, B/C, Valuation, Depreciation, Replacement Studies and Life Cycle Costing

- Development of Project Alternatives and Application of the Analysis Techniques

- Sensitivity Analysis, Risk Analysis and Management

- Project Funding and Selection

- Project Appraisal Report.

Textbooks

Grant, Ireson and Leavenworth, Principles of Engineering Economy (J. Wiley & Sons) Latest Edition

PMGT5875
Project Innovation Management

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Early **Classes:** Session 2: On-line; Session 1 and Summer School: Block mode **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

This course is intended for students who want to know what is going on at the leading edges of innovation in project management practice. Important trends in innovation in project organisation, management and delivery are identified and their implications for project innovation management explored. Major topics include: the trend to open information ("open source") rather than protected intellectual property innovation structure; impact of the open innovation structure on organisational project management; improved understanding of the client requirements and achievement of quality goals through open based or user driven project innovation management practices; distribution of innovation over many independent but collaborating actors; and toolkits that empower users to innovate for themselves.

PMGT5876
Strategic Delivery of Change

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Block Mode; Session 2: Online **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

Objectives, Format, and Participants:

This is a modular course designed for on-campus learning among students and industry professionals. We focus on the skills managers need to adapt successfully to:

- The sweeping changes in the nature of work and the workforce.

- Changes occurring in business organizations, the debates about their roles in society, and their relationships with employees and other stakeholders.

- Changes in relations among institutions that interact with work, particularly labour market, community and family-centered groups and organisations and government.

There is a great deal of innovation and debate underway on these issues today. This course will surface these debates and innovations and discuss their implications for current and future managers and leaders.

Assignments:

Students taking the course will have three sets of written assignments:

1. An "applications notebook" containing two page memos summarising how his or her organisational unit (or one of the organisational case studies provided as part of the tutorial readings in the course) is addressing the issues discussed in 5 of the modules. This paper has to be done individually. These memos will assess (a) the current state of practice in the organisational unit, (b) a vision for what the state of practice should be in the unit five years from now, and (c) recommendations for what needs to be done to achieve this vision. These memos will be emailed to the instructor no later than two weeks after the date the module was discussed in class. The time between class discussion and due date is provided so students can discuss these issues with others in their organisations that are responsible for or share an interest in the issue. Each memo will count for 10% of the course grade (total 50% for 5 memos).

2. A 10 page paper that focuses on one of the module topics and outlines a vision for how it fits into the organisation of the future and its managerial implications. This paper has to be done individually. Two tutorial class sessions will be devoted to a discussion of these papers. This paper will count for 20% of the course grade and is due the last day of class.

3. This year we will use the course to prepare for the term project (Group work) focusing on "Future Business Organisations and their Relations with Constituents", which will be presented by all groups as part of their term project as well as submission of a written report. This report plus a presentation will count for 30% of the overall semester grade.

PMGT5877
Management of Project Organisations

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: on-line; Session 2: 3 hours per week **Campus:** Camperdown/Darlington **Mode of delivery:** On-line

This course examines the challenges and approaches of managing project-oriented organisations. These could be independent business units or divisions within a larger corporation. Examples are construction contractors, ICT services, R&D units and many internal business units that are project-oriented.

Today, more organisations are adopting project management as a management strategy to provide effective and timely solutions to clients. They are managing organisational architecture to support both 'business as usual' and projects that are increasingly important to the organisation.

Focus is on the relationship between project management and the following: organisational culture, structure, processes, cross-functional teams, project governance, performance management, organisational learning, change and knowledge management. The assessment comprises a series of case study based assignments, quizzes and exams.

PMGT5879
Strategic Portfolio & Program Management

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: on-line; Session 2: Block Mode **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

This unit specifically addresses the selection and prioritisation of multiple programmes and projects which have been grouped to support an organisation's strategic portfolio.

The allocation of programmes of work within a multi-project environment, governing, controlling and supporting the organisation's strategy, are considered. The aim is to formulate and manage the delivery of the portfolio of strategies using programme management.

PMGT5886
System Dynamics Modelling for PM

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Online; Session 2: 3hrs per week **Campus:** Camperdown/Darlington **Mode of delivery:** On-line

Students should achieve an understanding of the roles of statistical methods, coordinate transformations, and mathematical analysis in mapping complex, unpredictable dynamical systems. Systems Thinking is a more natural and better way to think, learn, act, and achieve desired results. Effectively implemented, it can dramatically improve a manager's effectiveness in today's complex and interconnected business world. This course provides managers with many practical new Systems Thinking tools and the main concepts of Systems Thinking to enhance individual, team, and organizational learning, change, and performance.

Objectives:

- Basic concepts and definitions of systems dynamics and systems thinking

- Provides background to practical approaches and tools for becoming more customer focused in managing projects

- Introduces the A-BC-D systems model and discusses its importance in project management

- Introduces the concepts and practices of living systems and its application in understanding project management

- Provides overall summary of the approaches to strategic management systems

By the end of this unit of study, students should be able to:

- Understand concepts and definitions of systems dynamics and systems thinking

- Understand practical approaches and tools for managing customer focused in managing projects

- Understand the A-BC-D systems model and its importance in project management

- Understand the concepts and practices of living systems and its application in understanding project management

- Understand approaches to strategic management systems

PMGT5887
Computer Applications in PM

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Block mode; Session 2: On-line **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

Computer-Aided Project Management builds a bridge from the genesis of project management principles through today's software, developing a postmodern project management system paradigm for the twenty-first century. Adopting a unique systems perspective that emphasises project coding--an essential skill in project database management--this course demonstrates what fundamental project management principles are, what they do, and how they work in the software environment. Addressing all phases of a project it illustrates and expands theories through the use of realistic case studies which are based on actual project experience and extensive exercises running on PCs. An important feature of systems project management, the use of "scope" and "quality," is also discussed.

By the end of this unit of study, students should be able to:

- Understand application-based introduction to effective systems and methods for project planning and control

- Understand essential knowledge to manage successfully and to create, use, and communicate PC-, Server-, Web-, and Internet-based project management information.

- Understand the use of structures such as PDS (Project Definition Structure), WBS (Work Breakdown Structure), OBS (Organizational Breakdown Structure), and Masterformat project coding for areas, functions, elements, phases, stages, packages, purchase orders, contracts, and human resources planning and scheduling by CPM (Critical Path Method) and PERT (Program Evaluation and Review Technique) communicating with Gantt and bar charts and graphics such as S curves relating estimating and cost control from order-of-magnitude numbers to appropriation grade budgets.

PMGT5888
Global Project Management

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Late **Classes:** Session 1: Block Mode; Session 2: Online **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

This course has been designed to suggest the development of best practices in communication, collaboration and management across international borders. The objectives are to: Understand the challenges faced by a global program and project teams; and, Improve the overall skills and practices of global project managers that will lead international companies to achieve maturity in global project management. Topics include: Introduction to traditional, distributed, and virtual project work; Global projects and requirements; Organisational change and organisational theory; Cross-cultural collaboration; Global project leadership; Trust building and conflict resolution; Coaching over distance; Global communication and channels; Leading a global organisation; Implementing collaborative tools; and, Implementing a Global Project Management Framework.

PMGT5889
Integrated Cost and Scheduling Control

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: On-line; Session 2: Block Mode **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

Aims:

Students should achieve an understanding of the time and cost management in project environments.

Objectives:

Students should be able to:

- Discuss the project management trade-offs on balancing the triple-constraint;
- Explain the integrated cost and schedule control processes;
- Construct work breakdown structure (WBS) using given project information;
- Discuss scope monitoring and change control system;
- Produce networks diagrams for project scheduling;
- Apply critical path analysis (CPA) in network scheduling;
- Apply critical chain method in project scheduling;
- Estimate the project cost and duration;
- Apply resource scheduling techniques;
- Construct a time-phased budget plan;
- Discuss cost monitoring and control processes;
- Undertake earned value analysis (EVA); and
- Undertake integrated cost and schedule control processes using project management software (Microsoft Project or Primavera)

By the end of this unit of study, students should be able to:

- Undertake WBS exercises, CPA, EVA and trade-off analysis using the given project information;
- Explain how the components of time and cost management interrelate;
- Explain in depth why integrated cost and schedule management are important to project management; and
- Analyze a project situation that involves time and cost management issues and apply a solution(s)

PMGT5891
Project Risk Management

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Block mode; Session 2: On-line **Campus:** Camperdown/Darlington **Mode of delivery:** On-line

The aims of this course are to develop students' understanding and ability in applying project risk management skills in project environments. The course enables the students to apply best practice techniques and methods commonly used by industry in project risk management.

The competencies developed through this unit cover and go beyond the competencies in Risk areas as outlined in the competency standards by the Australian Institute of Project Management and Project Management Institute in the USA, respectively. The UoS aims to develop students' ability to understand and conceptualise risk management issues, and analyse and apply risk management techniques using concepts and frameworks from the underpinning literature.

- Ability to establish risk management plans, policies & integrate them with other project plans, organisation & align them to the business case
- Ability tounderstand the sources of potential risks (including but not limited to political, organisational, psychological and technical risks) and to use risk management tools & techniques to identify, assess, evaluate, & prioritise risks
- Ability to simulate the potential effects of risks on schedule, cost and other performance dimensions using sensitivity analysis, decision tree analysis and simulation techniques.
- Ability to track, monitor & control risks & actions to achieve project objectives & the business case
- Ability to close risks for an optimal outcome

PMGT5892
Project Management Industrial Project

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Weekly 3hr meeting; Session 2: Weekly 3hr meeting. **Campus:** Camperdown/Darlington **Mode of delivery:** Professional Practice

Note: Department permission required for enrolment. Note: Students must have a credit average for admission into this unit.

In this intensive PM capstone project, students are required to apply all of the skills necessary to successfully initiate, plan, execute, control and close a project. Working as part of a team on a simulated four-month, mid-sized, high-priority project, student will be responsible for developing the key project management deliverables, including the project charter, project plan, change control process, status reports and post-project reviews. Students will facilitate meetings, update the project plan with actuals and changes, present status to management, justify your decisions to key stakeholders and determine the impacts of your actions on multiple projects. Under the guidance of a senior project manager and their academic supervisor, students will be given direct feedback and techniques to increase efficiency and effectiveness.

Alternatively students with a 75D average may have the opportunity with permission to do an Honours level thesis working on a full-time project. The Hons level thesis will be a minimum of 70 pages and max of 100 pages. Please contact the Coordinator to discuss.

PMGT5893
Statistical Methods in PM

Credit points: 6 **Session:** Semester 2 **Classes:** Session 2: 3hrs Weekly **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Aims: Students should achieve an understanding of the applications of statistical methods in project environments.

Objectives:

- Conduct hypothesis test and draw conclusions;
- Apply regression analysis to examine relationships between variables;
- Explain the relationships between variables;
- Describe the distributions of variables;
- Draw conclusions based on results observed in a sample;
- Discuss the application of statistical model for project selection;
- Apply statistical method for forecasting project time and cost at completion;
- Discuss the application of statistical model for cost estimating; and
- Apply SPSS in analyzing and evaluating a project situation.

By the end of this unit of study, students should be able to:

- Discuss the applications of statistical methods in project management;
- Evaluate a project situation based on statistical results; and
- Apply simple statistical methods to problem-solving in project management.

PMGT6867
Quantitative Methods: Project Management

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: 3 hours per week; Session 2: Online **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit has been designed to teach understanding of the principles to plan, manage and deliver project scope, time and cost.

- To develop underpinning knowledge of scope, time and cost management as applied to projects
- To provide practical examples and opportunities to apply the relevant section of PMBOK to understanding the management of scope, time and cost on projects
- To initiate process of reflective learning and evidence development for competencies in the areas of scope, time and cost management.

Topics include:

- Project Integration
- Project Scope Management
- Project Time Management
- Project Cost Management
- Project Quality Management
- Project Risk Management

Textbooks

The Handbook of Project-based Management - Rodney J. Turner, McGraw Hill 1999, 3rd Edition or later
PMBOK 2000 - A Guide to the Project Management Body of Knowledge, Project Management Institute, 2000
Project Management The Managerial Process - Clifford F. Gray & Erik W. Larson, International Edition 2000

PMGT6869
Advanced Knowledge in Project Management

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Session 1: Online; Session 2: Block Mode **Prerequisites:** PMGT6867 **Campus:** Camperdown/Darlington **Mode of delivery:** On-line

The objectives of this Unit are:

Build on the knowledge and skills developed through the unit PMGT6867

Develop capability in creating environments for the success of multiple, large and complex projects

View problems as systems composed of interacting, interrelated, and interdependent components

Solve complex real-world problems

Examples of Unit outcomes include an ability to lead stakeholders in situations of changing needs and requirements in a 'managed' way, understanding that typical solutions to current problems may be the foundations for future failures & being able to deal with the unique challenges of large and complex projects.

Topics include:

- Business Case Development
- Project Failure
- Large and Multiple Projects
- International Project Teams
- Organisational Learning
- Corporate Law
- Systems Practice
- Organisational Design
- Performance and Benefit Measurement
- Project Management Methodology (PRINCE2)
- Systems and Data Integration
- Project Managing Events

School of Electrical and Information Engineering

ELEC5101
Antennas and Propagation

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 3 hours laboratory each week. **Prohibitions:** ELEC5522 Antennas and Propagation. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The first part of the unit describes the theory of radiation from elementary current sources, wires and arrays and introduces antenna terminology and characteristics such as radiation patterns, directivity, polarization and gain. The properties of receiving and transmitting antennas in a communications link are also described.

The second part of the unit describes three significant areas in antenna practice. (1) Numerical analysis of wire antennas; an introduction to the computer aided design of wire antennas and arrays. (2) Aperture antennas; an introduction to horn and reflector antennas and their applications. (3) Microstrip antennas; an introduction to modern printed circuit antennas and arrays and their applications.

The third part of the unit describes signal processing for multi-antenna arrays. Topics include Space-time coding, Multi-input Multi-output (MIMO) capacity, MIMO transmission, and the effects of antenna correlation.

ELEC5203
Topics in Power Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hour tutorial/loboratory per week. **Assumed knowledge:** (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives or ELEC3204 Power Electronics and Drives). **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to give students an in depth understanding of modern power electronic equipment supporting the intelligent grid of the future and the associated electronic control. Electronic power systems rely on a complex system of methods and equipment for controlling the voltage levels and for maintaining the stability and security of the supply. It covers recent findings in the fundamental theory and the massive change of modern power electronic equipment and methods supporting the electricity grids. It also looks at the huge influence of computer-aided analysis of electric power systems and the effects of the deregulation of the industry. The specific topics covered are as follows: Introduction to power electronic systems and applications in the electrical grid, power semiconductors, reactive power control in power systems, flexible AC transmission systems (FACTS), high-voltage direct-current transmission (HVDC), static reactive power compensator, dynamic voltage restorer, unified-power flow controller, line-commutated converters, thyristor-controlled equipment, phase-angle regulators, voltage-source converter based power electronic equipment, harmonics, power quality, passive and active filters, distributed generation, grid-interconnection of renewable energy sources, intelligent grid technologies.

ELEC5204
Power Systems Analysis and Protection

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 1 hour tutorial per week, 2 hours laboratory per week. **Prohibitions:** ELEC4201 Electrical Power Systems. **Assumed knowledge:** The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides the basis for the analysis of electricity grids using symmetrical components theory. It assumes familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines, etc.

The following specific topics are covered: The types and causes of power system faults; balanced faults and short circuit levels; an introduction to fault current transients in machines; symmetric components, sequence impedances and networks; the analysis of unsymmetrical faults. Review of the impact of faults on power system behaviour; issues affecting protection scheme characteristics and clearance times; the security and reliability of protection schemes; the need for protection redundancy and its implementation as local or remote backup; zones of protection and the need for zones to overlap; the analysis and application of over-current and distance relay protection schemes with particular reference to the protection of transmission lines.

ELEC5205
High Voltage Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours lecture and 3 hours tutorial/lab per week. **Prerequisites:** ELEC3105 or equivalent **Assumed knowledge:** The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Recommended: ELEC5204 Power Systems

The unit provides the basis of the fundamentals concepts of electromagnetic transients in power networks, high voltage equipment and its use in power systems, overvoltage and overcurrent in electrical networks and mitigation techniques, insulation of high voltage equipment and power systems apparatus and condition monitoring of power system apparatus.

Exposure to several state-of-art online monitoring techniques of power systems apparatus such as transformers and switchgear will ensure that students have knowledge of the latest industrial solutions to the management of the problems associated with overvoltage and overcurrent and the protection mechanisms used.

ELEC5206
Sustainable Energy Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures per week and 2 hours of labs and 2 hours of tutorials per fortnight. **Assumed knowledge:** Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit builds upon the knowledge of engineering mathematics, electronic devices and circuit theory and simulation techniques. It deals with both technical and business aspects of sustainable electrical energy systems. In technical aspect, it focuses on energy conversion and electrical characteristics of different renewable energy sources and integration of multiple energy sources into distributed electricity generation. In business aspect, it focuses on economical, marketing and political aspects of installing and managing sustainable electrical energy systems in present and future society. It lays a solid foundation of practical and managerial skills on electronics and electrical (power) engineering and later studies such as ELEC5203 and advanced energy conversion and power systems. The following topics are covered: modern power systems; distributed generation; co-generation; tri-generation; microturbine; renewable energy sources: solar, wind, hydro, biomass, geothermal, fuel cells; wind turbine; photovoltaic; grid-connected power systems; stand-alone power systems; power conditioner; maximum power point tracking; single-axis and two-axis tracker.

ELEC5303
Computer Control System Design

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prohibitions:** ELEC4301 Computer Controlled System Design. **Assumed knowledge:** This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach the basic issues involved in the analysis and design of computer-controlled systems. The emphasis is on theory rather than technological application or industrial practice.

However, students are expected to test some of these ideas on a few benchmark control problems in the laboratory. Completion of the unit will facilitate progression to advanced study in the area and to work in industrial control. This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory.

The following topics are covered. Sampled data systems: aliasing. Zero order hold equivalent: inverse of sampling, sampling system with time delay. Properties of difference equations: solution, stability, change of co-ordinates, Z transform. Input output models: pulse response, pulse transfer operator, pulse transfer function, interpretation of poles and zeros.

Analysis of discrete time system: stability (Jury's test, Nyquist criterion, Lyapunov method), sensitivity and robustness, observability (observers, reduced order observers), reachability and controllers, loss of reachability/observability through sampling, output feedback, the Separation theorem. Optimal control: Kalman filter, linear quadratic regulator, output feedback, the Separation theorem.

Approximating continuous time controllers. Finite word length mplementations.

ELEC5402
Digital Integrated Circuit Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 2 hours project work in class per week. **Prohibitions:** ELEC4402 Integrated Circuit Design. **Assumed knowledge:** Electronic circuit design and physics of electronic devices. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study explores CMOS technology and integrated circuit design and fabrication. The fundamental theory and techniques behind digital integrated circuit design are introduced. A primary focus of this unit is providing the student with practical laboratory design experience using a professional VLSI CAD tool to design digital integrated circuits. This unit provides a foundation for more advanced digital integrated circuit design techniques and also analogue integrated circuit design.

Topics covered in this unit are: IC manufacturing process and CMOS technology, CMOS static logic design, CMOS dynamic logic design, arithmetic building block design, sequential logic design, VLSI interconnection and wiring issues, timing issues, digital memory design, digital system design methodologies.

ELEC5403
Radio Frequency Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours lab/tutorial per week. **Prohibitions:** ELEC5521 Radio Frequency Engineering. **Assumed knowledge:** Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design , ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study builds upon earlier work and provides an introduction to radio frequency components and systems used in wireless and satellite communications as well as in other high frequency applications. It assumes some knowledge of: basic circuit analysis; semiconductor device models and behaviour; transistor operation as switches and amplifiers; transistor operation as current sources and current mirrors; differential amplifiers.

The following topics are covered: RF circuit element models, high-frequency effects and biasing in active devices, transmission lines and the Smith Chart, RF system characteristics, RF amplifiers, oscillators, mixers, power amplifiers, microwave measurements.

ELEC5507
Error Control Coding

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 1 hour tutorial per week. **Prohibitions:** ELEC4503 Error Control Coding **Assumed knowledge:** Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit deals with the principles of error control coding techniques and their applications in various communication and data storage systems. Its aim is to present the fundamentals of error control coding techniques and develop theoretical and practical skills in the design of error control encoders/decoders. Successful completion of this unit will facilitate progression to advanced study or to work in the fields of telecommunications and computer engineering. It is assumed that the students have some background in communications principles and probability theory.

The following topics are covered. Introduction to error control coding, linear algebra. Linear block codes, cyclic codes, BCH codes, Reed-Solomon codes, burst-error correcting codes, design of codecs for block codes, applications of block codes in communications and digital recording. Convolutional codes, Viterbi algorithm, design of codecs for convolutional codes, applications of convolutional codes in communications, soft decision decoding of block and convolutional codes, trellis coded modulation, block coded modulation, design of codecs for trellis codes, applications of trellis codes in data transmission. Turbo codes and applications to space and mobile communications.

ELEC5508
Wireless Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 1 hour tutorial per week. **Prohibitions:** ELEC5504 Cellular Radio Engineering, ELEC4504 Wireless Networks. **Assumed knowledge:** Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will introduce the key ideas in modern wireless telecommunications networks. It will address both physical layer issues such as propagation and modulation, plus network layer issues such as capacity, radio resource management and mobility management issues.

The following topics are covered. Mobile radio channel: Multipath fading, diversity, log-normal fading, mean propagation loss, propagation models. Cellular technologies: Cell types, coverage, frequency reuse, spectral efficiency, link budget, power budget, traffic capacity. Omnidirectional and sectorised antennas. Handover, interaction with the fixed network. Microcells and macrocells, Medium access control: Near-far effect and the hidden terminal problem. Multiple access schemes: FDMA, TDMA, CDMA. Aloha and s-Aloha, carrier sense multiple access, reservation-based MAC schemes, polling, spread-aloha multiple access. GSM: System architecture, radio resource management, mobility management, connection management.

Third generation systems: WCDMA and cdma2000. Wireless LANs: IEEE802.11, Hiperlan, Bluetooth. Convergence: GSM evolution to data services via GPRS and EDGE. Issues with TCP over wireless. Mobility management in MobileIP.

ELEC5509
Mobile Networks

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lecture and a 2 hours tutorial/project meeting per week. **Prohibitions:** ELEC5501 Advanced Communication Networks. **Assumed knowledge:** Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study serves as an introduction to communications network research. The unit relies on a solid understanding of data communications and mobile networks. It introduces some of the currently most debated research topics in mobile networking and presents an overview of different technical solutions. Students are expected to critically evaluate these solutions in their context and produce an objective analysis of the advantages/disadvantages of the different research proposals. The general areas covered are wireless Internet, mobility management, quality of service in mobile and IP networks, ad hoc networks, and cellular network architectures. The following topics are covered. Introduction to wireless and mobile Internet. Wireless cellular data networks. Cellular mobile networks. Mobile networks of the future. Quality of service in a mobile environment. Traffic modelling for wireless Internet. Traffic management for wireless Internet. Mobility management in mobile networks. Transport protocols for mobile networks. Internet protocols for mobile networks.

ELEC5510
Satellite Communication Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures,1 hour tutorial per week. 3 hour site visit during semester. **Prohibitions:** ELEC5502 Satellite Communications Systems. **Assumed knowledge:** Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Satellite communication systems provide fixed and mobile communication services over very large areas of land, sea and air. This unit presents the fundamental knowledge and skills in the analysis and design of such systems. It introduces students to the broad spectrum of satellite communications and its position in the entire telecommunications network; helps students to develop awareness of the key factors affecting a good satellite communications system and theoretical and practical skills in the design of a satellite communications link.

Topic areas include: satellite communication link design; propagation effects and their impact on satellite performance; satellite antennas; digital modem design, speech codec design; error control for digital satellite links.

ELEC5511
Optical Communication Systems

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and 2 hours laboratory/tutorial per week. **Assumed knowledge:** (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics). **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Introduction to optical fibre communications. Optical fibre transmission characteristics; fibre modes, multi-mode fibres, single-mode fibres, dispersion, loss. Semiconductor and fibre laser signal sources; dynamic laser models, switching, chirp, noise, optical transmitters. Optical modulation techniques. Optical amplifiers and repeaters, noise characteristics. Fibre devices, gratings, multiplexers. Optical detectors, shot noise and avalanche noise. Optical receiver and regenerator structures; sensitivity and error rate performance. Photonic switching and processing. Optical local area networks. Multi-channel multiplexing techniques. Design of optical fibre communication systems.

ELEC5512
Optical Networks

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 1 hour laboratory/tutorial per week. **Prohibitions:** ELEC5506 Optical Networks. **Assumed knowledge:** ELEC3503 Introduction to Digital Communications **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This Unit builds upon the fundamentals of optical communication introduced in ELEC3405 (Communications Electronics and Photonics) and ELEC5511 (Fibre Optic Communication Systems). It focuses on photonic network architectures and protocols, network design, enabling technologies and the drivers for intelligent optical network. Students will learn how to analyze and design optical networks and optical components. 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.

ELEC5514
Networked Embedded Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours lecture and 2 hours lab per week. **Assumed knowledge:** ELEC3607, ELEC3305, ELEC3506 and ELEC5508 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aim to teach the fundamentals concepts associated with: embedded systems programming, real-time operating systems wireless channel propagation and radio power consumption power-aware and energy-aware communication protocols. Distributed embedded systems problems such as time synchronization and node localization, Programming of networked embedded systems Exposure to several recently developed solutions to address problems in wireless sensor networks and ubiquitous computing giving them a well-rounded view of the state-of the-art in the networked embedded systems field. Student involvement with projects will expose them to the usage of simulators and/or programming some types of networked embedded systems platforms. Ability to identify the main issues and trade-offs in networked embedded systems. Understanding of the state-of-the-art solutions in the area Based on the above understanding, ability to analyse requirements and devise first-order solutions for particular networked embedded systems problems. Familiarization with a simulator platform and real hardware platforms for network embedded systems through the students involvement in projects.

ELEC5515

Gigabits Wireless Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours of tutorials per week **Assumed knowledge:** This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to provide the theory and design aspects of high speed and short-range wireless systems operating in the unlicensed frequency bands. The targeted system is at multi-gigabits per second within a 100m operating space. Typical applications include wireless local (or personal) area networks. At the completion of this unit, students will gain the essential knowledge to design a gigabit wireless system based any of the emerging standards. The following specific topics are covered: international regulatory requirements on unlicensed frequency bands; the MAC and PHY overview of WirelessHD, ECMA and IEEE802.11/15 standards; an introduction of the industry design process and tools. 60 GHz transceiver architecture and high-speed ADC/DAC requirements; pre-amble and pilot signal design; initial acquisition techniques; OFDM techniques (automatic gain control (AGC); channel estimation; carrier and sampling frequency estimation and compensation; in-phase and quadrature (I/Q) imbalance characterization, estimation and compensation; soft-output algorithms; peak to average power ratio (PAPR) reduction and adaptive bit loading); beam-forming and multiple input and multiple output(MIMO) techniques; Case study: solutions for IEEE802.11 VHT

ELEC5613

Image Processing and Computer Vision

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, a 2 hours lab/tutorial per week. **Assumed knowledge:** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit is concerned with the computer analysis and processing of images. The emphasis is on fundamental theory with discussion of some applications. A reasonable background in engineering mathematics and a modern programming language is assumed. The prime aim of this unit of study is to develop a sound understanding of the basic theory of image processing and a capacity for research and inquiry. Completion of the unit will facilitate progression to advanced study in the area and to work in the image processing field.

Topics covered include Image perception and representation; Enhancements - histogram & pixelwise transforms; Transforms - FFT, Laplace, Z, Hough; Filtering; Compression and image coding; Texture analysis - Modelling, classification, segmentation; Geometry - Transforms, matching; Mathematical Morphology - non-linear filtering, distances, residues, HMT; Segmentation - Thresholding, split & merge, snakes, watershed, SRG, recent PDE methods. The unit will conclude by discussing some applications in fields such as medical image processing and automation.

ELEC5614

Real Time Computing

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures, 1 hour tutorial per week, 2 hours labs per week. **Prohibitions:** ELEC4602 Real Time Computing. **Assumed knowledge:** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit is concerned with the theory and practice of real time computer systems as applied to the design of embedded systems and computer control systems in engineering, manufacturing and automation.

Some background in programming, object oriented design and system architecture is assumed. A prime aim of this unit of study is to develop a capacity for research and inquiry in the field of real-time and embedded systems. Completion of this unit will facilitate progression to advanced study or to work in embedded systems and industrial real-time computer systems.

The following topics are covered. Hard real time and embedded systems, as applied to engineering, manufacturing and automation. Timing and scheduling: periodic vs aperiodic processes, deadlines, rate monotonic, deadline monotonic and earliest deadline scheduling. Management of shared resources. Real-time languages and their features. Real time operating systems. Real time software design. Embedded Systems: overview, signal flow, interfacing. Reliability and fault tolerance in hardware and software. SCADA and DCCS. Some case studies.

ELEC5615

Advanced Computer Architecture

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 2 hours tutorial per week. **Assumed knowledge:** ELEC3305 Digital Signal Processing, ELEC3505 Communications, ELEC4503 Error Control Coding **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to provide the theory and design aspects of high speed and short-range wireless systems operating in the unlicensed frequency bands. The targeted system is at multi-gigabits per second within a 100m operating space. Typical applications include wireless local (or personal) area networks.

At the completion of this unit, students will gain the essential knowledge to design a gigabit wireless system based any of the emerging standards.

The following specific topics are covered:

- international regulatory requirements on unlicensed frequency bands;

- the MAC and PHY overview of WirelessHD, ECMA and IEEE802.11/15 standards;

- an introduction of the industry design process and tools.

- 60 GHz transceiver architecture and high-speed ADC/DAC requirements;

- pre-amble and pilot signal design;

- initial acquisition techniques;

- OFDM techniques (automatic gain control (AGC); channel estimation; carrier and sampling frequency estimation and compensation; in-phase and quadrature (I/Q) imbalance characterization, estimation and compensation; soft-output algorithms; peak to average power ratio (PAPR) reduction and adaptive bit loading);

- bean-forming and multiple input and multiple output(MIMO) techniques;

- Case study: solutions for IEEE802.11 VHT

ELEC5616

Computer and Network Security

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, 1 hour of tutorial and 2 hours labs per week. **Prohibitions:** ELEC5611 Computer and Network Security, NETS3016 Computer and Network Security, NETS3916 Computer and Network Security (Adv). **Assumed knowledge:** A programming language, basic maths. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit examines the basic cryptographic building blocks of security, working through to their applications in authentication, key exchange, secret and public key encryption, digital signatures, protocols and systems. It then considers these applications in the real world, including models for integrity, authentication, electronic cash, viruses, firewalls, electronic voting, risk assessment, secure web browsers and electronic warfare. Practical cryptosystems are analysed with regard to the assumptions with which they were designed, their limitations, failure modes and ultimately why most end up broken.

ELEC5618

Software Quality Engineering

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours lecture and 2 hours tutorials per week. **Prohibitions:** SOFT3302 Software Quality Assurance **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will cover software quality planning, validation and verification methods and techniques, quality measurement and analysis, software standards and software process improvement and software reliability.

Students who successfully complete this unit will:

- understand the fundamental concepts of software quality,
- be able to assess the quality of a software design
- be acquainted with methods of building for quality
- be able to verify and test a unit of code

ELEC5619
Object Oriented Application Frameworks

Credit points: 6 **Session:** Semester 2 **Classes:** 3 hours project work in class per week. **Assumed knowledge:** Java programming, and some web development experience are essential. Databases strongly recommended **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the main issues involved in producing large Internet systems by using and building application frameworks. Frameworks allow great reuse so developers do not have to design and implement applications from scratch, as students have done in ELEC3610 The unit lays down the basic concepts and hands on experience on the design and development of enterprise systems, emphasizing the development of systems using design patterns and application frameworks. A project-based approach will introduce the problems often found when building such systems, and will require students to take control of their learning. A project-based approach will introduce the problems often found when building such systems, and will require students to take control of their learning. Several development Java frameworks will be used, including Spring, Hibernate, and others. Principles of design patterns will also be studied. At the end of the unit you would have built an application for a framework with over 1M lines of code.

ELEC5620
Model Based Software Engineering

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours lectures, 1 hour of tutorial and 2 hours of lab/project work in class per week. **Assumed knowledge:** A programming language, basic maths **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Model-Based Software Engineering focuses on modern software engineering methods, technologies, and processes used in professional development projects. It covers both the pragmatic engineering elements and the underlying theory of the model-based approach to the analysis, design, implementation, and maintenance of complex software-intensive systems. Students will participate in a group project, which will entail developing and/or evolving a software system, following a full development cycle from requirements specification through to implementation and testing using up-to-date industrial development tools and processes. At the end of the course they will provide a presentation and demonstration of their project work to the class. There is no formal teaching of a programming language in this unit, although students will be expected to demonstrate through their project work their general software engineering and architectural skills as well as their mastery of model-based methods and technologies. Students successfully completing this unit will have a strong practical and theoretical understanding of the modern software development cycle as applied in industrial settings. In particular, they will be familiar with the latest model-based software engineering approaches necessary for successfully dealing with today's highly complex and challenging software systems. The pedagogic grounds for this course and its focus on model-based approaches are to arm new software engineers with skills and perspectives that extend beyond the level of basic programming. Such skills are essential to success in software development nowadays, and are in great demand but very low supply. The dearth of such expertise is one of the key reasons behind the alarmingly high failure rate of industrial software projects (currently estimated at being greater than 40%). Therefore, this unit complements SQE and strengthens a key area in the program.

ELEC5701
Commercial Engineering Practice

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and 1 hour visiting professional or team-based interaction exercise per week. **Prohibitions:** ENGG4003 Commercial Engineering Practice. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study prepares graduating students for the professional engineering workplace by developing awareness of the obligations, expectations and performance expected of a new graduate employee. It does this through exposure to the key aspects of the work environment and through focus on skills and knowledge which will enhance their performance and value to the employer. The unit assumes a knowledge of general engineering technology.

The following topics are covered. The commercial working environment. Managing and being managed. Workplace, workforce and commercial ethics. What the Marketing Department wants. What the Production Department wants. Communication: language and form. Conflict resolution and working relationships. Time management. Report writing and documentation. Project planning and resource management. Budgets and costings. Intellectual property: inventions, patents and copyright. Legal issues, employment contracts, technology contracts.

ELEC5720
Foundations Electronic Devs and Circuits

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures per week, and a 2 hours tutorial and 2 hours lab per fortnight. **Prohibitions:** ELEC2104 Electronic Devices and Basic Circuits, ELEC2401 Introductory Electronics. **Assumed knowledge:** Ohm's Law and Kirchoff's Laws; action of Current and Voltage sources; network analysis and the superposition theorem; Thevenin and Norton equivalent circuits; inductors and capacitors, transient response of RL, RC and RLC circuits; the ability to use power supplies, oscilloscopes, function generators, meters, etc. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students who do not have an Engineering degree.

Modern Electronics has come to be known as microelectronics which refers to the Integrated Circuits (ICs) containing millions of discrete devices. This course introduces some of the basic electronic devices like diodes and different types of transistors. It also aims to introduce students the analysis and design techniques of circuits involving these discrete devices as well as the integrated circuits. Completion of this course is essential to specialize in Electrical, Telecommunication or Computer Engineering stream. The knowledge of ELEC1103 is assumed.

ELEC5721
Foundations of Signals and Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures, 2 hours lab/tutorial per week and 1 hour of eLearning session per week. **Prohibitions:** ELEC2301 Signals & Systems, ELEC2302 Signals and Systems, MATH3019 Signal Processing, MATH3919 Signal Processing (Adv). **Assumed knowledge:** MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only avaliable to Master of Professional Engineering students who do not have an Engineering degree.

This unit aims to teach some of the basic properties of many engineering signals and systems and the necessary mathematical tools that aid in this process. The particular emphasis is on the time and frequency domain modeling of linear time invariant systems. The concepts learnt in this unit will be heavily used in many units of study (in later years) in the areas of communication, control, power systems and signal processing. A basic knowledge of differentiation and integration, differential equations, and linear algebra is assumed.

The following topics are covered. Continuous-time signals: classification and properties. Basic properties of systems: linearity, time-invariance, causality, and stability. Linear time-invariant (LTI) systems: characterization by differential equations (including state space formulation), and the convolution integral. Fourier series and Fourier Transform: definition, properties, frequency response and analysis of LTI systems based on Fourier transform. Sampling.

Correlation and Power Spectral Density. Laplace transform: definition, properties, and analysis of LTI systems based on Laplace transform. Solution of state space equations using Laplace transform.

ELEC5722
Foundations of Digital Systems Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, 2 hours of tutorials and 2 hours of laboratory work per week. **Prohibitions:** ELEC3601 Digital Systems Design, ELEC3608 Digital Systems Design. **Assumed knowledge:** This unit of study assumes some knowledge of digital data representation and basic computer organisation. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering students who do not have Engineering degree.

The purpose of this unit is to equip the students with the skills to design simple digital logic circuits which comprise modules of larger digital systems. The following topics are covered: logic operations, theorems and Boolean algebra, number operations (binary, hex, integer and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, and the design of a simple computer.

ELEC5730
Foundations of Eng Electromagnetics

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 2 hours tutorial per week. **Prohibitions:** ELEC3102 Engineering Electromagnetics, ELEC3104 Engineering Electromagnetics. **Assumed knowledge:** Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering students with a Non-Electrical Engineering degree.

This unit introduces students to the broad spectrum of engineering electromagnetics and helps students to develop theoretical and analytical skills in the area of electrical and telecommunications engineering and develop understanding of the basic electromagnetic theory underpinning optical communications, wireless communications and electrical engineering.

ELEC5731
Foundations of Circuit Theory and Design

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 2 hours laboratory/tutorial per week. **Prohibitions:** ELEC3101 Circuit Theory and Design. **Assumed knowledge:** (ELEC2101 Circuit Analysis or ELEC2104 Electronic Devices and Basic Circuits or ELEC2401 Introductory Electronics) and (ELEC2301 Signals and Systems or ELEC2302 Signals and Systems). **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering students with a Non-Electrical Engineering degree.

This unit of study is to build on the platform provided by the basic theory and technical units such as ELEC2104 Electronic Devices and Basic Circuits and ELEC2103 Simulation and Numerical Solutions in Engineering. Based on deep understanding of aspects in active analog filter design students are equipped with the knowledge and skills to design, and to be in a good position to undertake further self study as required. This unit of study is conducted with theoretical study and design project practice. It covers the theory and design of active and passive analog filters including the followings: Fundamental concepts in circuit theory: network functions, characteristic frequencies; Types of filter: lowpass, bandpass, etc; Review of operational amplifiers; Design of first and second order filters using operational amplifiers; Cascade design; Typical filters: Butterworth, Chebyshev, etc; Frequency transformations in design; Sensitivity, etc.

ELEC5732
Foundations of Electricity Networks

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prohibitions:** ELEC3201 Electrical Energy Systems, ELEC3203 Power Transmission Systems. **Assumed knowledge:** This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit of study provides an introduction to electrical power engineering and lays the groundwork for more specialised units. It assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in elements of introductory physics.

A revision will be carried out of the use of phasors in steady state ac circuit analysis and of power factor and complex power.

The unit comprises an overview of modern electric power system with particular emphasis on generation and transmission.

Detailed study will be carried out of the following. The use of three phase systems and their analysis under balanced conditions. Transmission lines: calculation of parameters, modelling, analysis. Transformers: construction, equivalent circuits. Generators: construction, modelling for steady state operation. The use of per unit systems. The analysis of systems with a number of voltage levels. The control of active and reactive power. The load flow problem: bus and impedance matrices, solution methods.

ELEC5733
Foundations of Power Electronics & Apps

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures, 1 hour tutorial and 2 hours lab per week. **Prohibitions:** ELEC3202 Power Electronics and Drives, ELEC3204 Power Electronics and Drives **Assumed knowledge:** Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit of study aims to teach the fundamentals of advanced energy conversion systems based on power electronics. It provides description of the operation principles and control of these blocks. Through analysis and design methodologies, it delivers an in depth understanding of modern enabling technologies associated with energy conversion. Through laboratory hands-on experience on actual industrial systems, such electrical motor drives, robotic arms, and power supplies, it enhances the link between the theory and the "real" engineering world. The unit clarifies unambiguously the role these imperative technologies play in every human activity; from mobile telephone chargers to energy electricity grids; from electric vehicles and industrial automation to wind energy conversion to name just few. The following topics are covered: Introduction to power electronic converters and systems; applications of power electronic converters; power semiconductor devices; uncontrolled rectifiers: single- and three-phase; non-isolated dc-dc converters: buck, boost and buck-boost; isolated dc-dc converters; inverters: single- and three-phase; uninterruptible power supplies; battery chargers and renewable energy systems; electric and hybrid electric vehicles technologies, design of converters and systems.

ELEC5734
Foundations Elec Energy & Conversion Sys

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures per week and 3 hours of labs and one hour of tutorial per fortnight. **Assumed knowledge:** Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit of study aims to give students a good understanding of electrical energy conversion techniques and equipment. Students who successfully complete this unit will have a broad view of electrical energy conversion systems including transformers, DC machines, induction machines and synchronous machines; be able to analyze and solve problems in transformers and electric machines; have gained confidence in their ability to undertake more advanced study in the power area. The following specific topics are covered: magnetic circuits, inductance, sinusoidal excitation, hysteresis and eddy current loss, permanent magnets, electromechanical energy conversion, singly-excited and doubly-excited systems, transformers, single-phase, equivalent circuit parameters, three-phase transformers, autotransformers, DC machines, separate excitation, shunt excitation, series excitation, and compound excitation, efficiency, armature reaction, induction machines, revolving field, equivalent circuit, squirrel cage machines, measurements of the parameters, DC resistance test, no-load test, blocked-rotor test, synchronous machines, field relationships, power-angle relationships, salient pole machines.

ELEC5735
Foundations of Control

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 3 hours lab/tutorial per week. **Prohibitions:** ELEC3302 Fundamentals of Feedback Control, ELEC3304 Control, Control, AMME3500 System Dynamics and Control. **Assumed knowledge:** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. ELEC2302 and MATH2061 or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit is concerned with the application of feedback control to continuous-time, linear time-invariant systems. The emphasis is on fundamental theory rather than applications. Some background in linear systems theory and the Laplace transform is assumed. The prime aim of this unit of study is to develop a sound understanding of basics and a capacity for research and inquiry. Completion of the unit will facilitate progression to advanced study in the area and to work in industrial control.

The following topics are covered. History of control. Modelling of physical processes; state variables and differential equations. Dynamic response; review of Laplace transform, transfer functions and block diagrams, poles and zeroes. 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; the Nyquist stability criterion; gain and phase margins; compensator design in the frequency domain. An introduction to state space design for single input single-output systems; eigenvalues, zeroes and transfer functions; state variable feedback and design of estimators.

ELEC5736
Foundations of Digital Signal Processing

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prohibitions:** ELEC3303 Digital Signal Processing, ELEC3305 Digital Signal Processing. **Assumed knowledge:** Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit aims to teach how signals are processed by computers. It describes the key concepts of digital signal processing, including details of various transforms and filter design. Students are expected to implement and test some of these ideas on a digital signal processor (DSP). Completion of the unit will facilitate progression to advanced study in the area and to work in the industrial use of DSP. This unit assumes a basic knowledge of differentiation and integration, differential & difference equations and linear algebra, plus various time and frequency domain representations of continuous time signals and systems.

The following topics are covered. Review of analog and digital signals. Analog to digital and digital to analog conversion. Some useful digital signals. Difference equations and filtering. Impulse and step response of filters. Convolution representation of filters. The Z-transform. Transfer functions and stability. Discrete time Fourier transform (DTFT) and frequency response of filters. Finite impulse response (FIR) filter design: windowing method. Infinite impulse response (IIR) filter design: Butterworth filters, Chebyshev filters, Elliptic filters and impulse invariant design. Discrete Fourier Transform (DFT): windowing effects. Fast Fourier Transform (FFT): decimation in time algorithm. DSP hardware.

ELEC5737
Foundations of Electronic Circuit Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures per week, 2 hours tutorial and 3 hours laboratory per fortnight. **Prohibitions:** ELEC3401 Electronic Devices and Circuits, ELEC3404 Electronic Circuit Design **Assumed knowledge:** A background in basic electronics and circuit theory is assumed. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit of study aims to teach students analysis and design techniques for electronic systems such as signal amplifiers, differential amplifiers and power amplifiers. A background in basic electronics and circuit theory is assumed. Completion of this unit will allow progression to advanced studies or to work in electronics and telecommunication engineering.

Topics covered are as follows. The BJT as an amplifier. Biasing in BJT amplifier circuits. Small signal operation and models. Single stage BJT amplifiers. BJT internal capacitances and high frequency models. The frequency response of the common-emitter amplifier. BJT current sources and current mirrors. Differential amplifiers. Output stages and power amplifiers:class A, class B and class AB.

ELEC5738
Foundations Comm Electronics & Photonics

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prohibitions:** ELEC3402 Communications Electronics, ELEC3405 Communications Electronics and Photonics. **Assumed knowledge:** ELEC2401 Introductory Electronics or ELEC2104 Electronic Devices and Basic Circuits. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit of study provides an introduction to the fundamental operation and design of transmitter and receiver subsystems for two broad classes of communications systems: those based on electronic transmission and those based on optical transmission. In the area of electronic communication subsystems, the course presents transmitter and receiver design. Topics relating to the transmitter comprise electronic oscillator sources, tuned electronic amplifiers, and modulators. Topics relating to receiver design comprise RF and IF frequency selective amplifiers, mixers, demodulators, phase-lock loops, feedback amplifiers, and high frequency RF and microwave communication amplifiers. In the area of optical communication subsystems, the course presents photonic transmitters and receivers. On the transmitter side this focuses on the principles of light generation in optical sources such as semiconductor lasers and light emitting diodes, electro-optic modulation of light, and optical amplifiers. On the receiver side, photodetectors, optical receivers, and front-end circuits are discussed. The principles and design of these subsystems are considered with reference to a basic optoelectronic communication link.

ELEC5739
Foundations of Communications

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 3 hours lab and tutorial per week. **Prohibitions:** ELEC3503 Introduction to Digital Communications **Assumed knowledge:** Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This is an intermediate unit of study in telecommunications following on the general concepts studied in earlier units such as Signal and Systems and leading on to more advanced units such as Digital Communication Systems. Student will learn how to critically design and evaluate digital communication systems including the elements of a digital transmission system, understand the limitations of communications channels, different analog and digital modulation schemes and reasons to use digital techniques instead of analog, and the effect of noise and interference in performance of the digital communication systems. On completion of this unit, studentss will have sufficient knowledge of the physical channel of a telecommunications network to approach the study of higher layers of the network stack.

The following topics are covered. Introduction to communications systems, random signals and stochastic process, components, signals and channels, sampling, quantization, pulse amplitude modulation (PAM), pulse code modulation (PCM), quantization noise, time division multiplexing, delta modulation. Digital communications: baseband signals, digital PAM, eye diagram, equalization, correlative 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.

ELEC5740
Foundations of Data Comm & the Internet

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours of lectures, 2 hours tutorial per week. 2 hours of labs per fortnight. **Prohibitions:** ELEC3504 Data Communications and the Internet, ELEC4501 Data Communication Networks. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

Students undertaking this unit should be familiar with fundamental digital technologies and representations such as bit complement and internal word representation. Students should also have a basic understanding of the physical properties of communication channels, techniques and limitations. Furthermore, students should be able to apply fundamental mathematical skills.

The unit will cover the following specific material: Communication reference models (TCP/IP, ATM and OSI). Circuit switched and packet switched communication. Network node functions and building blocks. LAN, MAN and WAN technologies. ATM systems. Protocols fundamental mechanisms. The TCP/IP core protocols (IP, ICMP, DHCP, ARP, TCP, UDP etc.). Applications and protocols (FTP, Telnet, SMTP, HTTP etc.).

ELEC5741
Foundations of Embedded Computing

Credit points: 6 **Session:** Semester 2 **Classes:** 1 hour of lectures per week and 10 three hour labs. **Prohibitions:** ELEC2601 Microcomputer Systems **Assumed knowledge:** Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

Students undertaking this unit of study are assumed to have a basic understanding of digital concepts, and combinational and sequential devices, together with an introduction to computers.

The aim of this unit of study is to teach students about microprocessors and their use. This includes architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications.

ELEC5742
Foundations: Internet Software Platforms

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours lecture and 2 hours tutorials per week **Prohibitions:** EBUS4001 E-Business Engineering **Assumed knowledge:** INFO1103, INFO2110 and INFO2120 or equivalent **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This course will focus on the design, the architecture and the development of web applications using technologies currently popular in the marketplace including Java and .NET environments. There are three key themes examined in the course: Presentation layer, Persistence layer, and Interoperability. The course will examine practical technologies such as JSP and Servlets, the model-view-controller (MVC) architecture, database programming with ADO.NET and JDBC, advanced persistence using ORM, XML for interoperability, and XML-based SOAP services and Ajax, in support of the theoretical themes identified.

On completion the students should be able to Compare Java/J2EE web application development with Microsoft .NET web application development, Exposure to relevant developer tools (e.g. Eclipse and VS.NET), Be able to develop a real application on one of those environments, Use XML to implement simple web services and AJAX applications.

ELEC5743
Foundations of E-Business Anal & Design

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours project work in class and 1 hour tutorial per week. **Prohibitions:** EBUS3003 E-Business SystemDesign, EBUS3001 **Assumed knowledge:** INFO2120 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

This unit examines the essential pre-production stages of designing successful internet websites and services. It focuses on the aspects of analysis, project specification, design, and prototype that lead up to the actual build of a website or application. Topics include, B2C, B2B and B2E systems, business models, methodologies, modeling with use cases / UML and WebML, the Project Proposal and Project Specification Document, Information Architecture and User-Centred Design, legal issues, and standards-based web development. Students build a simple use-case based e-business website prototype with web standards. A final presentation of the analysis, design and prototype are presented in a role play environment where students try to win funding from a venture capitalist. An understanding of these pre-production fundamentals is critical for future IT and Software Engineering Consultants, Project Managers, Analysts and CTOs.

ELEC5744
Foundations of Digital Comm Systems

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hours of lectures and a 2 hours lab/tutorial per week. **Prohibitions:** ELEC4502 Digital Communication Sys **Assumed knowledge:** ELEC3505 Communications or equivalent **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

Digitally modulated signals: non-linear modulation methods, continuous phase FSK, continuous phase modulation. Modulated carrier data transmission: QPSK, QAM, MFSK, MSK. Trellis coded modulation and modem technologies. Spread spectrum, including frequency hopping and CDMA principles. Plus selected topics from: Optical communication systems - single and multi-channel systems, performance criteria and systems analysis. Satellite communications systems. Cellular mobile radio systems.

ELEC5745
Foundations of Computer Architecture

Credit points: 6 **Session:** Semester 1 **Classes:** 1 hour of lecture and 3 hours lab/tutorial per week. **Prohibitions:** ELEC4601 Computer Design **Assumed knowledge:** Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks, microprocessors and their use, the architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.

The digital systems design process. The design cycle. Top down design. Specification. Functional design. Structural design. Testing. Hardware description languages such as Verilog or VHDL. Digital systems architectures. Processors, buses and I/O devices. Synchronous, asynchronous and semi-synchronous buses. Bus interconnections. Memory and I/O interface design. Static and dynamic memory design. Memory interfacing. Interrupts. Vectored interrupts. Interrupt controllers. Parallel interface design. Serial interface design. Bus arbitration. Processor interfacing. IBM PC interfacing. PCB and packaging design, grounding, shielding and power distribution, some case studies.

ELEC8900
Project

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Project work - own time. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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).

ELEC8901
Project Part A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Project work - own time **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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 coursework 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.

ELEC8902
Project Part B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Project work - own time **Prerequisites:** ELEC8901 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

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 coursework 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.

School of Information Technologies

COMP5028
Object-Oriented Design

Credit points: 6 **Session:** Semester 1 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Prohibitions:** INFO3220 **Assumed knowledge:** Intermediate level of object oriented programming such as Java **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit introduces Object-Oriented Analysis and Design especially the principles of modelling through Rational Unified Process and agile processes using Unified Modeling Language (UML), both of which are industry standard. Students work in small groups to experience the process of object-oriented analysis, architectural design, object-oriented design, implementation and testing by building a real-world application.

Objectives: In this unit students will develop the ability to: identify how the system interacts with its environment; identify appropriate objects and their attributes and methods; identify the relationships between objects; write the interfaces of each object; implement and test the objects; read and write various UML diagrams including use case, class, and sequence diagrams; apply design patterns to standard problems.

COMP5045
Computational Geometry

Credit points: 6 **Session:** Semester 1 **Classes:** One 2 hour scheduled small group class per week, plus 10 hours per week private work. **Prohibitions:** COMP4045 **Assumed knowledge:** Data structures, analysis of algorithms **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

In many areas of computer science - robotics, computer graphics, virtual reality, and geographic information systems are some examples - it is necessary to store, analyse, and create or manipulate spatial data. This course deals with the algorithmic aspects of these tasks: we study techniques and concepts needed for the design and analysis of geometic algorithms and data structures. Each technique and concept will be illustrated on the basis of a problem arising in one of the application areas mentioned above.

Textbooks

M. de Berg, et al "Computional Geometry: Algorithms and Applications", Springer (2000)

COMP5046
Statistical Natural Language Processing

Credit points: 6 **Session:** Semester 1 **Classes:** One 2 hour scheduled small-group class per week. **Prohibitions:** COMP4046 **Assumed knowledge:** Concepts of Linguistics, elementary statistics, AI techniques. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit deals with techniques for the automatic processing of natural languages (such as English, French). Methods for various forms of analysis of large corpora such as parsing, part-of-speech tagging, word sense disambiguation, information extraction, question answering, clustering and classifying are treated. Particular emphasis is given to methods that analyse the meaning in texts and the general application of machine learning methods to these topics. Various applications of these methods to research in health texts and other contexts being pursued in the University of Sydney will be explored.

COMP5047
Pervasive Computing

Credit points: 6 **Session:** Semester 2 **Classes:** One 2 hour scheduled small-group class per week, plus 10 hours per week private work. **Prohibitions:** NETS4047 **Assumed knowledge:** Networking concepts, operating system concepts, programming expertise. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

There is a trend that computers will become invisible and pervasive, as they have shrunk in size tremendously in recent years. As a result, there is a strong need to come up with new approaches and techniques to accommodate these changes. In this unit of study, the students are made aware of the various issues related to the pervasive computing, e.g. importance of contextual information in computing, appropriate methods to elicit requirements for pervasive system, required infrastructure, construction of an adaptive and personalised system, incorporation of new input and output media and, also the psychology and social issues.

COMP5048
Information Visualisation

Credit points: 6 **Session:** Semester 2 **Classes:** One 2 hour scheduled small group class per week. **Prohibitions:** COMP4048 **Assumed knowledge:** Discrete mathematics, algorithms and complexity. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Information Visualisation and Graph Drawing aim to make good pictures of abstract information, such as stock prices, family trees, and software design diagrams. Well designed pictures can convey this information rapidly and effectively. The research challenge for Information Visualisation and Graph Drawing is to design and implement new algorithms that produce such pictures. Applications include visualisation of bioinformatics, social network, software visualisation and network visualisation. This unit will provide basic concepts, techniques and fundamental algorithms to achieve good visualisation of abstract information. Further, it will also provide opportunities for academic research and developing new methods for information visualisation.

COMP5105
Foundations of Data Structures

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 2hrs) per week **Prohibitions:** INFO1105 **Assumed knowledge:** HSC Mathematics Extension 1 or 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will teach some powerful ideas that are central to quality software: data abstraction and recursion. It will also show how one can analyse the scalability of algorithms using mathematical tools of asymptotic notation. Contents include: both external "interface" view, and internal "implementation" details, for commonly used data structures, including lists, stacks, queues, priority queues, search trees, hash tables, and graphs; asymptotic analysis of algorithm scalability, including use of recurrence relations to analyse recursive code. This unit covers the way information is represented in each structure, algorithms for manipulating the structure, and analysis of asymptotic complexity of the operations. Outcomes include: ability to write code that recursively performs an operation on a data structure; experience designing an algorithmic solution to a problem using appropriate data structures, coding the solution, and analysing its complexity.

COMP5114
Digital Media Fundamentals

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Multimedia has become an indispensable part of our heterogeneous computing and communication environment. This unit provides an overview of coding and manipulating digital media, which mainly include image, audio and video. It introduces principles and current techniques such as multimedia data acquisition, analysis, processing, compression and management. It also elaborates different multimedia coding standards, various multimedia systems and cutting-edge multimedia applications.

Objectives: The unit covers Multimedia Primer; Text Processing which includes text parsing, text summarization, text manipulation, text index and retrieval, and surrogate coding; Audio Data Processing which includes audio attribute, audio masking, MP3 audio, audio manipulation and audio segmentation; pictorial data processing which includes still image processing, multi-modal image processing and artificial image processing; video data processing which includes active image processing, video segmentation, motion analysis, moving object extraction, video representation and codification.

COMP5116
Internet Protocols

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Prohibitions:** ELEC5740 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

In this unit students will gain understanding of the fundamental architecture and protocols used in the TCP/IP protocol stack that is the foundation of the Internet. Furthermore, the unit will provide students with the insight needed to begin to design and analyse protocols in the context of their intended use.

Objectives: On completion of this unit students will have developed an understanding of the principles and practice of the layered model of communications architecture, the TCP/IP protocol stack and its component protocols, and various common techniques and tools for protocol analysis.

COMP5138
Database Management Systems

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Assumed knowledge:** Intermediate level of object oriented programming such as Java. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides a conceptual and practical introduction to the use of common platforms that manage large relational databases. Students will understand the foundations of database management and enhance their theoretical and practical knowledge of the widespread relational database systems, as these are used for both operational (OLTP) and decision-support (OLAP) purposes. The unit covers the main aspects of SQL, the industry-standard database query language. Students will further develop the ability to create robust relational database designs by studying conceptual modelling, relational design and normalization theory. This unit also covers aspects of relational database management systems which are important for database administration. Topics covered include storage structures, indexing and its impact on query plans, transaction management and data warehousing.

Objectives: In this unit students will develop the ability to:

- Understand the foundations of database management;
- Strengthen their theoretical knowledge of database systems in general and relational data model and systems in particular;
- Create robust relational database designs;
- Understand the theory and applications of relational query processing and optimization;
- Study the critical issues in data and database administration;
- Explore the key emerging topics in database management.

COMP5206
Introduction to Information Systems

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Prohibitions:** INFO5210 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides a comprehensive introduction to information systems in organisations and the enabling role of information technology. The critical role of data and knowledge management will be covered from both conceptual and practical standpoints. Methods and techniques for analysing systems and eliciting user requirements will be emphasised. Key topics covered include: basic information systems concepts; systems approach and systems thinking; E-Business and E-Commerce; data and knowledge management; systems analysis and development methodologies; ethical, legal and social aspects of information technologies; and Web 2.0 and social computing. On completion of this unit students will have a good understanding of important information concepts; a deep understanding of the systems approach and its applicability; be able to develop skills to perform systems analysis in contemporary systems environments; have an understanding of major conceptual and technological developments in Information Systems.

COMP5211
Algorithms

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lectures and one 1 hour tutorial per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The study of algorithms is a fundamental aspect of computing. This unit of study covers data structures, algorithms, and gives an overview of the main ways of thinking used in IT from simple list manipulation and data format conversion, up to shortest paths and cycle detection in graphs. The objective of the unit are to teach basic concepts in data structure, algorithm, dynamic programming and program analysis. Students will gain essential knowledge in computer science.

COMP5212
Software Construction

Credit points: 6 **Session:** Semester 1 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This is a programming unit of study focussing on the Python and C languages, with emphasis on the individual producing code that works correctly. Topics include: the memory model, and errors associated with that (including pointers, malloc/free, sizeof, stack vs heap); coding simple dynamic data structures (linked lists); debugging; use of Unix tools for managing programming activities such as testing; learning from manual entries for standard library functions and Unix commands.

Objectives: On completion of this unit students will have acquired programming skills and techniques applicable to the development of software used in areas such as networking, computer engineering, language translation, and operating systems.

COMP5213
Computer and Network Organisation

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides an overview of hardware and system software infrastructure including: compilers, operating systems, device drivers, network protocols, etc. It also includes user-level Unix skills and network usability. The objectives are to ensure that on completion of this unit students will have developed an understanding of compilers, operating systems, device drivers, network protocols, Unix skills and network usability.

COMP5214
Software Development in Java

Credit points: 6 **Session:** Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study introduces software development methods, where the main emphasis is on careful adherence to a process. It includes design methodology, quality assurance, group work, version control, and documentation. It will suit students who do not come from a programming background, but who want to learn the basics of computer software.

Objectives: This unit of study covers systems analysis, a design methodology, quality assurance, group collaboration, version control, software delivery and system documentation.

COMP5318
Knowledge Discovery and Data Mining

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 1hr) per week **Assumed knowledge:** COMP5138 and familiarity with basic statistics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Knowledge discovery is the process of extracting useful knowledge from data. Data mining is a discipline within knowledge discovery that seeks to facilitate the exploration and analysis of large quantities of data, by automatic or semiautomatic means. This subject provides a practical and technical introduction to knowledge discovery and data mining.

Objectives: Topics to be covered include problems of data analysis in databases, discovering patterns in the data, and knowledge interpretation, extraction and visualisation. Also covered are analysis, comparison and usage of various types of machine learning techniques and statistical techniques: clustering, classification, prediction, estimation, affinity grouping, description and scientific visualisation.

COMP5338
Advanced Data Models

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 1hr) per week **Assumed knowledge:** COMP5138 or equivalent **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study gives a comprehensive overview of post-relational data models and of latest developments in database technology. Particular emphasis is put on spatial, temporal, and semi-structured data. The unit extensively covers the advanced features of SQL:2008, as well as XML and related standards such as XMLSchema, xPath, and xQuery. The last part is dedicated to current developments of advanced data management techniques. Besides in lectures, the advanced topics will be also studied with prescribed readings of database research publications.

COMP5347
e-Commerce Technology

Credit points: 6 **Session:** Semester 1 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Assumed knowledge:** COMP5028 Object Oriented Analysis and Design **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will focus on technological advances supporting the development of e-commerce applications and systems. This includes client and server side development of e-commerce applications. AJAX is the core client side technology covered in this course. Both server scripting and server page technology are covered as key server side technology. It will also examine the emerging trend of web services and its role in E-commerce systems. This unit aims at providing both conceptual understanding and hand-on experiences for the technologies covered.

COMP5348
Enterprise Scale Software Architecture

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 1hr) per week **Assumed knowledge:** INFO3220 or COMP5028 or equivalent. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit covers topics on software architecture for large-scale enterprises. Computer systems for large-scale enterprises handle critical business processes, interact with computer systems of other organisations, and have to be highly reliable, available and scalable. This class of systems are built up from several application components, incorporating existing "legacy" code and data stores as well as linking these through middleware technologies, such as distributed transaction monitors, remote objects, message-queuing, publish-subscribe, and clustered application servers. The choice of middleware can decide whether the system achieves essential non- functional requirements such as performance and availability. The objective of this unit of study is to educate students for their later professional career and it covers Software Architecture topics of the ACM/IEEE Software Engineering curriculum.

COMP5415
Multimedia Authoring and Production

Credit points: 6 **Session:** Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides principles and practicalities of creating interactive and effective multimedia products. It gives an overview of the complete spectrum of different media platforms and current authoring techniques used in multimedia production. Coverage includes the following key topics: enabling multimedia technologies; multimedia design issues; interactive 2D & 3D computer animation; multimedia object modelling and rendering; multimedia scripting programming; post-production and delivery of multimedia applications.

COMP5416
Advanced Network Technologies

Credit points: 6 **Session:** Semester 2 **Classes:** (Lec 2hrs & Prac 1hr) per week **Assumed knowledge:** ELEC3506 or equivalent **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit introduces networking concepts beyond the best effort service of the core TCP/IP protocol suite. Understanding of the fundamental issues in building an integrated multi-service network for global Internet services, taking into account service objectives, application characteristics and needs and network mechanisms will be discussed. Enables students to understand the core issues and be aware of proposed solutions so they can actively follow and participate in the development of the Internet beyond the basic bit transport service.

COMP5424
Information Technology in Biomedicine

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Tut 1hr) per week **Assumed knowledge:** Basic programming skills **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Information technology (IT) has significantly contributed to the research and practice of medicine, biology and health care. The IT field is growing enormously in scope with biomedicine taking a lead role in utilizing the evolving applications to its best advantage. The goal of this unit of study is to provide students with the necessary knowledge to understand the information technology in biomedicine. The major emphasis will be on the principles associated with biomedical digital imaging systems and related biomedicine data processing, analysis, visualization, registration, modelling, compression, management and communication. Specialist areas such as Picture Archiving and Communication Systems (PACS), computer-aided diagnosis (CAD), image-guided surgery (IGS), content-based medical image retrieval (CBMIR), and ubiquitous m-Health, etc. will be addressed. A broad range of practical integrated clinical applications will be also elaborated.

COMP5425
Multimedia Storage, Retrieval & Delivery

Credit points: 6 **Session:** Semester 1 **Classes:** One 2-hour lecture and 1 1hour prac per week. **Assumed knowledge:** Algorithms (equivalent to COMP5211). **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The explosive growth of multimedia data, including text, audio, images and video, has generated an extremely challenging job in effective and efficient storing, managing, retrieving and delivering this data across IT infrastructure. This unit provides students with the most updated knowledge in order to address these issues, from multimedia database to multimedia content delivery. The unit content principally covers multimedia data compression; low-level feature extraction; high-level semantic description; storage structures and management; similarity measurement, indexing, and retrieval; security for content distribution. Various applications will be discussed, including multimedia Internet search and video streaming.

COMP5426
Parallel and Distributed Computing

Credit points: 6 **Session:** Semester 1 **Classes:** (Lec 2hrs & Prac 1hr) per week. **Assumed knowledge:** Equivalent of COMP5116 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit is intended to introduce and motivate the study of high performance computer systems. The student will be presented with the foundational concepts of parallel and distributed computing that are pertaining to the different types and classes of high performance computers. The student will be exposed to the description of the computer systems and will also get an introduction to the principles of cloud computing. Students will gain skills in evaluating, experimenting with, and optimizing the performance of high performance computers. The unit also provides students with the ability to undertake more advanced topics and courses on high performance computing.

COMP5456
Computational Methods for Life Sciences

Credit points: 6 **Session:** Semester 2 **Classes:** One 2 hour lecture, one 1 hour tutorial and one 2 hour lab per week. **Prohibitions:** COMP3456 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit brings together a wide range of skils that are routinely practised in bioinformatics, from the "hard" subjects of mathematics, statistics and computer science, to the "soft" subjects in the biological/health sciences and pharmacology. It covers the essentials of bioinformatics data gathering, manipulation, mining and storage that underpin bioinformatics research, and provides additional practice in the graduate attributes of Research and Inquiry, Information Literacy and Communication through analysis of scientific research, use of large bioinformatics data sets, and writing of reports.

COMP5615
Software Engineering Project

Credit points: 6 **Session:** Semester 2 **Classes:** One 1-hour meeting with supervisor, one 2-hour class, and meeting with client. **Prerequisites:** INFO6007 **Prohibitions:** COMP3615 and INFO3600 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit will provide students an opportunity to apply the knowledge and practise the skills acquired in the prerequisite and qualifying units, in the context of designing and building a substantial software development system in diverse application domains including life sciences. Working in groups for an external client combined with academic supervision, students will need to carry out the full range of activities including requirements capture, analysis and design, coding, testing and documentation. Students will use the XP methodology and make use of professional tools for the management of their project.

COMP5702
IT Research Project A

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Eight hours of practical work per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Specialist/Elective/Project

COMP5703
Information Technology Project

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Eight hours of practical work per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Specialist/Elective/Project

COMP5704
IT Research Project B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Four hours of practical work per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Specialist/Elective/Project

COMP5705
Information Technology Short Project

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main, Winter Main **Classes:** Four hours of practical work per week. **Prohibitions:** COMP5702, COMP5704 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

A short software development oriented project.

COMP5706
IT Industry Placement Project

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Weekly meetings, and about 8 hours of independent study and project work per week. **Prohibitions:** COMP5702, COMP5703, COMP5704 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This is a short 6cp IT project unit of study that can be taken in combination with COMP5705 Information Technology Short Project by students taking an Industry-based scholarship such as the Faculty's Research Industry Placement Project Scholarship (RIPPS), which they split over one day a week over both semester 1 and semester 2.

INFO5001
System Analysis and Modelling

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hours lecture and 2 hour lab per week. **Prohibitions:** INFO2110, ELEC3610 and ELEC5743 **Assumed knowledge:** Experience with a data model as in COMP5212 or COMP5214 or COMP5028 or COMP5138 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit provides a comprehensive introduction to the analysis of complex systems. Key topics are the determination and expression of system requirements (both functional and non-functional), and the representation of structural and behavioural models of the system in UML notations. Students will be expected to evaluate rqeuirements documents and models as well as producing them. This unit covers essential topics from the ACM/IEEE SE2004 curriculum, espcially from MAA Software Modelling and Analysis.

INFO5010
IT Advanced Topic A

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Late **Classes:** One 2 hour scheduled small-group class per week. **Prerequisites:** Permission of Head of School **Prohibitions:** INFO4010 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit will cover some topic of active and cutting-edge research within IT; the content of this unit may be varied depending on special opportunities such as a distinguished researcher visiting the University.

INFO5011
IT Advanced Topic B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour scheduled small-group class per week. **Prerequisites:** Permission of Head of School **Prohibitions:** INFO4011 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit will cover some topic of active and cutting-edge research within IT; the content of this unit may be varied depending on special opportunities such as a distinguished researcher visiting the University.

INFO5301
Information Security Management

Credit points: 6 **Session:** Semester 1 **Classes:** 2 hrs of lecture, 1 hr of lab/tut per week **Assumed knowledge:** Basic IT knowledge of databases and networks. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will provide a broad information architectural view of IT security. Topics covered will include (i) the relationship between security needs and organization structure, (ii) risk assessment, (iii) design and implementation of security policies (iv) compliance with industry standards (v) monitoring services for security at the network, computer and human level, (vi) response to security breaches and disaster recovery. The course will decouple itself from the traditional association of security with cryptography.

INFO5990
Professional Practice in IT

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** (Lec 2hrs & Tut 1hr) per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This Unit of Study defines and explains the standards of knowledge of Information & Communication Technology (ICT) professionals. It covers the factors necessary for successful management of system development or enhancement projects, including managing the system life cycle, system performance evaluation, managing expectations of team members, cost effectiveness analysis, scheduling and change management. The unit also covers the issues related to the Organisational Behaviour, Interpersonal Communications, Ethics and Social implications as part of their involvement in professional practice.

INFO5991
Services Science Management and Eng

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Assumed knowledge:** INFO5990 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The service sector plays a dominant and growing role in economic growth and employment in most parts of the world and information technology (IT) is a key enabler of this. This unit of study offers IT professionals an understanding of IT-enabled services in a socio-economic and business context, and of the principles of their design, engineering and management in a service-oriented computing framework. Delivery of the unit is driven by a critical approach to the literature and live case studies presented by industry professionals.

INFO5992
Understanding IT Innovations

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 3 hour tutorial per week. **Prohibitions:** PMGT5875 **Assumed knowledge:** INFO5990 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

An essential skill for an IT manager is the ability to keep up-to-date with emerging technologies, and be able to evaluate the significance of these technologies to their organisation's business activities. This unit of study is based around a study of current technologies and the influence of these technologies on business strategies. On completion of this unit, sutdents will be able to identify and analyse an emerging technology and write a detailed evaluation of the impact of this technology on existing business practices.

INFO5993
IT Research Methods

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 3 hour scheduled small-group class per week, plus 9 hours per week private work (inclluding interaction with research supervisors). **Prohibitions:** INFO4990 **Assumed knowledge:** Elementary statistics **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit will provide an overview of the different research methods that are used in IT. Students will learn to find and evaluate research on their topic and to present their own research plan or results for evaluation by others. The unit will develop a better understanding of what research in IT is and how it differs from other projects in IT. This unit of study is required for students in IT who are enrolled in a research project as part of their Honours or MIT/MITM degree. It is also recommended for students enrolled or planning to do a research degree in IT and Engineering.

INFO6007
Project Management in IT

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** One 2 hour lecture and one 1 hour tutorial per week. **Prohibitions:** INFS6014 IT Project Management, PMGT5871 **Assumed knowledge:** INFS6000 or COMP5206 or INFO5990 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study covers the factors necessary for successful management of system development or enhancement projects. Both technical and behavioural aspects of project management are discussed. Potential topics of interest could include managing the system life cycle, system and database integration issues, system performance evaluation, managing expectations of team members, cost effectiveness analysis, scheduling and change management.

ISYS5050
Knowledge Management Systems

Credit points: 6 **Session:** Semester 1 **Classes:** One 2 hour scheduled small-group class per week. **Prohibitions:** ISYS4050 **Assumed knowledge:** Information systems concepts, database concepts **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit will offer a comprehensive introduction to the emerging area of Knowledge Management (KM) from both the technological and organisational perspectives. A diverse range of published papers and other publications that deal with a variety of KM-related topics will be reviewed. Topics include KM: Conceptual Foundations; Taxonomies of organisational knowledge and KM mechanisms; Case/Field Studies of KM Initiatives; Ontologies; Sematic Web; Customer Relationship Management (CRM) systems; Communities-of-Practice; Knowledge Sharing/Open Source Software Development; and Social Network Analysis and KM.

General units offered by the Faculty

ENGG5001
Professional Development

Credit points: 6 **Session:** Semester 1 **Classes:** 2hr lectures, tutorials and workshops per week may be taught as an intensive format if appropriate **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objectives: To provide:

-an introduction to the various elements of engineering practice

-an understanding of the role of the engineer in industry

-basic knowledge of the law of contracts and legal responsibility

-teamwork and leadership skills

-an understanding of professional responsibilities of engineers

-competence in verbal communication and presentations

-competence in reading and writing reports

-an understanding of ethical considerations.

Outcomes: Students will have a working competence in the various elements of engineering practice, and enhanced communication skills that will assist them in their other technical courses.

Syllabus Summary:

-Some Heroic Engineers

-The various roles of engineers

-Professional and legal responsibilities

-Teamwork

-Leadership

-Creativity

-Effective verbal communication

-Effective written communication

-Ethical issues

-Engineering case studies - successes and disasters

-Management of risk

ENGG5201
Data Quality in Engineering Computing

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hrs of lecture, 1 hr of lab/tuts per week **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Engineering design requires extensive use of computation in determining parameters and evaluating alternative approaches, but the output of a computer program can appear deceptively authoritative. This unit will enhance the students' capacity to work reliably with data. It will first consider medium-scale computations, as done by existing applications or self-produced ones. It will show the risks to data quality from causes such as numerical instability, inadequate tracking of data provenance, lack of automated procedures for controlling data flow among applications, etc; students will learn principled approaches to deal with data. Students will work with examples in a range of tools including spreadsheets, Matlab, and a scripting language. The unit then considers larger-scale tasks, where the engineer needs to act as client for a large industrial IT project. Students will learn about the major expertise and tasks conducted by database designers and administrators, network designers and administrators, and user application developers; the focus is on how each can contribute to the quality of the data stored in the system and the data produced by it.

ENGG5202
Sustainable Design, Eng and Mgt

Credit points: 6 **Session:** Semester 1 **Classes:** 2 lectures per week, tutorials 2 hour per week and projects and self assisted learning (4 hours per week) **Assumed knowledge:** General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objective of this unit of study is to provide a comprehensive overview of the nature and causes of the environmental problems facing our planet. The aim is to give students an insight of the political, economical and social forces underlying environmental conflicts and assesses the competing approaches used to address these issues. The sustainable technology and green chemical processes will be introduced to the students. The course explains the interaction between energy, chemicals and materials and alternative methods to minimize wastes. The topics such as sustainable raw materials, sustainable energy sources, bioethanol, biodiesel, fuel cells, photochemistry, and electrochemistry are described. The aspects of designing a sustainable building, green technologies that minimizes the energy consumption, consider recycling and reducing the waste disposal using advanced process design, selection of environmentally friendly reagents, catalysts, solvents will be discussed during this course.

The knowledge is given to students to perform a sustainability impact assessment and to develop sustainability objectives and targets within an organisation. The students will assess the procedures that can be used to interact with stakeholders to identify and prioritise sustainability.

ENGG5203
Quality Engineering and Management

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Sessions 1: Online; Session 2:3 hours per week; also taught online in session 2. **Campus:** Camperdown/Darlington **Mode of delivery:** On-line

To enable engineers entering practice from other related disciplines or with overseas qualifications to do so in a safe and effective way. This will include management of quality in research, design and delivery of engineering works and investigation. To give an understanding of safe work practices and systems assurance. Students will have a knowledge of and ability to apply the occupational health and safety act; knowledge of procedures for quality assurance both in design and construction; an understanding of Industrial Relations issues; an understanding of basic Civil Engineering contracts; an awareness of ethical ssues related to the Engineering Profession and the social responsibility of engineers.

ENGG5204
Engineering Professional Practice

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 3-week intense period of lectures. **Assumed knowledge:** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. **Practical field work:** Remainder of semester project and field work. **Campus:** Camperdown/Darlington **Mode of delivery:** Block Mode

Note: Department permission required for enrolment in the following sessions: Semester 2.

An initial 3-week intense period of lectures will provide all students with the necessary underpinning knowledge. The remainder of the semester would be based on project and field work, requiring the application in, practice of all the generic skills, with teaching staff playing a continuing resource and mentor role.

The project-based learning approach will expose students, in teams, to a series of professional engineering practice challenges to which they must respond in the limited time common in industry. This will be complemented by a small number of individual learning experiences to ensure adequate competence at the individual level. Students will have a working competence in the various elements of engineering practice, and enhanced communication skills that will assist them in their other technical units of study.

ENGG5205
Professional Practice in PM

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 3hrs per week **Assumed knowledge:** Basic engineering or science knowledge. At least 2-3 years of work experience preferred. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This UoS teaches the fundamental knowledge on the importance, organizational context and professional practice in project management. It serves as an introduction to project management practices for non-PM students. For PM students, this UoS lays the foundation to progress to advanced PM subjects. Although serving as a general introduction unit, the focus has been placed on scope, time, cost, and integration related issues. Specifically, the UoS aims to

1. introduce students to the institutional, organisational and professional environment for today's project management practitioners as well as typical challenges and issues facing them;

2. demonstrate the importance of project management to engineering and organizations;

3. demonstrate the progression from strategy formulation to execution of the project;

4. provide a set of tools and techniques at different stages of a project's lifecycle with emphasis on scope, time, cost and integration related issues;

5. highlight examples of project success/failures in project management and to take lessons from these;

6. consider the roles of project manager in the organization and management of people;

7. provide a path for students seeking improvements in their project management expertise.

By the end of this UoS, students should be able to define a project and the roles of project managers; understand the contextual as well as organizational constraints to the application of various project management approaches, and select and implement the appropriate approach(es); understand the tasks involved for cost, time and scope plan and control, and demonstrate capabilities to carry out the plan and control; understanding the usefulness and limitations existing bodies of knowledge on project management (PMBOKs) from various project management institutions, and integrate (PMBOKs) into studies and projects; and understand and identify ethical issues facing project management professionals in projects.

Textbooks

Harvey Maylor (2008) Project Management. 4th ed, Prentice Hall.

ENGG5210
Research Methods in Engineering (Intro)

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 2 hours of lectures per week for first 6 weeks attending INFO5993 Research Methods **Prohibitions:** INFO5993 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The UOS will introduce students to standard research methodologies in various engineering sub-disciplines. Students will learn how to carry out a literature survey into their research topic and evaluate the relevant literature. Different research methodologies will be introduced including the Experimental Method and the crucial role played by Statistics. This will rpovided a formal platform through which they can complete a thorough literature survey, crystallise a research proposal and formulate a research plan. Emphasis will be placed on writing, communication and presentation skills.

ENGG5214
Management of Technology

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Lecture, Tutorial, Lab, E-learning **Assumed knowledge:** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment in the following sessions: Semester 2.

Students will have a working competence in the all aspects of the management of technology, an understanding of the context and importance of technological innovation in the global knowledge economy, and practical skills in the management of technology development and commercialisation.

It will provide To provide an introduction to all aspects of the management of technology; develop an understanding of the nature and importance of technological change and innovation, within the context of the global knowledge economy; insights into the management of the new product development process; to understand the role of technology in manufacturing and service competitiveness; to recognise the role of IT in logistics management, supply chain strategies, and communication; to develop an understanding the characteristics of high technology markets.

ENGG5215
International Eng Strategy & Operations

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 3 hours per week; also taught on-line **Assumed knowledge:** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day or On-line

Note: Department permission required for enrolment in the following sessions: Semester 1.

Students will have an understanding of international nature, scope and strategies of engineering operations, a portfolio of knowledge about the operations of global engineering companies, insights into emerging engineering strategies in China, India, Europe and the US, and access to practical experience of engineers in constructing and managing an international career. The UoS will provide an introduction to all aspects of international engineering strategies and operations; an overview of the international dimensions of contemporary engineering businesses; detailed case studies of the operations and business strategies of major international engineering companies; experience of working on a project within an Australian international engineering company.

ENGG5216
Management of Engineering Innovation

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Lecture, Tutorial, Lab, E-learning **Assumed knowledge:** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment in the following sessions: Semester 1.

Students will have an understanding of the theory, concepts, data and practice of the management of engineering innovation, the central role of innovation in economic development, the growing importance of service innovation, and a measurable competence in all aspects of practical innovation promotion and management. The UoS will provide: an introduction to all aspects of the management of engineering innovation; to develop an understanding of the nature and importance of technological change and innovation, within the context of the global knowledge economy; to examine the role of innovation in international competitiveness and economic development;

to examine the changing nature of manufacturing and service innovation; to understanding the characteristics of the emerging global knowledge economy, and the consequent issues of knowledge valuation and management, e-commerce, value chain, and alliance management; to recognise the major elements in the management of technological innovation, including forecasting, R&D, technology acquisition, business strategy, financial control and marketing; to develop an understanding of how companies formulate strategy and make decisions about exploitation of technology, through a series of case studies; to develop an understanding of the issues involved in commercialisation of research and technology, and in the start-up of a new technology-based venture.

ENGG5217
Industrial Placement

Session: Semester 1, Semester 2 **Classes:** Students will work closely with a supervisor from industry and a supervisor appointed by the Faculty. **Prerequisites:** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialisation. **Campus:** Camperdown/Darlington **Mode of delivery:** Professional Practice

Note: Department permission required for enrolment.

This UoS aims to give students a rich experience in carrying out a major project within an industrial environment, which will have significant ties to their chosen specialisation. Supervision of the project will be the responsibility of the Industry partner. Students will work in industry for 12 weeks and engage fulltime on the project at the industrial site. Students will prepare and present a detailed technical report on their work. This UoS will give students essential experience working on real-life projects, where their knowledge gained in the first year of their MPE will be put into practice. Students will also obtain invaluable knowledge and experience of the way engineering skills are employed in an industrial context.

ENGG5218
Research Dissertation

Credit points: 24 **Session:** Semester 1, Semester 2 **Classes:** Each student will be assigned an academic supervisor from their chosen stream or specialisation. Students will meet with an academic supervisor for approximately 1 hour per week for one semester. **Prerequisites:** Completion of a minimum of 48cp of MPE UOS and have received a distinction average **Corequisites:** ENGG5210 Introduction to Research Methods in Engineering **Prohibitions:** AMME5218 Research Dissertation **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This UoS will give students the opportunity to research and analyse a problem and produce a well-argued, in-depth thesis. Students will develop research skills to cope with ambiguity and solve open-ended problems. The objective of this UoS is to introduce students to research methods and provide a formal platform through which they can complete a thorough literature survey, crystallise a research proposal and write a solid research dissertation.

ENGG5219
Research Project

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Students will be assigned a supervisor who they will meet with on a weekly basis to discuss their progress. **Prerequisites:** Students will have completed a minimum of 48cp towards the MPE, including up to 24cp of Engineering Management UoS and a minimum of 24cp from their chosen specialization. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This UoS aims to give students the ability to carry out a research project either within an industrial environment or a research group of the University, which will have significant ties to their chosen specialisation. Supervision of the project will be the responsibility of an academic within the Faculty of Engineering and IT. This UoS will give students essential experience researching and reporting on a relevant project. Students will also obtain invaluable knowledge and experience of the way engineering skills are employed in a research context. Students will work for one semester on the project and will prepare and present a detailed report on their project.

ENGG5220
Engineering Project A

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Independent project work. **Prerequisites:** 48 credits from MPE degree program **Prohibitions:** ENGG5222, ENGG5223 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The ability to plan, systemically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies previously obtained, as well as making use of the report writing and communication skills the students have developed.

In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project.

ENGG5221
Engineering Project B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** Independent project work. **Prerequisites:** ENGG5220 **Prohibitions:** ENGG5222, ENGG5223 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The ability to plan, systemically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies previously obtained, as well as making use of the report writing and communication skills the students have developed.

In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project.

ENGG5222
Dissertation A

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Independent project work **Prerequisites:** Distinction Average in 48 credit points of MPE program **Prohibitions:** ENGG5220, ENGG5221 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

To complete a substantial research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued, in-depth thesis.

Department permission required for enrolment.

In order to enrol in a project, students must first secure an academic supervisor in an area that they are interested. The topic of your project must be determined in discussion with the supervisor. The supervisor can come from any of the Engineering Departments, however, they need to send confirmation of their supervision approval to the Postgraduate Administrator.

ENGG5223
Dissertation B

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Independent porject work. **Prerequisites:** ENGG5222 **Prohibitions:** ENGG5220, ENGG5221 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

To complete a substantial research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued, in-depth thesis.

Department permission required for enrolment.

In order to enrol in a project, students must first secure an academic supervisor in an area that they are interested. The topic of your project must be determined in discussion with the supervisor. The supervisor can come from any of the Engineering Departments, however, they need to send confirmation of their supervision approval to the Postgraduate Administrator.

ENGG5601
Greenhouse Gas Mitigation

Credit points: 6 **Session:** Semester 2 **Classes:** 2 hour lecture and a tutorial each week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Unit Administration: WebCT

Graduate unit of study designed for environmental engineering students, either M.E.S. or Grad. Cert. of GHG Mitigation

Keywords:Greenhouse science, energy efficiency, carbon sinks, climate change amelioration

Objectives:To develop an understanding of, the significance of carbon dioxide in climate; the role of increasing fossil fuel energy conversion efficiency; the international framework for carbon sinks; the size, cost, potential and nature of terrestrial and oceanic sinks of carbon; the amelioration of the impacts of climate change.

Outcomes:Students will be able to make recommendations of the most cost effective approach to enterprises meeting carbon dioxide limits expected to be imposed as a result of the Kyoto Protocol.

Textbooks

P. Riemer, A. Smith, K. Thambimuthu (1998). Greenhouse Gas Mitigation, Elsevier, Amsterdam. pp777.

ENGG5610
Environmental Studies at Tokyo

Credit points: 6 **Session:** Semester 1 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

A graduate unit of study designed for environmental engineering students, either M.E.S. or Grad. Cert. of GHG Mitigation.

Keywords: Global environments, environmental technology, policy making.

Objectives: To make students familiar with environmental technology policy making, environmental engineering and energy engineering, and the planning of environmentally harmonising systems.

Outcomes: Students will be able to systematically discuss:

- Current topics concerning global environmental and energy issues;
- How to make world and national policy;
- Environmental technologies and their role in policy;
- Advanced environmental research;

and be able to produce a plan harmonising the conflicting requirements such as protection of the environment and development.

ENGG5701
Doctoral Thesis 1A

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Candidate must have at least one meeting with supervisor per week **Corequisites:** ENGG5210 Research Methods in Engineering **Practical field work:** Must carry out at least 8 hous of research per week. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Candidates enrolled in this UoS will begin research on an approved project. The research may be performed in a candidate's place of employment on a project that has been approved by the Faculty. A supervisor from the Faculty of Engineering and Information Technologies will be appointed for the duration of the research project. The objective of this UoS is to provide a formal platform through which the candidate can complete a research project from a thorough review of the various stages of literature survey, research proposal, research plan, conduct of research, data analysis and presentation of outcomes.

ENGG5702
Thesis and Doctoral Seminar 1B

Credit points: 12 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

In the doctoral seminar program the candidate must present the first of three research colloquia to his or her peers in the form of a a research proposal. The candidate will be able to give a thorough review of the various stages of literature survey, research proposal, research plan, conduct of research, data analysis and presentation of outcomes.

ENGG5703
Doctoral Thesis 2A

Credit points: 12 **Session:** Semester 1, Semester 2 **Classes:** Candidate must have at least 1 meeting per week with supervisor. **Practical field work:** Candidate must carry out at least a minimum of 8 hours per week on research. **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Candidates enrolled in this UoS will continue their research on their approved project as outlined in ENGG5701 Doctoral Thesis 1A.

ENGG5704
Thesis and Doctoral Seminar 2B

Credit points: 12 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The candidate must carry out research for the fourth semester of the Doctoral research program, and at the end of the semester, must present the second of the three research colloquia (of approximately half an hour's duration) to his or her peers as a work in progress seminar, one of which might be analogous to an oral defence of the nearly completed thesis. The Seminar will be considered in the annual progress report on progress.

ENGG5705
Thesis and Doctoral Seminar 3A

Credit points: 24 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The candidate must carry out research for the fifth semester of the degree, and present the third of the three research colloquia (of approximately half an hour's duration) one of which might be analogous to an oral defence of the nearly completed thesis to the academic staff and postgraduate students of the Faculty of Engineering and Information Technology.

ENGG5706
Thesis and Oral Defence

Credit points: 24 **Session:** Semester 1, Semester 2 **Campus:** Camperdown/Darlington **Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Carry out research for the final semester, and at the end of the Semester, present the results of the research in a thesis of approximately 60,000 words. The candidate is required to present a final Seminar which is similar to an oral defence of the thesis before staff and research students of the Faculty of Engineering and Information Technology at the end of the semester.

8. Other Faculty information

Faculty advisers

Students can discuss with the undergraduate or postgraduate advisers any questions about their studies, difficulties in maintaining their 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, students should seek help without delay. Discussions are held in strict confidence – simply come to the faculty office, in Room 226, Engineering and Information Technologies faculty building and make an appointment.

Examinations

Freedom of Information Act

Examination scripts, or copies, are available for viewing from school offices for three months after final examinations, after which they will be shredded.

Enquiries

All examination result enquiries must be made with your school. The Engineering and Information Technologies faculty office is not equipped to handle examination enquiries.

Supplementary examinations

The award of supplementary examinations is a privilege and not a right. 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.

Illness or misadventure

The faculty recognises that the performance of students may be adversely affected by illness or other misadventure, and makes provision for special consideration of such 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 an 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 must still 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 sub-standard 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 with the Financial Assistance Office and the Students' Representative Council.

Financial Assistance Office (Student Services)
Phone: +61 2 9351 2416

Students' Representative Council
Phone: +61 2 9660 5222

JN Ellis Memorial Fund

The JN Ellis Memorial Fund was established in 1969 following an appeal made to all graduates in engineering to honour the memory of Neil Ellis. As Sub-Dean and later as Administrative Assistant to the Dean Neil Ellis was able, through 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 and Information Technologies 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 +61 2 9351 2416. Awards are made on the recommendation of the Dean and are valued at $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 +61 2 9351 3853.

Faculty staff

Dean
Professor Archie Johnston PhD *Heriot Watt* FTSE FIEAust CPEng FICE MAICD

Executive Assistant to the Dean
Kay Fielding

Pro Dean
Professor Liyong Tong, BSc MEngSc *Dalian* PhD *BUAA*, FIEAust MAIAA

Associate Dean (Postgraduate Research and Training) and Director of the Graduate School of Engineering and IT
Professor Assaad R Masri, BE PhD *Sydney*

Associate Dean (Postgraduate Coursework) and Director of the Graduate School of Engineering and IT
Associate Professor Fariba Dehghani, PhD *UNSW*

Associate Dean (Undergraduate)
Dr Douglass J Auld, BSc BE MEngSc PhD

Associate Dean (Teaching and Learning)
Dr Irena Koprinska, MSc *TU-Sofia* PhD *Sofia* MEd

Associate Dean (First Year)
Associate Professor Marjorie Valix, BSc PhD *UNSW*

Associate Dean (International)
Professor Liyong Tong, BSc MEngSc *Dalian* PhD *BUAA*, FIEAust MAIAA

Associate Dean (IT)
Dr Tim Wilkinson, BSc BE MA PhD *Sydney*

Director Master of Professional Engineering
Professor Masud Behnia, BSME MSME PhD*Purdue* FIEAust MASME MAIAA

Director Master of Project Management
Associate Professor Liaquat Hossain, BBA MSc *Assumption* PhD *Woll* Postdoc *MIT*

Director Master of Information Technology
Dr Uwe Rohm, Dip CS *Passau* PhD *ETH Zurich*

Chief Operating Officer
David Cox BA *UNSW*, BE *UNSW*, MSciSoc *UNSW*, FRAeS

Director Marketing and International
Eric van Wijk, BSc *ANU* GradDipEd *UC*
GradDipAppEcon *UC*

Engineering Sydney
Keiran Passmore, BSW *UNSW* MA *UNSW* GradDipCareerEd *RMIT* (Executive Director)
Ariel Riveros

Secretary to the Faculty
Annette Alexander

Student administration staff

Graduate School of Engineering and IT
Lesley Vanderkwast Grad Dip Frontline Management (Manager)
Jo Gillott BA (Hons) *Macquarie*
George Carayannopoulos BSW (Hons)
Emily Major BA Hons *Wellington*

Undergraduate Administration
Annamaria Brancato (Manager)
Rosaria Hamilton
Randa Farrelly

Faculty Marketing Officer and Scholarships
Trish Dimasi Grad Dip Marketing *NT*

Project Officer (MPE)
Susan Day AFMIA

Faculty Librarian
Irene Rossendell, BA (*UQ*) Dip Lib *UNSW*, ALIA

Advisers to undergraduate students

Aerospace, Mechanical and Mechatronic Engineering
Director (Undergraduate Studies):
Dr KC Wong BE PhD MAIAA

Aeronautical advisers:
Year 1 – Dr KC Wong
Year 2 – Dr K. Srinivas
Year 3 – Professor Liyong Tong
Year 4 – Dr Peter Gibbens

Biomedical advisers:
Years 1 and 2 – Dr Qing Li
Years 3 and 4 – Associate Professor Andrew Ruys
Combined degrees (all years) – Associate Professor Andrew Ruys

Mechanical advisers:
Stream coordinator – Paul McHugh
Year 1 – Paul McHugh
Year 2 – Professor Assaad Masri
Year 3 – Professor Masud Behnia
Year 4 – Dr Michael Kirkpatrick
Combined degree (all years) – Paul McHugh

Mechatronic advisers:
Year 1 – Dr David Rye
Year 2 – Dr Steve Scheding
Year 3 – Prof Masud Behnia
Year 4 – Dr Graham Brooker

Space Engineering advisers:
Year 1 – Dr Doug Auld
Year 2 – Dr Xiaofeng Wu
Years 3 and 4 – Associate Professor Salah Sukkarieh

Chemical and Biomolecular Engineering
Director (Undergraduate Studies):
Associate Professor Howard See

Year 1 – Associate Professor Marjorie Valix
Year 2 – Dr Alejandro Montoya
Year 3 – Associate Professor Vincent Gomes
Year 4 – Dr Andrew Harris

Advisor Postgraduate Students
Postrgaduate Research – Dr Alejandro Montoya
Postrgaduate Coursework – A/Prof Fariba Dehghani

Civil Engineering
Director (Undergraduate Studies):
Dr David Airey

Project Engineering Management (PEM) including combined degrees – Dr Li Liu
Administrative Officer (undergraduate) – Cynthia Papangelis

Contact the School of Civil Engineering for a detailed list of year advisers for the various streams.

Electrical and Information Engineering

Director (Undergraduate Studies):
Dr Yash Shrivastava

Year 1 – Associate Professor Steve Simpson
Year 2 – Dr Xiheng Hu
Year 3 – Dr Yash Shrivastava
Year 4 – Dr Swamidoss Sathiakumar
Combined degree courses – Dr Swamidoss Sathiakumar
International students – Dr Xiheng Hu

Information Technologies

Director (Undergraduate Studies):
Dr Josiah Poon

Director (Postgraduate Coursework Studies):
Dr Uwe Röhm

Director (Research):
Dr Bernhard Scholz

List of staff by school

Aerospace, Mechanical and Mechatronic Engineering

Head of School
Steven W Armfield, BSc *Flinders* PhD *Sydney*

Peter Nicol Russell Professor
Roger I Tanner, BSc *Brist* MS *Calif* PhD *Manc*, FRS FAA FTSE HonFIEAust FASME

Lawrence Hargrave Professor
Vacant

Professors
Steven W Armfield, BSc *Flinders* PhD *Sydney*
Masud Behnia, BSME MSME PhD *Purdue*, FIEAust MASME MAIAA *ARC Federation Fellow, Professor of Mechatronic Engineering*
Hugh F Durrant-Whyte, BSc(Eng) *Lond* MSE PhD *Penn*, FTSE FIEEE
Yiu-Wing Mai, BSc (Eng) PhD DSc *HK* DEng *Sydney*, FRS FAA FTSE FHK Eng FWIF FIE Aust FASME FHKIE
Assaad R Masri, BE PhD *Sydney*
Eduardo M Nebot, BS *Bahia Blanca* MS PhD *Colorado State*
Liyong Tong, BSc MEngSc *Dalian* PhD *BUAA*, FIEAust MAIAA
Lin Ye, BS *Harbin* MS PhD *BUAA*, FTSE
Liangchi Zhang, BSc MEng *Zhejiang* PhD *Peking* DEng *Sydney*, FTSE MASME MASPE MJSPE MJSME

Associate Professors
Colin Dunstan, BSc, MSc *UNSW* PhD *Sydney*
Andrew Ruys, BE (Hons) PhD *UNSW*
Salah Sukkarieh, BE(Hons) PhD *Sydney*

Senior Lecturers
Douglass J Auld, BSc BE MEngSc PhD *Sydney*
Graham Brooker, BSc MSc(Eng) *Wits* PhD *Sydney*
Peter W Gibbens, BE PhD *Newcastle (NSW)*, MAIAA
Ahmad Jabbarzadeh, BE *UTabriz* MES PhD *Sydney*
Michael Kirkpatrick, BE PhD *Sydney*, MIEAust
Qing Li, BE ME *Hunan* ME *UTS* PhD *Sydney*
Xiaozhou Liao, BSc *Huaqiao* MSc *Dalian* PhD *Sydney*
Paul J McHugh, BSc BE *Sydney*
David C Rye, BE *Adelaide* PhD *Sydney*
Steven Scheding, BE PhD *Sydney*
Karkenahalli Srinivas, BE *Bangalore* ME PhD *IISc*
Stefan Williams, BASc *Wat* PhD *Sydney*
KC Wong, BE PhD *Sydney*, MAIAA
Hala Zreiqat, BSc(Hons) *Jordan* PhD *UNSW*

Lecturer
Xiaofeng Wu, BE *NWPU* PhD *Lboro*

Emeritus Professors
Robert W Bilger, BSc BE *NZ* DPhil *Oxf*, FAA FTSE
Graeme Bird, BSc ME PhD *Sydney*, Foreign Asspc NAE (USA) FTSE FAIAA FRAeS FIEAust
Grant P Steven, BSc(Hons) *Glas* DPhil *Oxf*, FTSE FRAeS FIEAust

Honorary Professors
Arthur Brandwood, BSc *R'dg* Phd *Leeds*, MIMMM CEng
John H Kent, BE MEngSc PhD *Sydney*, FIEAust

Honorary Associate Professor
Peter Youssef, MBBS(Hons), PhD *Flinders*, FRACP
Ashish Diwan, MBBS, MS, PhD *UNSW*

Visiting Professors
Brian Cotterell, BSc (Eng) *London* PhD *Cantab*
Toshio Tanimoto, MEng, DEng *Doshisha*
Gordon Williams, BSc(Eng) PhD DSc *Lond*, FRS FCGI FREng FIMechE FIM

Adjunct Professors
Francis Rose, BSc(Hons) PhD *Sheff*, FTSE FIEAust IMA

Adjunct Associate Professors
Allen Lowe, BE ME *UNSW* PhD *UoN*
Greg Roger, MBBS MEng(Res) *Sydney*

Chemical and Biomolecular Engineering

Head of School
Timothy AG Langrish, BE(Hons) *NZ* DPhil *Oxf*, FIChemE FIEAust CPEng

Professors
Geoffrey W Barton, BE PhD *Sydney*
Hans Coster MSc PhD *Sydney*, MInstP CPhys FAIP
Brian S Haynes, BE PhD *UNSW*, FIChemE FIEAust CPEng
Anthony Vassallo PhD *Macquarie*, Delta Electricity Chair in Sustainable Energy

Associate Professors
Fariba Dehghani, PhD *UNSW*
Vincent G Gomes, BTech MEng PhD *McGill*
Andrew Harris, BSc BE(Hons) *Qld* PhD *Camb*
Timothy AG Langrish, BE NZ DPhil *Oxf*, FIChemE FIEAust CPEng
Howard See, BSc BE MSc *Tokyo* PhD *Nagoya*
Marjorie Valix, BSc PhD *UNSW*

Senior Lecturers
Ali Abbas, BE PhD

Lecturers
John Kavanagh, BE(Hons) PhD *Sydney*
Alejandro Montoya, PhD *Sydney*

Emeritus Professors
Jim G Petrie, BSc PhD *Cape T*
Rolf G H Prince AO, BE BSc *NZ* PhD *Sydney*, FIChemE HonFIEAust FTSE FREng

Honorary Professors
Judy Raper, BE(Hons) PhD *UNSW*

Honorary Adjunct Professor
David Fletcher, BSc PhD *Exeter*

Honorary Adjunct Associate Professor
Donald O White, BE *Liverpool*

Research Staff
Dr Dean Chambers PhD *Macquarie*
Dr Terry Chilcott BE *UQ* MESc PhD *UNSW*
Dr Donald Chiou PhD
Adrian Dawson BE *UNSW*
Dr David Kittipoomwong PhD *Wisconsin-Madison*
Dr Jun Liu PhD
Victor Lo BSc *UTS*
Sergio Londono ME
Mr Carlos Moreno Arguello BE UPB
Dr Kenneth Chee Howe See PhD
Dr Karina Sendt PhD
Dr Stuart Thickett PhD
Dr Shicheng Xue PhD

Analytical Manager
Dr Jeffrey Shi PhD

Technical Manager
Gary Towell

Technical Support Staff
Bogumil Eichstaedt
Alex Farago
Dennis Trevaskis
Linda Wang

Administration Manager
Katharyn Thomas

Academic Support Office
Agnes Constanti
Sonya Corcoran
Alex Missiris

Visiting Appointments
Professor Richard Darton BSc PhD FREng FIChemE CEng FREng
Dr Dirk Reichert, PhD *Sydney*
Dr Bjornar Sandnes

Honorary Associates
Dr Gregory Abramowitz PhD
Dr Alex Cheung, BSc PhD *UNSW*
David Hind
Dr Peter B Linkson, BE PhD *Sydney*, FIEChemE FAusIMM FGAA CEng
Dr Stuart McGill BE PhD
Dr Justin Nijdam BE PhD *Cant*
Dr Daniel Ryan BSc *UCT* PhD *Rhodes*
Dr Emilie Seris PhD

Civil Engineering

Head of School
Kim JR Rasmussen, MEngSc *TU Denmark* PhD *Sydney*

Professors
Kim J R Rasmussen, MEngSc *TU Denmark* PhD *Sydney*
John Patterson BSc Hons *UQ*, PhD *UQ*

Adjunct Professor
Ian SF Jones, BE *UNSW* PhD *Wat*, MIEAust

Adjunct Associate Professor
Michael Chaaya BE ME PhD CPENG FieAust
Tim Finnigan
Ted Tooher BSc BE Hons MA

Adjunct Senior Lecturer
Lip Hen Teh, BE Hons *UOW*, PhD
Richard Weber
Paul Uno, BE MBdgSc MIEAust CPEng

Associate Professors
David W Airey, BA MPhil PhD *Camb*
Chengwang Lei BE, ME, PhD
Itai Einav, BSc PhD *Sydney*
Liaquat Hossain, BBA, MSc *Assumption* PhD *UOW* Postdoc *MIT*
Stuart G Reid, BE (Hons) (*Cant*) ME *Cant* PhD *McGill*
Abbas El-Zein, BE MSc PhD *Sydney*, MIEAust MASCE

Adjunct Associate Professor
Julie Wright LLB GradDipLP M ConstLaw

Emeritus Professors
Gregory Hancock AM, BE BSc PhD DEng FIEAust FTSE
Bluescope Steel professor of Steel Structures
Harry G Poulos AM, BE PhD DScEng *Sydney*, FIEAust FASCE FAA
John Small BSc Hons PhD FIEAust MASCE
Nicholas S Trahair, BSc BE MEngSc PhD DEng *Sydney*, FIEAust

Senior Lecturers
Gianluca Ranzi, BE MScEng PhD *Sydney*
Luming Shen, BE *Tongji* ME *Tongji* PhD *Missouri Columbia*
Tim Wilkinson, BSc BE MA PhD *Sydney*
Li Liu, BE *(NUTD)* MBA *(AIT)* MTax *Sydney* PhD *(AGSM)*

Lecturer
Steve Cochard MScEng PhD
Federico Maggi MSc PhD
Gwenaelle Proust, BS MS PhD *Sydney*
Hao Zhang, BS *Tsinghua* MS *Tsinghua* PhD *GATECH*
Bee-Lan Oo, BBCM(Hons) *UNSW* PhD *HK PolyU*

Professional Officers
Nigel P Balaam, BE PhD *Sydney*
Antonio Reyno BE MES
John P Papangelis, BE PhD *Sydney*, MIEAust

Honorary Professors
Kourosh Kayvani, BSc *Tehr* MengSc PhD *UNSW* MIEAust CPEng MIABSE MIASS

Honorary Associate Professors
Andrew Abel, Dipl Ing *TU Bud* MSc McM PhD *UNSW*, CEng FIM
Peter Ansourian, BSc BE PhD *Sydney*
Robert J Wheen, BSc BE MEngSc *Sydney*, FIEAust MASCE

Honorary Senior Lecturer
Logan Apperley,BE PhD *Auck*
Richard Watkins, BEng(Hons) PhD *Edin*

Honorary Lecturer
Ian G Bowie, MSc *Manc*, MASCE MIEAust

Electrical and Information Engineering

Head of School
Branka Vucetic, MSc PhD *Belgrade*, FIEEE

Professors
PNRussell Professor and University Professorial Fellow
Branka Vucetic, MSc PhD *Belgrade*, FIEEE
Energy Australia Chair of Power Engineering 2007
Vassilios Agelidis, BE *Democritus U of Thrace* MAppSc *C'dia* GradDipBusAdmin Grad CertEd PhD *Curtin*, SMIEEE MIET
Energy Australia Chair of Power Engineering 2007
Robert A Minasian, BE PhD *Melbourne* MSc *Lond*, FIEEE FIEAust CPEng

Emeritus Professor
Trevor Cole, BE *UWA*, Phd *Camb*, FTSE HonFIEAust

Associate Professors
Javid Atai, BSc(Hons) *UWA* PhD *ANU*, SMIEEE
Abbas Jamalipour, PhD *Nagoya*, FIEEE FIEAust MURSI MIEICE
David Levy, MScEng PhD *Natal*, MIEEE MACM
Philip Leong, BSc BE PhD
Stephen W Simpson, BSc PhD *Sydney*

Reader
Andre van Schaik, MSc *Twente* PhD *EPFL*, SMIEEE

Senior Lecturers
Rafael Calvo, Licenciado in Physics PhD *Universidad Nacional de Rosario*
Xiheng Hu, MEng *Chongqing* PhD *Sydney*
Craig Jin, BSc *Stan* MS *Caltech* PhD *Sydney*

Yonghui Li, BSc *Jilin* PhD *Beijing U Aero and Astro*
Guoqiang Mao, BE *Hubei Poly U* ME *Southeast China* PhD *Edith Cowan*, MIEEE
James G Rathmell, BSc BE PhD *Sydney*, SMIEEE
Swamidoss Sathiakumar, BSc *American Coll India* BE ME PhD *IISc*
Yash Shrivastava, BTech IIT *Kanpur* PhD *Iowa*, MIEEE

Lecturers
Dylan Lu, BE PhD *HK PolyU*, MIEEE MIEAust
Xiaoke Yi, ME *Northwestern Poly U*, PhD *Nanyang Tech U*

School Manager
Dorothy Wilmhurst, BA *UNE* MEd Admin *UNSW*

Professional Officers
Rui Hong Chu, MElecEng *Xi'an Jiao Tong* PhD
William Fong, BE *UWA* MEngSc
Ross Hutton, BE *QIT* ME(Res)
Van Pham, BE *SAust* MEngSc PhD *UNSW*, MIEEE
Robert Sutton, ME *UNSW*

Technical Officers
Kavitha Jeevan
Dhruba Roy
Robert Wallace (Senior Technical Officer)

Academic Support Office
Manager: Raymond Patman, BEc MA *Sydney*
Sylvia Pyman
Rita Wong

Information Technology Unit
Manager: David Brown, BSc BE *Sydney*
Rodica-Maria Popp
Wesley Wu BSc *Shenzhen*, MSc Internetworking *UTS*
Michael Zhou, BSc *Suzhou* BE *UTS*

Finance and Resources
Rummy Gill
Ping Zhang, BA *Fudan*

Technical Assistant
Danny Phillips

Honorary Professors
David Hill, BE BSc *UQ* PhD *UoN*, FIEAust FIEEE
Godfrey Lucas, BEng PhD *Belf*, FIEE
Hong Yan, BE *Nanking UPT* MSE *Mich* PhD *Yale*, FIEEE FIAPR FIEAust

Adjunct Associate Professors
Peter M Nickolls, MBBS BSc BE PhD *Sydney*

Honorary Associate Professor
Iain Collings, BE *Melbourne*, Phd *ANU*, SMIEEE
Hansen Yee, BSc BE PhD *Sydney*

Honorary Senior Lecturer
Brian Campbell, ME *Sydney*

Adjunct Senior Lecturer
Shipin Chen, BE *University of Technology Harbin*, ME *Chinese Academy of Sciences*, PhD *UNSW*

Adjunct Lecturers
Zhou Chen
Didier Debuf, BE MEngSc PhD *UNSW*

Information Technologies

Associate Professor and Head of School
Sanjay Chawla, PhD *Tennessee* BA *Delhi*

Professors
Chair of Software Technology
Peter Eades, BA PhD *ANU*, FACS

David (Dagan) Feng, ME *SJTU* MS PhD *UCLA*, FATSE FIEEE FACS FHKIE FIET

Judy Kay, PhD *Sydney*

Chair of Language Technologies
Jon D Patrick, DipBehHealthPsych *LaTrobe* Dipl Surv *RMIT* BSc *Deakin* MSc *Dub* PhD *Monash*, FACS

Chair of High Performance Computing and Networking
Albert Zomaya, BEng PhD *Sheff*, FAAAS FIEEE FIET CEng

Associate Professors
Michael Charleston, LTCL *Trinity College London* BSc (Hons) PhD *Massey*
Joseph G Davis, BSc *Calicut* PostGradDipMgmt *IIMA* PhD *Pitt*
Alan Fekete, PhD *Harv* BSc *Sydney*
Seok Hee Hong, MS PhD *Ewha*
Robert J Kummerfeld, PhD *Sydney*
Bjorn Landfeldt, PhD *UNSW*
Masahiro Takatsuka, ME *TokyoInst Tech* PhD *Monash*
Bing Bing Zhou, BSc *Nanjing* PhD *ANU*

Senior Lecturers
Weidong (Tom) Cai, BSc *HuaQiao* PhD *Sydney*
James Curran, PhD *Edin* BSc(Adv)(Hons) *Sydney*
Irena Koprinska, MSc *TU-Sofia* PhD *Sofia* MEd
Josiah Poon, BSc(Hons) *UMIST* MSc *Deakin* PhD *Sydney*
Uwe Röhm,
Dipl-Inform *Passau* Dr.sc.techn *ETH Zurich*
Bernhard Scholz, Dipl-Ing Dr Techn *TUVienna*
Anastasios Viglas, MA PhD *Prin*
Kalina Yacef, DEA MSc PhD *Paris V*

Lecturers
Vera Chung, PhD *QUT*
Simon Poon, GradCert MathsSci MEng *UTS* BSc PhD *Sydney*
Zhiyong Wang, PhD *HKPU*
Xiu Ying Wang, PhD *Sydney*
Ying Zhou, BSc MEng *Nanjing* PhD *NUS*

Research Staff
Research Associate
Cindy Bai, BSc CompSci *HuaQiao*
Postdoctoral Research Fellow
Chung (Jan) Chan, BEng(Hons) *HKPU* PhD *Sydney*
Jinman Kim, PhD *Sydney*
Young Choon Lee, BSc(Hons) PhD *Sydney*
ARC Postdoctoral Research Fellow
Tara Murphy, PhD *Edin* BSc(Adv)(Hons) *Sydney*
Postdoctoral Researcher
Luis Pizzato, BSc MSc *PUCRS* PhD *Macquarie*
Research Associate
Reza Sarkamari, MMDes MIT *Sydney*
Postdoctoral Research Fellow
Javid Taheri, PhD *Sydney*
Postdoctoral Fellow
Lingfeng Wen, PhD *Sydney*
Yong Xia, BE ME PhD *NPU China*

Technical and Infrastructure Services Manager
Greg Ryan, BSc(Hons) *Sydney*

Technical and Infrastructure Services Staff

William Calleja
Allan Creighton
Witold Janus, BSc DipInfTechProfPrac *UTS*
Michael Rados
Arthur Scott

School Manager

Shari Lee, BA *Sing* MA *Sydney*

Administrative Officers

Cecille Faraizi
Wei-ying Ho
Madelon Klein, BA *NHTV Breda* MA *Radboud Nijmegen*
Linda Kristian, MA (Journalism) *UTS* BA(Hons) *Sydney*
Evelyn Riegler
Josephine Spongberg
Katie Yang, MEd *UTS*

Adjunct Professor

Stefan Eberl, MSc PhD *UNSW*
Michael Fulham, MB BS *UNSW*
Professor Ya-Qin Zhang, BS MS *USTC* PhD *GW*

Honorary Senior Lecturer

Adel Al-Jumaily, BSc MSc *TechnolBaghdad* PhD *TechUMalaysia*
Mahendran Maliapen
Selvakennedy Selvadurai, BSc MSc PhD *UPM*

Honorary Appointments

Rod Belcher
John Baker, PhD *UNSW*
Em Professor John Makepeace Bennett AO, BE(Civ) BE(Mech&Elec) BSc *UQ* PhD *Camb*, FTS FACS FBCS FIEAust FIMA
Athanassios Boulis, PhD *UCLA*
Fang Chen, BE MEngSc *Beijing Aeron & Astron* MBA *Warnborough* PhD *Jiaotong*
Sirong Chen
Zheru Chi, BEng MEng PhD *Zhejiang*
Ho Chuen (Eric) Choi
Roger Fulton, MSc PhD *UTS*
Vance Gledhill, PhD *Melbourne* BSc *Sydney*, FACS
Paul Greenfield, BSc MSc *Sydney*
Joachim Gudmundsson
Doan B Hoang, BE ME *WAust* PhD *UoN*
Brian Hutton, MSc Aberd PhD *UTS* BSc *Sydney*
Jeffrey Kingston, BSc PhD *Sydney*
Eugene Lim, PhD *Sydney*
Zhonghua Ma, MEng *DLUT* BEng PhD *SJTU*
Steve Meikle, PhD *UNSW*
Maximilian Ott
Cecile Paris, PhD *Col*
Ian A Parkin, PhD *Adelaide* BSc *Sydney*
Aaron Quigley BS(Mod)(Hons) *TCD* PhD *UoN*
Markus Rittenbruch, PhD *UQ*
Yu Shi
Abdur Sikder, PhD *Sydney*
Andrea Stern, BA *Macquarie* Diploma *UNSW*
James Uther, PhD *Sydney*
Kai Xu, , BEng(IT) BEng(Bus) *SJTU* PhD *UQ*
David Zhang
HongJiang Zhang, PhD *Denmark* BS *Zhengzhou*
Jian Zhang

Scholarships and prizes

Many students enrolling in the Faculty of Engineering and Information Technologies 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 Quadrangle.
Phone: +61 2 9351 3250.

Engineering and Information Technologies scholarships

The scholarships website is at www.eng.usyd.edu.au/scholarships.

Scholarships are funded by industry, as well as the faculty and its departments and schools. The scholarships website is the most accurate source of information but departmental/school websites also contain scholarship information.

WM Neirous Scholarship

For women enrolling in structural (civil) engineering, valued at $3000 pa for four years.

Scholarships and prizes offered by ther School of Information Technologies

The School of IT offers several prizes and scholarships to students studying information technologies. For a full list please visit www.it.usyd.edu.au/scholarships.

Other scholarships

Other scholarships are provided by Transfield, RTA, ABB, Baulderstone Hornibrook, Evans & Peck, Turbomeca, and Resmed.

The University of Sydney Scholarships and the University of Sydney International Scholarships for engineering are also selected by the faculty.

For more information, contact:
Faculty Scholarships Office
Phone: +61 2 9351 2834/2131
Fax: +61 2 9351 3885
Email: scholarships@eng.usyd.edu.au

The University website provides information on scholarships. Visit www.usyd.edu.au/scholarships.

The Major Industrial Project Placement Scheme for undergraduates (MIPPS)

Chemical and Biomolecular Engineering

The objective of this program, 'MIPPS', is to provide opportunities for top students (first class honours potential), to spend six months in industry undertaking high-level investigative projects during their final year of studies. No subjects are taken in the first semester of the final year. No extra time is usually required for a student to complete their degree.

Students work full-time in industry, from mid-January to early July, at the sponsor's premises, providing an industrial experience, rather than a part-time position for a full-time student. It is insisted that the project must be the company's, and that it is always under the company's final control. The sponsor appoints the project supervisor, who must have the authority to make and enact project decisions. Although not an essential requirement, projects which tap into the research and applications expertise within the School are preferred.

A key feature of the scheme is that the School participates extensively through sharing supervisory responsibilities and appointing an academic as associate supervisor. The associate supervisor supports the students in their first significant investigative task (finding resources, handling information, setting direction etc.), supports the projects by contributing to the direction and methodology, and monitoring project progress.

Students are invited to apply and are selected based on academic and personal qualities demonstrated during the first three years of their studies.

The MIPPS stipend is currently $12,500 tax free to the student. Total cost to the sponsor is currently $21,000 to $23,000, depending on the extent of other support by the sponsor to the department, such as Foundation membership.

Sponsors

The sponsors for 2008 were BHP Billiton Technology, BOC, Intec Ltd, QENOS, Visy Pulp Paper, Caltex and Shell.

Student facilities and societies

Noticeboards

Faculty noticeboards, one for first year courses and one for second year courses, are located outside the Student Enquiry Office, second level, faculty building. Each of the Engineering and Information Technologies departments has a noticeboard for third and fourth year students.

Noticeboards 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 noticeboards. Students are expected to inspect the noticeboards at frequent intervals.

Notices referring to cadetships, scholarships, vacation employment and career opportunities and other matters of this nature are also displayed on the noticeboards in and around the Student Enquiry Office, 2nd level, Engineering and Information Technologies faculty building.

Information is regularly placed on the faculty's electronic bulletin board at www.aeromech.usyd.edu.au/cgi-bin/yabb2/YaBB.pl.

The SciTech Library

The SciTech Library supports the Faculties of Engineering and Information Technologies, Science, and Architecture, Design and Planning.

Items may be borrowed for 8 weeks with unlimited renewals. However, if a borrowed item is requested by another user, then it must be returned within a week of the request being placed – you will be emailed if this happens. High demand items are placed in the Researve collection and can be borrowed for 2 hours.

Many library resources are available in full text online via the catalogue at http://opac.library.usyd.edu.au. This includes online journals, e-books and Australian Standards. These items can also be accessed from off campus, 24 hours a day.

The Faculty of Engineering and Information Technologies has two dedicated Faculty Liaison Librarians who can assist you with any enquiries or training needs. Their contact details are at http://www.library.usyd.edu.au/contacts/subjectcontacts.html.

SciTech Library is on level 1 of the Jane Foss Russell Building. Printing and photocopying are available. Opening hours and contact details are at www.library.usyd.edu.au/libraries/scitech.

Summer School

Most faculties at the University offer units of study from degree programs during January/February. As the University uses all of its HECS quota in first and second semester, these units are full fee-paying and entirely voluntary. However, Summer School units enable students to accelerate their degree progress, make up for a failed unit or fit in a unit which otherwise would not suit their timetables. New students may also gain a head start by completing requisite subjects before they commence their degrees. Units start on 5 January and run for up to six weeks (followed by an examination week). Notice of the units available is contained in the various faculty handbooks and is usually circulated to students with their results notices.

Engineering associations

SUCEA

The Sydney University Chemical Engineering Alumni (SUCEA) is a body representing the graduates of the School of Chemical and Biomolecular 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 School and its graduates (some of whom are well into their sixties). 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:

- 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 and Information Technologies, University of Sydney, and the students thereof,
- to act as an intermediary body between the teaching staff on the one hand and the members of the Association on the other.

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 and Information Technologies 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 and Information Technologies undergraduates, including those enrolled in the Faculty of Science as candidates for the double degree, are eligible to vote.

SUSPECTS

SUSPECTS is the Sydney Uni Software Power Electrical Computer Telecom (Engineering) Students Society. The student body was formed in 2002 to formalise links between staff, students and the Electrical and Information Engineering Foundation.

SUSPECTS organises activities and events to enhance the University experience for all Electrical and Information Engineering students. As an official Union club, it makes full use of the Union's assistance with funding and operations. In 2002 SUSPECTS ran an O-Week stall, a number of BBQs, a Trivia Night and a two-day power station trip to the Hunter Valley. A new student common room on Level 4 of the Electrical Engineering building will be maintained by SUSPECTS, and all students are invited to see the room, get involved and look for the notices of upcoming events.

SUITS

The Sydney University Information Technologies Society (SUITS) is a society for all students interested in IT. SUITS provide many activities and services for members, including running social events, conducting seminars, connecting companies with students, and liaising between staff and students. SUITS events are a fun way to get to know your fellow students in other disciplines or at different stages of study.

SUITS runs programming competition training, LAN gaming nights, BBQ lunches, topical seminars, and "The Great Debate - Mac vs Windows". SUITS also provide valuable IT resources for students, such as tutorials and guides on topics such as programming, using software tools and UNIX. We also have an online forum where you can discuss the hot topics of the day with other SUITS members. Visit the SUITS website http://suits.it.usyd.edu.au/wordpress for more information.

WINDSOC

The Aeronautical and Space Engineering student society. Formed in 1989, this society is run by students to promote fellowship, mentoring and Aerospace activities. Invited guest lecturers, BBQs, site visits and

Flight Sim game lunches are regular events organised by this student group. For more information visit www.aeromech.usyd.edu.au/windsoc.

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 – for example, 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 (StudIE 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.

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: +61 3 9642 2294
Email: tgraham@icheme.org.au

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: +61 2 9264 9500

A short history of the faculty

In 2008 the Faculty of Engineering and Information Technologies celebrated 125 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 at the opening by three matriculated students who were candidates for the engineering certificate and by seven non-matriculated students.

The lecturer in engineering was Mr WH 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 the 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 PN 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-70s all schools have been accommodated in this area, although a wind tunnel in the Woolley Building is still in use by Aeronautical Engineering.

In 2007 the faculty officially changed its name to Engineering and Information Technologies and expanded to include the School of IT. This significant move brought added strength to the faculty by bringing together staff with similar research and teaching goals and ambitions.

Foundations

Engineering Sydney

Engineering Sydney was established within the Faculty of Engineering and Information Technologies and consists of a Board of Directors, Executive Director, and a support/project administrator. It is responsible for liaising with senior management of engineering companies, government, faculty foundations and the University.

Alumni

Manage the construction and maintenance of the contact database so that alumni can be reached and involved according to their personal and career interests.

Bringing industry and students together

Orchestrate and manage events programs throughout the Engineering Sydney community that bring students, faculty, centres and industry together, including the management of the Conversatione.

The faculty wants to be the first choice of students

Industry and the public sector want consulting, advice and access to expertise/research. We establish working relationships with corporations and government bodies that have interests in disciplines and fields of specialisation that match faculty and centre interests.

Provide information services

Coordinate the development and execution of appropriate communications that keep the Engineering Sydney community informed and promote its capabilities in research and teaching.

The Chemical Engineering Foundation

The Chemical and Biomolecular Engineering Foundation was created in 1981 as a means of fostering closer ties between the School and industry. Foundation activities include:

- Regular meetings with guest lectures, research round-ups, open forum discussions and symposia
- Career Days to introduce Foundation members interested in graduate recruitment to students in the School
- Facilitating access to areas of specialist expertise in the School
- Professional development courses
- Providing input and advice regarding the composition and teaching of undergraduate programs

Current company members of the Foundation include Dow Chemicals, BOC Gases, Shell Refining, Visy Pulp & Paper, Caltex, Honeywell Ltd, BHP Billiton, Huntsman Corporation, Sydney Water, Intech Ltd, Ep Group and SEMF. These corporate representatives are joined by a strong body of individual members, many of whom work as independent consultants in the field of chemical engineering.

Phone: +61 2 9351 5284
Fax: +61 2 9351 2854
Website: www.chem.eng.usyd.edu.au/foundation

The Civil Engineering Foundation

The Civil Engineering Foundation was founded in 1968 to assist civil engineering postgraduate and undergraduate students to achieve their goals in the civil engineering industry. The foundation acts in all non-academic areas and is a conduit between academic staff, parents and industry. In addition, the foundation supports the department activities and is an integral part of the whole department's function.

The foundation is the arm of the civil engineering industry within the University and received all of its funds from the civil engineering industry by way of foundation membership. In addition, the foundation organises seminars and courses and holds a number of fund raising activities which are keenly supported by the industry. The foundation also takes care of pastoral needs of undergraduate students when required and is active in procuring practical work experience for third year students and full time placements for graduating students.

The foundation funds are used to provide education and research scholarships and to ensure the school is fully equipped to engage in civil engineering research and development. Many civil engineering consultants, contractors and architects use the school's research knowledge and laboratories before commencing any major works.

The foundation promotes lectures, seminars, short courses, master's programs and technical notes. It is also active in fostering research linkage between the civil engineering industry and the department to ensure the Australian civil engineering industry is kept at the forefront of world practice.

Contact the foundation via email: foundation@civil.usyd.edu.au.

Electrical and Information Engineering Foundation

The mission of the Electrical and 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:

- government/university relations
- bringing industry and students together
- industry participation in University teaching
- industry participation in University research
- encouraging student and teacher excellence
- Sophia Technica Project
- Alumni relations

President – Michael Dureau

Director – Professor Robert Minasian

Executive Officer – Stuart Glanfield

Phone: +61 2 9351 7171
Fax: +61 2 9351 7172
Email: eief@ee.usyd.edu.au
Website: www.ee.usyd.edu.au/foundation

The Sydney Summer and Winter Schools

2010	Dates
Summer School	December 2009 to February 2010
Winter School	28 June to 24 July 2009

The Summer School

The Summer School is a full fee-paying, intensive program offering high quality undergraduate and postgraduate subjects from nine faculties. These subjects are the same as those offered in Semesters One and Two, but are taught as an intensive program over summer.

Some classes commence in December; others commence in the first week of January; others in the third week and continue into February (including the exam week). Some subjects run for six weeks; others are shorter. Students can take a maximum of two subjects.

The Winter School

The Winter School is a smaller, more intensive program that runs for four weeks, including the exam week, during July.

Advantages

Attending classes at the University of Sydney during the summer and winter holidays offers many advantages. You can:

- accelerate your academic career and finish your degree sooner
- devote your full attention to a single area of study
- take subjects that are outside your normal degree
- reduce your workload throughout the rest of the year
- repeat subjects in which you may have been unsuccessful
- combine study with a field trip in Australia or a tour overseas.

High school graduates can sample a university subject, and get an early start on their degree.

How to apply

Applications are only accepted online (at www.summer.usyd.edu.au). Most subjects have limited places and fill very quickly. All places are filled strictly on a first-in, first-served basis so it is recommended that you apply early.

Applications open on:

- 1 October 2009 (Summer School)
- 24 May 2010 (Winter School)

Applications close:
27 November 2009 (Session 1, Summer December)
11 December 2009 (Session 2, Summer Main)
8 January 2010 (Session 3, Summer Late)
11 June 2010 (Winter School)

Late application fees may apply after these dates.

Census dates

Students can withdraw from their subject without academic penalty and receive a full refund until the census date (based on when the class commences). However, a late withdrawal fee may apply.

There is one census date for the Winter School, and three for the Summer School, as classes start between December and February.

ID	Session name	Classes begin	Census date
42*	Summer December	7 December 2009	4 January 2010
43	Summer Main	4 January 2010	11 January 2010
44**	Summer Late	18 January 2010	29 January 2010
11	Winter School	28 June 2010	3 July 2010

** 42 Summer December: Allows for a unit to run for 3 to 9 weeks, provided that the 20 per cent criterion is met.*
*** 44 Summer Late: Last exam must be held by 1 March.*

Withdrawal and refund policy

- For Summer School classes starting in **December 2010**, students who withdraw from a subject between 28 November 2009 and the relevant census date will receive a refund of tuition fees but will be liable for a $500 late withdrawal fee.
- For Summer School classes starting in **January 2010**, students who withdraw from a subject between 12 December 2009 and the relevant census date will receive a refund of tuition fees but will be liable for a $500 late withdrawal fee.
- For Winter School classes starting on **28 June 2010**, students who withdraw from a subject between 21 June 2010 and the relevant census date will receive a refund of their tuition fees but will be liable for a $500 late fee withdrawal.

Students may withdraw from their Summer or Winter School subject(s) up until 4pm on the last day of the teaching period for that particular subject. However, there may be an academic penalty (please refer to our website).The teaching period for purposes of this policy is defined in hours of published classes from the first day through to the last day of classes, excluding any final examination or assessment.

Students who withdraw from a subject after 4pm on the relevant census date will receive no refund of their tuition fee.

Transferring between subjects

Students on a waiting list can transfer between subjects at any time prior to the commencement of class. For all other students, transfers should be completed a week before classes commence. **No** transfers will be allowed after commencement of the class.

Summer and Winter School scholarships

Merit scholarships

Three undergraduate merit scholarships and one postgraduate merit scholarship are available. These are automatically awarded to the top four students in their respective faculty (Arts, Science, or Economics and Business) for their Summer School subject.

Educational/Financial Disadvantage scholarships

Full Summer School scholarships are available to local undergraduate students who have a good academic record. To be eligible for consideration you will need to provide evidence of long-term and serious educational disadvantage based on two or more criteria, one of which must be financial hardship. Please check our website for further details. Scholarship applications close on 30 October 2009 (Summer School), and 9 June 2010 (Winter School).

For more information

Website: www.summer.usyd.edu.au
Email: info@summer.usyd.edu.au
Phone: +61 2 9351 5542 Fax: +61 2 9351 5888

General University information

For further information or advice, please call our toll-free helpline on **1300 362 006**.

This section includes information on the following:

Academic progression
Accommodation Service
Admissions Office
Applying for a course
Attendance
Bus service
Campuses
Careers Centre
Centre for Continuing Education (CCE)
Centre for English Teaching (CET)
Child Care Information Office
The Co-op Bookshop
Counselling Service
Disability Services
Employment opportunities for students
Enrolment
Environmental Policy
Equity Support Services
Examinations
Fees
Financial Assistance Office
Freedom of information
Graduations Office
Grievances and appeals
HECS and Domestic Fees Office
Information and Communications Technology
International Office
International Student Support Unit (ISSU)
Koori Centre and Yooroang Garang
Learning Centre
Library
Mathematics Learning Centre
Museums and galleries
MyUni student portal
Orientation and O-Week
Part-time, full-time attendance
Policy online
Printing service (UPS)
Privacy
Research Office
Revenue Services
Scholarships for undergraduates
Security Service
Service Management, Information and Communications Technology (ICT)
Special Consideration
Staff and Student Equal Opportunity Unit (SSEOU)
Student administration and support
Student Centre
Student course material (online stores)
Student identity cards
Sydney Summer School
SydneyTalent
Sydney Welcome Orientation and Transition Program (SWOT)
The University of Sydney Foundation Program (USFP)
Timetabling Unit
University Health Service

Academic progression

The University requires students to maintain a minimum rate of progression throughout their candidature. Any student who does not satisfy progression requirements for their degree will be placed on a monitored academic progression program. This program requires students to consult an academic adviser in their faculty, to attend a support services information session, and to fill in a survey. Students will be advised of program requirements by their faculty.

Students who do not sustain the minimum academic progression requirements may be asked to 'show cause' as to why they should not be excluded from their degree. For further information, please see www.usyd.edu.au/secretariat/students

Student Affairs, Executive Governance
Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8425
Fax: +61 2 8627 8484
Email: appeals@secretariat.usyd.edu.au

Accommodation Service

The Accommodation Service helps students find off-campus accommodation. It maintains an extensive database of accommodation close to campus or with easy access to public transport. For more information visit the Accommodation page: www.usyd.edu.au/current_students

Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 3312
Fax: +61 2 8627 8484
Email: accomm@stuserv.usyd.edu.au
Website: www.usyd.edu.au/accommodation

Admissions Office

The Admissions Office, located in the Student Centre, is responsible for overseeing the distribution of offers to undergraduate applicants through the Universities Admissions Centre (UAC). They can advise prospective local undergraduate students on admission requirements. Postgraduate students should contact the appropriate faculty.

- If you are an Australian citizen, or permanent resident with qualifications from a non-Australian institution, you can get more information by phoning +61 2 8627 8209.
- For enquiries regarding special admissions (including mature-age entry), phone +61 2 8627 8207.
- Applicants without Australian citizenship or permanent residency should contact the International Office.

Admissions Office, Student Centre
Level 3, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8210 or +61 2 8627 8209
Fax: +61 2 8627 8278
Email: admissions@records.usyd.edu.au
Website: www.usyd.edu.au/future_students/how_to_apply

Applying for a course

Domestic applicants for undergraduate courses and programs of study

For the purpose of admission and enrolment, 'domestic applicant' refers to citizens and permanent residents of Australia and citizens of New Zealand. If you are in this group and wish to apply for admission to an undergraduate course, you would generally apply through the Universities Admissions Centre (UAC).

The deadline for applications is the last working day in September in the year before enrolment. For more information see www.uac.edu.au

Some faculties have additional application procedures, such as the Conservatorium of Music, Sydney College of the Arts, Pharmacy and Dentistry (for the Bachelor of Oral Health).

Domestic applicants for postgraduate courses and programs of study

For the purpose of admission and enrolment, 'domestic applicant' refers to citizens and permanent residents of Australia and citizens of New Zealand. Application is direct to the faculty which offers the course that you are interested in. Application forms for postgraduate coursework, postgraduate research and the master's qualifying or preliminary program, and for non-award postgraduate study can be found at www.usyd.edu.au/future_students

Note: some faculties use their own specially tailored application forms. Check with the relevant faculty.

International applicants for all course types (undergraduate and postgraduate)

'International applicants' refers to all applicants other than Australian citizens, Australian permanent residents and citizens of New Zealand. In the majority of cases international applicants apply for admission through the University's International Office (IO). All the information international applicants need, including application forms, is available from the IO website (www.usyd.edu.au/internationaloffice).

Attendance

See 'Special Consideration'.

Bus service

A free bus service operates to, from and around the Camperdown and Darlington campuses each weekday that Fisher Library is open (except for public holidays). The service begins at 4.15pm and ends at Fisher Library closing time.

Two buses operate along the route, starting at Fisher Library and finishing at Redfern station. The buses leave at approximately 10 minute intervals during semester and in semester breaks.

The bus timetable/route guide can be collected from Security Administration or Campus Infrastructure Services reception.

Floor 2, Services Building, G12
Corner of Codrington and Abercrombie streets
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 4753
Fax: +61 2 9351 5699
Website: www.facilities.usyd.edu.au/security

Campuses

The University has 10 different teaching campuses, located throughout the Sydney area. For information on each campus, including maps, contact details and parking information, see www.usyd.edu.au/about/campuses

Campus	Faculties
Camperdown and Darlington campuses	Faculty of Agriculture, Food and Natural Resources Faculty of Architecture, Design and Planning Faculty of Arts Faculty of Economics and Business Faculty of Education and Social Work Faculty of Engineering and Information Technologies Faculty of Law (Sydney Law School) Faculty of Medicine (Sydney Medical School) Faculty of Pharmacy Faculty of Science Faculty of Veterinary Science The Sydney Summer School
Cumberland Campus	Faculty of Health Sciences
St James Campus	Faculty of Law (teaching spaces only)
Mallett Street Campus	Faculty of Nursing and Midwifery The Centre for English Teaching The NHMRC Clinical Trials Centre
Sydney Conservatorium of Music	Sydney Conservatorium of Music
Sydney College of the Arts	Sydney College of the Arts (SCA)
Camden Campus	Faculty of Veterinary Science Faculty of Agriculture, Food and Natural Resources
Surry Hills Campus	Faculty of Dentistry
Burren Street Campus	Institute of Transport and Logistics Studies

Careers Centre

The University’s Careers Centre provides students with career planning and employability skills development.

The Careers Centre services are free and include:

- help finding casual, part-time, full-time and graduate employment
- an internet job vacancy database
- individual careers counselling
- a comprehensive resource centre and online resources
- workshops in resume writing, interview skills, job searching and skills development
- careers fairs and employer information sessions.

Careers Centre
Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8402
Fax: +61 2 8627 8477
Email: careers.information@usyd.edu.au
Website: www.careers.usyd.edu.au

Centre for Continuing Education (CCE)

The CCE provides the community with the opportunity to engage with the University of Sydney, offering people access to the academic expertise of one of Australia's finest educational institutions.

The CCE provides lifelong learning opportunities for people at all stages of life who want to undertake a course in self-enrichment, engage in active retirement learning, upgrade their professional skills and qualifications, or bridge a gap between previous study and university. CCE offers short courses in all areas of the humanities and social sciences, languages, science and technology, business and management, and continuing professional development.

160 Missenden Road
Newtown NSW 2042
(Postal address: Locked Bag 2020, Glebe NSW 2037)

Phone: +61 2 9036 4789
Fax: +61 2 9036 4799
Email: cce.info@usyd.edu.au
Website: www.cce.usyd.edu.au

Centre for English Teaching (CET)

The CET offers English language and academic study skills programs to international students who need to develop their English language skills in order to meet academic entry requirements.

Wentworth Building, G01
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9036 7900
Fax: +61 2 9036 7910
Email: info@cet.usyd.edu.au
Website: www.usyd.edu.au/cet

Child Care Information Office

Five child care centres operate on or near the Camperdown, Darlington and Cumberland campuses, catering for over 220 children aged from six weeks to five years. The centres are managed by qualified staff and provide programs that are developmentally appropriate and responsive to the needs of the individual child. The Child Care Information Office is the first point of contact for students and staff looking for information about child care services such as long day care, occasional care, vacation care and family day care.

For more information visit the student services page at www.usyd.edu.au/current_students

Child Care Information Office
Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8419
Fax: +61 2 8627 8480
Email: childc@stuserv.usyd.edu.au
Website: www.usyd.edu.au/child_care

The Co-op Bookshop

The Co-op Bookshop is a one-stop store for:

- text and reference books
- general books
- University of Sydney clothing and memorabilia
- DVDs
- flash drives
- software at academic prices.

Take advantage of a lifetime of membership benefits. For a one-time fee of $20, you are entitled to great member pricing, promotional offers and much more.

The Co-op Bookshop
Sports and Aquatic Centre Building, G09
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 3705
Fax: +61 2 9660 5256
Email: sydu@coop-bookshop.com.au
Website: www.coop-bookshop.com.au

Counselling Service

Counsellors are qualified professionals who aim to help people fulfill their academic, individual and social goals. The Counselling Service helps students develop effective and realistic coping strategies and master essential study and life management skills.

Students can make appointments for 50-minute sessions. Walk-in (25-minute) sessions are available for urgent problems every day from 11am to 3pm during semesters, and after-hours appointments are also available. In addition, the service offers workshops each semester on a wide range of student concerns. These are open to local and international, undergraduate and postgraduate students. There are specific workshops to help first-year students successfully adapt to university study.
For more information visit the student services page at www.usyd.edu.au/current_students

Camperdown and Darlington campuses

Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8433
Fax: +61 2 8627 8482
Email: counsell@stuserv.usyd.edu.au
Website: www.usyd.edu.au/counselling

Cumberland Campus

Ground Floor, A Block, C42
The University of Sydney
East Street, Lidcombe
NSW 2141 Australia

Phone: +61 2 9351 9638
Fax: +61 2 9351 9635
Email: cs.cumberland@stuserv.usyd.edu.au

Disability Services

Disability Services is the principal point of contact providing advice for students with disabilities. Disability Services staff work closely with academic and administrative staff to ensure that students receive reasonable adjustments in their study. The unit produces a number of publications explaining the disability support services available within the University.

Students are encouraged to make contact with Disability Services prior to commencement or as early in their studies as possible. Available help includes assistive technology, note-taking, interpreters, and advocacy with academic staff to negotiate assessment and course requirement modifications where appropriate. Students must register with Disability Services to receive assistance.

For more information visit www.usyd.edu.au/current_students

Camperdown and Darlington campuses

Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8422
Fax: +61 2 8627 8482
Email: disserv@stuserv.usyd.edu.au
Website: www.usyd.edu.au/disability

Cumberland Campus

Ground Floor, A Block, C42
The University of Sydney
East Street, Lidcombe
NSW 2141 Australia

Phone: +61 2 9351 9638
Fax: +61 2 9351 9635
Email:ds.cumberland@stuserv.usyd.edu.au

Employment opportunities for students

See 'Careers Centre', 'SydneyTalent'.

Enrolment

Domestic and international students entering their first year via UAC

Details of enrolment procedures will be sent to students with their UAC offer of enrolment. Enrolment takes place during the last week of January or in February for the later offer rounds.

Domestic and international students entering their first year via a direct offer from the University

Details of the enrolment procedures will be sent to students with their University offer of enrolment. Enrolment takes place during the first two weeks of February.

All continuing domestic and international students

A pre-enrolment package is sent to all enrolled students in late September and contains instructions on the procedure for web-based pre-enrolment.

Environmental Policy

The University of Sydney's Environmental Policy promotes sustainable resource and product use and encourages the practice of environmental stewardship by staff and students. The policy is supported by the University-wide Sustainable Campus Program. Enquiries can be directed to:

Manager, Campus Sustainability
Phone: +61 2 9036 5441
Email: sustainable@usyd.edu.au

Visit the website www.usyd.edu.au/sustainable to find out what the University is doing, and learn how you can get involved or make suggestions.

Equity Support Services

Equity Support Services brings together a number of student support services that provide practical assistance and information to help students meet their academic and personal goals while at University.

Services include the Accommodation Service, Child Care Information Office, Disability Services and the Financial Assistance Office.
For more information visit www.usyd.edu.au/current_students

Examinations

The Examinations Office arranges the end-of-semester examination periods in June and November each year and provides assistance for faculty staff with examinations held at other times. Staff and students can find information about examinations at www.usyd.edu.au/current_students/student_administration/examinations or contact the Examinations Office directly.

Student Centre
Level 3, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8200 or +61 2 8627 8217
Fax: +61 2 8627 8279
Email: exams.office@exams.usyd.edu.au
Website:
www.usyd.edu.au/current_students/student_administration/examinations

Fees

See 'Revenue Services Office'.

Financial Assistance Office

The University has a number of loan funds and bursaries to help students who experience financial difficulties. Assistance is not intended to provide the principal means of support but to help in emergencies and supplement other income. Financial assistance is available for undergraduate and postgraduate students enrolled at the University of Sydney in degree and diploma programs. It is for essential living and study expenses.

Financial assistance consists of loans, which are usually repayable within one year, and bursaries, which may be awarded as part of a financial assistance package, depending on financial need and academic merit (average marks at credit level or higher). Advertised bursaries are also available and must be applied for separately by 30 April (see website for details). Bursaries are generally only available to local full-time undergraduate students.

For more information visit www.usyd.edu.au/current_students

Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 2416
Fax: +61 2 8627 8480
Email: fao@stuserv.usyd.edu.au
Website: www.usyd.edu.au/financial_assistance

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
- enables a member of the public to obtain access to documents held by the University
- enables a member of the public to ensure that records held by the University concerning his or her personal affairs are not incomplete, incorrect, out of date or misleading.

A 'member of the public' includes staff and students of the University.

It is a requirement of the Act that applications be processed and a determination made within a specified time period, generally 21 days. Determinations are made by the University's Deputy Registrar.

While an application may be made to access University documents, some may not be released in accordance with particular exemptions provided by the Act. There are review and appeal mechanisms which apply when access has been refused.

The University is required to report to the public on its freedom of information activities on a regular basis and to produce two documents: a *Statement of Affairs* (annually) and a *Summary of Affairs* (every six months).

The *Statement of Affairs* contains information about the University, its structure, function and the kinds of documents held. The *Summary of Affairs* identifies the University's policy documents and provides information on how to make an application for access to University documents. More information and copies of the reports can be found at www.usyd.edu.au/arms/info_freedom

Graduations Office

The Graduations Office is responsible for organising graduation ceremonies and informing students of their graduation arrangements.

Student Centre
Level 3, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8223 or +61 2 8627 8224
Protocol enquiries: +61 2 8627 8221
Fax: +61 2 8627 8281
Email: grads.office@usyd.edu.au

Grievances and appeals

You may consider that a decision affecting your candidature for a degree or other activities at the University has not taken into account all relevant matters. In some cases the by-laws or resolutions of the Senate 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, the Student Representative Council, and on the Policy Online website (www.usyd.edu.au/policy click on 'Study at the University', then 'Appeals' – see the Academic Board and Senate resolutions).

For assistance or advice regarding an appeal contact:

Undergraduates

Students' Representative Council
Level 1, Wentworth Building, G01
The University of Sydney
NSW 2006 Australia
Phone: +61 2 9660 5222
www.src.usyd.edu.au

Postgraduates

Sydney University Postgraduate Representative Association (SUPRA)
Corner of Raglan and Abercrombie
The University of Sydney
NSW 2006 Australia
Phone: +61 2 9351 3115
www.supra.usyd.edu.au

HECS and Domestic Fees Office

The HECS and Domestic Fees Office assists domestic students with queries relating to their entitlements for Commonwealth Support, HELP-Loans, domestic full fees and the Research Training Scheme (RTS). Students' entitlements are also assessed based on their citizenship or residency status.

Student Centre
Level 3, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8239
Fax: +61 2 8627 8285
Email: hecs.fees@records.usyd.edu.au

Information and Communications Technology (ICT)

See 'Service Management, Information and Communications Technology'.

International Office

The International Office helps international students with application, admission and enrolment procedures. It has units responsible for international marketing, government and student relations, international scholarships (including AusAID scholarships and administrative support for international financial aid programs), and compliance with government regulations relating to international students. The Study Abroad and Student Exchange units help domestic and international students who wish to enrol for overseas study or exchange programs.

International Office

Level 4, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8300
Fax: +61 2 8627 8387
Email: info@io.usyd.edu.au
Website: www.usyd.edu.au/internationaloffice

Study Abroad

Phone: +61 2 8627 8322
Fax: +61 2 8627 8390
Email: studyabroad@io.usyd.edu.au
Website: www.usyd.edu.au/studyabroad

Student Exchange

Phone: +61 2 8627 8322
Fax: +61 2 8627 8482
Email: exchange@io.usyd.edu.au
Website: www.usyd.edu.au/studentexchange

International Student Support Unit (ISSU)

The International Student Support Unit (ISSU) aims to help international students develop successful strategies for coping with the challenges of living and studying in an unfamiliar culture, to achieve success in their studies, and to make the experience of being an international student rewarding and enjoyable.

ISSU's student counsellors are qualified professionals with extensive experience in cross-cultural counselling. They provide an integrated service to international students and their families, which includes free and confidential counselling, welfare advice, information, and assistance with accessing other support services and resources on campus and in the community.

Other ISSU services include pre-departure information, on-arrival information sessions and an orientation program for new international students. There is also a program of social and cultural activities which runs throughout the year. International students also have access to all University student support services.

Camperdown and Darlington campuses

Level 5, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8437
Fax: +61 2 8627 8482
Email: info@issu.usyd.edu.au
Website: www.usyd.edu.au/issu

Cumberland Campus

Ground Floor, A Block, Cumberland Campus, C42
The University of Sydney
East Street, Lidcombe
NSW 2141 Australia

Phone: +61 2 9351 9638
Fax: +61 2 9351 9635
Email: issu.cumberland@stuserv.usyd.edu.au
Website: www.usyd.edu.au/issu

Koori Centre and Yooroang Garang

The Koori Centre and Yooroang Garang support Aboriginal and Torres Strait Islander people in all aspects of tertiary education at the University of Sydney. The Cadigal Special Entry Program helps Indigenous Australians enter undergraduate study across all areas of the University.

As well as delivering block-mode courses for Indigenous Australian students, the Koori Centre teaches Indigenous Australian Studies in various faculties across mainstream courses. The Koori Centre also provides tutorial assistance, and student facilities including a computer lab, Indigenous research library and study rooms for the University's Indigenous Australian students.

In particular, the Koori Centre aims to increase the successful participation of Indigenous Australians in undergraduate and postgraduate degrees, develop the teaching of Aboriginal studies, conduct research in the field of Aboriginal education, and establish working ties with schools and communities.

The Koori Centre works in close collaboration with Yooroang Garang, Indigenous Student Support Unit in the Faculty of Health Sciences at the Cumberland Campus. Yooroang Garang provides assistance, advice and academic support for Indigenous students in the faculty, as well as preparatory undergraduate and postgraduate courses.

Koori Centre

Ground Floor, Old Teachers College, A22
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 2046 (general enquiries)
Toll-free within Australia: 1800 622 742
Community Liaison Officer: +61 2 9351 7003
Fax: +61 2 9351 6923
Email: koori@koori.usyd.edu.au
Website: www.koori.usyd.edu.au

Yooroang Garang

T Block, Level 4, Cumberland Campus, C42
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 9066
Toll free: 1800 000 418
Fax: +61 2 9351 9400
Email: yginfo@fhs.usyd.edu.au
Website: www.fhs.usyd.edu.au/yooroang_garang

Learning Centre

The Learning Centre helps students develop the generic learning and communication skills that are necessary for university study and beyond. The centre is committed to helping students achieve their academic potential during their undergraduate and postgraduate studies.

Learning Centre staff can be found at the Camperdown and Cumberland campuses. The centre's program includes a wide range of workshops on study skills, academic reading and writing, oral communication skills and postgraduate writing and research skills. Other services include an individual learning program, a faculty-based program and access to online and print-based learning resources.

For details of programs, activities and online resources available from the Learning Centre, see its website.

Camperdown and Darlington campuses

Level 7, Education Building, A35
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 3853
Fax: +61 2 9351 4865
Email: learning.centre@usyd.edu.au
Website: www.usyd.edu.au/lc

Cumberland Campus

Ground Floor, A Block, C42
The University of Sydney
East Street, Lidcombe
NSW 2141 Australia

Phone: +61 2 9351 9638
Fax: +61 2 9351 9635
Email: lc.cumberland@usyd.edu.au
Website: www.usyd.edu.au/stuserv/learning_centre/cumberl.shtml

Library

The University of Sydney Library provides services via a network of libraries on eight campuses, and online at www.library.usyd.edu.au

The location, opening hours and specific subject focus of each library is listed on the website. Over 5.5 million items are available via the library catalogue, including more than 67,000 online journals and 325,000 online books.

Enrolled students are entitled to borrow from any of the University libraries. Reading list books and articles are available via the reserve service either online or in print. Past examination papers are also available online.

Library facilities include individual and group study spaces, computers, printers, multimedia equipment, photocopiers and adaptive technologies. Refer to the 'Libraries' link on the University website to find out about services and facilities in specific libraries.

Library staff are available in every library to support students with their study and research. Faculty liaison librarians help students find great information on any topic and provide training in using a wide range of resources. For contact details of faculty liaison librarians, see www.library.usyd.edu.au/contacts/subjectcontacts.html

It is also possible to learn research and information skills online; see www.library.usyd.edu.au/skills

Phone: +61 2 9351 2993
Website: www.library.usyd.edu.au

Mathematics Learning Centre

The Mathematics Learning Centre helps undergraduate students to develop the mathematical knowledge, skills and confidence that are needed for studying first-level mathematics or statistics units at university. The centre runs bridging courses in mathematics at the beginning of the academic year (fees apply). The centre also provides ongoing support to eligible students during the year through individual assistance and small group tutorials.

For details of activities and online resources provided by the centre see the centre's website.

Level 4, Carslaw Building, F07
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 4061
Fax: +61 2 9351 5797
Email: mlc@usyd.edu.au
Website: www.usyd.edu.au/mlc

Museums and galleries

The University of Sydney has one of the largest and finest university collections of antiquities, art, ethnography and natural history in Australia. While these collections are used for teaching, they also provide an opportunity for the University to contribute to the cultural life of the country.

University Art Gallery

Founded in the 1860s, the University of Sydney Art Collection now holds more than 7000 paintings, sculptures and works on paper by Australian, Asian and European artists, as well as more than 700 works from the University Union Art Collection. One of the most significant collections derives from the John Wardell Power Bequest. The gallery showcases changing exhibitions of works from the collection as well as high-quality exhibitions of both contemporary and historical works.

War Memorial Arch
The Quadrangle, A14
Camperdown Campus

Phone: +61 2 9351 6883
Fax: +61 2 9351 7785
Website: www.usyd.edu.au/museums

Macleay Museum

The Macleay Museum originated with the 18th century collection of insects owned by Alexander Macleay. The oldest of its kind in Australia, the museum today holds significant collections of ethnographic artefacts, scientific instruments, biological specimens and historic photographs. Changing exhibitions engage with the diversity of the collection.

Macleay Building, A12
Gosper Lane (off Science Road)
Camperdown Campus

Phone: +61 2 9036 5253
Fax: +61 2 9351 5646
Email: macleaymuseum@usyd.edu.au
Website: www.usyd.edu.au/museums

Nicholson Museum

The Nicholson Museum contains the largest and most prestigious collection of antiquities in Australia. It is also the country's oldest university museum, and features works of ancient art and objects of daily life from Greece, Italy, Egypt, Cyprus, the Near and Middle East, as well as Northern Europe. A regular changing schedule of exhibitions highlights various parts of the collection.

The Quadrangle, A14
Camperdown Campus

Phone: +61 2 9351 2812
Fax: +61 2 9351 7305
Email: nicholsonmuseum@usyd.edu.au
Website: www.usyd.edu.au/museums

The Tin Sheds Gallery

The Tin Sheds Gallery is part of the Art Workshop complex within the University of Sydney's Faculty of Architecture, Design and Planning. The gallery hosts exhibitions across a wide variety of contemporary visual arts practices from individuals and groups, as well as community projects and curated exhibitions.

Tin Sheds Gallery and Art Workshops
Faculty of Architecture
Wilkinson Building, G04

Phone: +61 2 9351 3115
Fax: +61 2 9351 4184
Email: tinsheds@arch.usyd.edu.au
Website: www.arch.usyd.edu.au/art_workshop.shtml

MyUni Student Portal

The MyUni student portal (http://myuni.usyd.edu.au) is the starting point and 'one-stop' environment for students to access all their web-based University information and services.

MyUni automatically tailors what a student sees based on their login and offers personalisation options.

MyUni enables students to access:

- student administration systems for obtaining examination results, enrolment and variations, timetabling, email services and links to courses and unit of study information
- the University's e-learning tools
- library services
- important messages and student alerts
- information and communications technology and support services
- campus maps, with descriptions of cultural, sporting and campus facilities.

Orientation and O-Week

Orientation

Starting university study brings both opportunities and challenges. A successful transition is important in developing a sense of belonging and better academic adjustment and success. The University of Sydney seeks to facilitate students' successful transition through a wide range of programs and activities.

Orientation activities for both undergraduate and postgraduate students are scheduled at the beginning of each semester. Transition support continues throughout the academic year within faculties, while student support services are available to help students throughout their study.

For more information visit
www.usyd.edu.au/current_students/orientation

Undergraduate students

In the week before Semester One, the Sydney Welcome Orientation and Transition (SWOT) program offers all commencing undergraduate students an opportunity to learn more about the University of Sydney.

During this week you can get to know the University, develop key skills for success, discover other key resources for getting the most out of university life and develop a sense of belonging. All students are welcome to attend activities, which are based at the Camperdown and Darlington campuses. Faculties based on other campuses also provide orientation activities and programs.

SWOT 2010 will run from **24 to 26 February 2010**.
For more information, see www.swot.usyd.edu.au

Postgraduate students

Postgraduate students are supported by their faculties in transitioning to postgraduate study at the University of Sydney.

For more information visit
www.usyd.edu.au/current_students/orientation

O-Week

O-Week is the orientation event at the beginning of Semester One. Organised by the University of Sydney Union (USU) and other student organisations, it runs in parallel with the SWOT program. O-Week 2010 will run from **24 to 26 February 2010**.
For more information visit www.usuonline.com

Part-time, full-time attendance

Undergraduate students

Undergraduate students are usually considered full time if they have a student load of at least 0.375 each semester. Anything under this amount is considered a part-time study load.

Note that some faculties have minimum study load requirements for satisfactory progress.

Postgraduate students (coursework)

Part-time or full-time status for postgraduate coursework students is determined by credit-point load. Enrolment in units of study which total at least 18 credit points in a semester is classed as full time. Anything under this amount is a part-time study load.

Please note that classes for some coursework programs are held in the evenings (usually 6pm to 9pm).

Postgraduate students (research)

Full-time candidates for research degrees do not keep to the normal semester schedule. Instead they work continuously throughout the year with a period of four weeks recreation leave.

There is no strict definition of what constitutes full-time candidature but if you have employment or other commitments that would prevent you from devoting at least the equivalent of a 35-hour working week to your candidature (including attendance at the University for lectures, seminars, practical work and consultation with your supervisor) you should enrol as a part-time candidate. If in doubt, consult your faculty or supervisor.

International students

Student visa regulations require international students to undertake full-time study. International students on visas other than student visas may be permitted to study part-time.

Policy Online

In addition to the resolutions covering specific courses, there are a number of University policies that apply to students. These include:

- Code of Conduct for students
- Academic Honesty in Coursework
- Student Plagiarism: Coursework Assessment and Examination of Coursework
- Identifying and Supporting Students at Risk.

All of these policies can be accessed at the University's Policy website (www.usyd.edu.au/policy).

Printing service

The University Printing Service (UPS) provides printing and binding services including high-volume printing and copying, short run/low-volume printing, and four-colour process printing. It also offers finished artwork and design, including website design, document scanning, file conversion and CD burning.

UPS products range from stationery, books, brochures, handbooks, graduation certificates and examination papers through to invitations, flyers and banners.

UPS also offers a variety of finishing options plus collating, addressing and filling of envelopes, mail merge options and print-broking services.

University Printing Service
Room 314, Level 3
Services Building, G12
Codrington Street

Phone: +61 2 9351 2004
Fax: +61 2 9351 7757
Email: ups@ups.usyd.edu.au
Website: www.usyd.edu.au/ups

Privacy

The University is subject to the *NSW Privacy and Personal Information Protection Act 1998* and the *NSW Health Records and Information Privacy Act 2002*. Central to both pieces of legislation are the sets of information protection principles (IPPs) and health privacy principles which regulate the collection, management, use and disclosure of personal and health information.

In compliance with the *Privacy and Personal Information Protection Act* the University developed a *Privacy Management Plan* which includes the *University Privacy Policy*. The *Privacy Management Plan* sets out the IPPs and how they apply to functions and activities carried out by the University. Both the plan and the *University Privacy Policy* were endorsed by the Vice-Chancellor on 28 June 2000.

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*, the *Health Records and Information Privacy Act* or the *Privacy Management Plan* should be directed to Archives and Records Management Services. See www.usyd.edu.au/arms for contact details.

Research Office

The Research Office administers the major government-funded research scholarships to postgraduate research students. Details of these scholarships and many others may be obtained from www.usyd.edu.au/ro/training

The closing date for applications for Australian Postgraduate Awards (APA) and University of Sydney Postgraduate Awards (UPA) is October every year.

Applications for National Health and Medical Research Council (NHMRC) Postgraduate Research Scholarships usually close in mid-July. It is wise to check in advance the exact closing date.

Research Office
Level 6, Jane Foss Russell Building, G02
Phone: +61 2 8627 8112
Email: research.training@usyd.edu.au
Website: www.usyd.edu.au/ro/training

Revenue Services

Revenue Services provides information on HECS/fee payment methods and can confirm the receipt of payments. The office can also provide information on the steps necessary to obtain a refund. More details are available on its website (listed below).

Revenue Services (domestic students)
Margaret Telfer Building, K07
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 5222
Fax: +61 2 9114 0556
Email: feespay@usyd.edu.au
Website: www.finance.usyd.edu.au/revenue_income/fees.shtml

Cashier's Office (domestic and international student payments)
Level 3, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia
Office hours: 9am to 5pm, Monday to Friday

Scholarships for undergraduates

The Scholarships and Prizes Office administers scholarships and prizes for undergraduate and postgraduate coursework degrees at the University of Sydney. To learn more, see the website.

Scholarships and Prizes Office
Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8450
Fax: +61 2 8627 8485
Email: scholarships.reception@usyd.edu.au
Website: www.usyd.edu.au/scholarships

Security Service

Security staff patrol the University's Camperdown and Darlington campuses 24 hours a day, seven days a week and are easily identified by their blue uniforms and distinguishing badges.

Security Escort Service

The University's Security Escort Service may be booked by phoning 9351 3487. This service provides transportation around the Camperdown and Darlington campuses as well as to the nearest transport point at its edge (it generally operates after the security bus has ceased). The service is for security situations and is not designed for convenience use. Requests for this service will be prioritised against other security demands.

Emergency contact

Phone: +61 2 9351 3333 (13333 from an internal phone)

Enquiries

Phone: +61 2 9351 3487 or (toll-free within Australia) 1800 063 487
Fax: +61 2 9351 4555
Email: security.admin@mail.usyd.edu.au
Website: www.facilities.usyd.edu.au/security

Traffic

Phone: +61 2 9351 3336

Lost property

Phone: +61 2 9351 5325

Service Management, Information and Communications Technology (ICT)

ICT is responsible for the delivery of many of the computing services provided to students. Students can contact ICT by phoning the helpdesk on (02) 9351 6000, through the IT Assist website (www.usyd.edu.au/ict/switch) or by visiting the staff at one of the University Access Labs. The location details of Access Labs can be found at www.usyd.edu.au/ict/switch/locations

The labs provide students free access to computers, including office productivity and desktop publishing software. Some services are available on a fee-for-service basis, such as internet access, printing facilities, and the opportunity for students to host their own non-commercial website.

Each student is supplied with an account, called a 'UniKey' account, which allows access to a number of services including:

- free email
- WebCT/elearning online resources
- access to the Internet from home or residential colleges
- facilities, such as exam results, enrolment variations and timetabling
- free courses in basic computing (such as MS Office, basic html and Excel), run by Access Lab staff in the week following orientation week. To register contact the Access Lab Supervisor on +61 2 9351 6870.

See www.usyd.edu.au/ict/switch for more information on these services.

Service Management, Helpdesk
University Computer Centre, H08
Camperdown Campus

Phone: +61 2 9351 6000
Fax: +61 2 9351 6004
Email: support@usyd.edu.au
Website: www.usyd.edu.au/ict/switch

Special Consideration

In cases of illness or misadventure, students should complete an *Application for Special Consideration* form, accompanied by relevant documentation, such as medical certificates, and submit it to the relevant faculty office. The forms are available at faculty offices, the Student Centre, and online at
www.usyd.edu.au/current_students/student_administration/forms

Exemption from re-attendance

Although you may have attended certain lectures or practical classes before, exemption from re-attendance is granted only in exceptional circumstances. In any case, you are required to enrol in all units of study in which you propose to take examinations, whether or not you have been granted leave of absence (or exemption) from re-attendance at lectures and/or practical work. To obtain exemption from re-attendance, apply at your faculty office.

Staff and Student Equal Opportunity Unit (SSEOU)

The Staff and Student Equal Opportunity Unit works with the University community to promote equal opportunity in education and employment, to create opportunities for staff and students who have traditionally been disadvantaged by mainstream practices and policies, and to create an environment that is free from discrimination and harassment.

The Staff and Student Equal Opportunity Unit is responsible for:

- providing policy advice to staff on harassment and discrimination
- providing equal opportunity policy development, promotion and training for staff and students
- coordinating and monitoring equity programs and initiatives
- providing information and advice to staff and students on equal opportunity matters
- resolving individual staff and student concerns about harassment and discrimination
- overseeing the University's Harassment and Discrimination Resolution procedure
- monitoring and reporting to external bodies on the University's progress in the equal opportunity area.

Every student and staff member at the University of Sydney has the right to expect that their fellow students and colleagues behave in a way that reflects these key values, irrespective of background, beliefs or culture.

In addition, every student and employee has a right to expect from the University equitable practices that preserve and promote equal opportunity to access, participate, and excel in their chosen field.

Rooms 228 to 235
The Demountables, H11
Codrington Street
Darlington Campus
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 2212
Fax: +61 2 9351 3195
Email: admin@eeo.usyd.edu.au
Website: www.usyd.edu.au/eeo

Student administration and support

The University provides personal, welfare, administrative and academic support services to facilitate your success. Many factors can have an impact on your wellbeing while studying, and student services can help you to manage these more effectively.

For details of services and online resources provided, visit www.usyd.edu.au/current_students

Student Centre

The Student Centre is responsible for the central functions of UAC admissions, enrolments, HECS, class timetabling, student records, examinations and graduations. In addition to the above matters, general information and academic transcripts can be obtained at the counter of the Student Centre.

Level 3, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

General enquiries: +61 2 8627 8200
Academic records: +61 2 8627 8200
Handbooks: +61 2 8627 8200
Fax: +61 2 8627 8279 or +61 2 8627 8284 (academic records)
Email: student.centre@usyd.edu.au
Email: academic.records@usyd.edu.au
Website: www.usyd.edu.au/current_students/student_administration

Student course material (online stores)

Students in several faculties can purchase course collateral through an online eStore (available on their faculty website). Course collateral includes laboratory coats, uniforms, safety boots and other equipment required for units of study. All items have been selected and approved by the faculty concerned to ensure they meet course requirements.

Student identity cards

The student identity card functions as a library borrowing card, a transport concession card (when suitably endorsed) and a general identity card. The card must be carried at all times on the grounds of the University and must be shown on demand and taken to all examinations.

University Card Services
Level 2, Fisher Library, F03
The University of Sydney
NSW 2006 Australia

Phone: +61 2 9351 2423
Email: university.cards@usyd.edu.au
website: www.usyd.edu.au/card_centre

Sydney Summer School

Nine faculties at the University offer subjects from undergraduate and postgraduate degree programs during a Summer School program. As the University uses its entire quota of Commonwealth-supported places in Semesters One and Two, these units are full fee-paying for both local and international students and enrolment is entirely voluntary.

Summer School enables students to accelerate their degree progress, make up for a failed subject or fit in a subject which otherwise would not suit their timetables. New students may also gain an early start by completing subjects before they commence their degrees.

Three sessions are offered during the semester break (commencing in mid-December, the first week of January, and the third week of January) and normally run for up to six weeks (followed by an examination week). Details of the available subjects are on the Summer School website.

A smaller Winter School is also offered. It will commence on 28 June 2010 and run for three weeks (followed by an examination week). The Winter School offers both postgraduate and undergraduate subjects.

To find out information about subjects offered and to enrol, see the Summer School website: www.summer.usyd.edu.au

SydneyTalent

SydneyTalent is a University initiative that offers course-related employment at market leading rates and with flexible hours. It connects students with meaningful roles in their chosen field of study, allowing them to develop vital professional skills and graduate with marketable career experience. With SydneyTalent, students are able to successfully manage the work-study balance while building for future success.

Level 5, Jane Foss Russell Building G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8000
Fax: +61 2 8627 8630
Email: sydney.talent@usyd.edu.au
Website: www.sydneytalent.com.au

Sydney Welcome Orientation and Transition Program (SWOT)

The Sydney Welcome Orientation and Transition program (SWOT) offers a head start to commencing undergraduate students at the University, helping you to become familiar with the University and its student support services. The library and central student support services work together with faculties to provide the SWOT program.

SWOT 2010 runs from **24 to 26 February 2010**.
For more information, see www.swot.usyd.edu.au or visit www.usyd.edu.au/current_students/orientation

The University of Sydney Foundation Program (USFP)

The University of Sydney provides a foundation program to international students as a preparation for undergraduate degrees at several Australian universities.

The program is conducted by Taylors College on behalf of Study Group Australia and the University of Sydney. It allows both first and second semester entry to undergraduate courses at the University of Sydney and other universities within Australia.

Contact details
Phone: +61 2 8263 1888
Fax: +61 2 9267 0531
Email: info@taylorscollege.edu.au
Website: www.usyd.edu.au/foundationprogram

College address
The University of Sydney Foundation Program
Taylors College
965 Bourke St
Waterloo NSW 2017
Phone: +61 2 8303 9700
Fax: +61 2 8303 9777

Timetabling Unit

The Timetabling Unit in the Student Centre is responsible for producing personalised student timetables which are available through MyUni. Semester One timetables are available 10 days before that semester begins. Semester Two timetables are available from the beginning of Semester One examinations.

Website:
www.usyd.edu.au/current_students/student_administration/timetables

University Health Service (UHS)

The University Health Service provides a full experienced general practitioner service and emergency medical care to all members of the University community. You can consult a doctor either by appointment or on a walk-in basis (for more urgent matters only). The UHS bills Medicare or your overseas student health care provider (Worldcare or Medibank Private) directly for the full cost of most consultations.

Email: i.marshall@unihealth.usyd.edu.au
Website: www.unihealth.usyd.edu.au
Phone: +61 2 9351 3484
Fax: +61 2 9351 4110

University Health Service (Wentworth)

Level 3, Wentworth Building, G01
The University of Sydney
NSW 2006 Australia

Opening hours: 8.30am to 5.30pm, Monday to Friday
Phone: +61 2 9351 3484
Fax: +61 2 9351 4110

University Health Service (Holme)

Holme Building, A09
Entry Level, Science Road
The University of Sydney
NSW 2006 Australia

Opening hours: 8.30am to 5.30pm, Monday to Friday
Phone: +61 2 9351 4095
Fax: +61 2 9351 4338

Student organisations

Students' Representative Council (SRC)

The Students' Representative Council represents, campaigns and advocates for undergraduate students throughout the University.

SRC caseworkers advise students on a range of issues, including academic appeals, Centrelink and Austudy, tenancy, harassment and discrimination. The solicitor (from Redfern Legal Centre) provides legal assistance and court representation. These services are free and confidential. The SRC also offers financial support in the form of emergency loans of up to $50.

In addition, the SRC runs a second-hand bookshop that specialises in the purchase and sale of coursework textbooks. Among the publications produced by the SRC are the weekly student newspaper *Honi Soit*, the *Counter-Course Handbook* and the *O-Week Handbook*.

The SRC, which recently celebrated its 80th anniversary, is one of the oldest student organisations in Australia, and is run by and for students. It's a great way to get involved in student life. Officers elected to the student council campaign on issues that directly affect students, such as course cuts and assessments, fee increases, discrimination and welfare rights. They also advocate on social justice matters both within the University and throughout the wider community.

SRC main office

Level 1, Wentworth Building (G01), City Road
Phone: +61 2 9660 5222
Fax: +61 2 9660 4260
Email: help@src.usyd.edu.au
Email (*Honi Soit* editors): editors@src.usyd.edu.au
Website: www.src.usyd.edu.au

Contact the main office for details of other campuses.

The SRC Secondhand Bookshop

Level 3, Wentworth Building (G01), City Road
Phone: +61 2 9660 4756
Fax: +61 2 9660 4260
Email: books@src.usyd.edu.au
Website: www.src.usyd.edu.au

Sydney University Postgraduate Representative Association (SUPRA)

SUPRA is an independent association which provides advice, advocacy and support services to postgraduate students. SUPRA is both the voice and safety net of these students, and represents their interests by:

- ensuring the representation of postgraduate views within the University and wider community
- providing free, confidential assistance and advocacy for postgraduates through the employment of Student Advice and Advocacy Officers (SAAOs)
- providing free legal advice for postgraduate students, in association with the Redfern Legal Centre
- representing postgraduates on University policymaking bodies such as the Academic Board, its committees and working parties
- meeting with members of the Senate on the Senate/Student Organisations Liaison Committee
- regularly consulting with the Vice-Chancellor, Registrar and other senior University officers
- drawing postgraduates together at all levels of University life.

SUPRA Council, committees and networks

The SUPRA Council is elected annually by and from the postgraduate student community. Council meetings are held monthly and postgraduate students are encouraged to attend. SUPRA committees and networks help to coordinate activities and run campaigns, and are a great way to get involved. All postgraduates can stand for the council or attend any SUPRA events provided they are a SUPRA subscriber (see below).

Advice and advocacy

SUPRA employs professional student advice and advocacy officers (SAAOs) to help postgraduate students with any academic or personal problems that may affect their study, such as:

- fee payment and administrative issues
- academic appeals and exclusions
- supervision problems
- tenancy issues
- Centrelink and financial assistance concerns
- harassment and discrimination.

This is a free and confidential service for all postgraduates at the University of Sydney. To access the SAAO service, you must be a SUPRA subscriber. It's free to subscribe and you can do it online, in the office, or when you see an SAAO. To find out more about the SAAO service, email help@supra.usyd.edu.au

Publications

SUPRA places the highest priority upon communication, being responsive to postgraduates and encouraging maximum participation in SUPRA through the following publications:

- *eGrad*, a regular email bulletin
- *The Postgraduate Survival Manual*
- *Thesis Guide*
- our weekly double-page spread in *Honi Soit*, the student newspaper
- a range of handbooks, fact sheets and brochures.

Electronic versions are available at www.supra.usyd.edu.au

All of SUPRA's services, activities and publications are free to SUPRA subscribers. By subscribing, you also show your support for all the work that SUPRA does on your behalf. It's free to subscribe and you can sign up online or drop into the SUPRA offices and fill out a form.

SUPRA Office
Raglan Street Building, G10
Corner Raglan Street and Abercrombie Street
Phone: +61 2 9351 3715 (local) or
Phone: 1800 249 950 (toll free within Australia)
Fax: +61 2 9351 6400
Email: admin@supra.usyd.edu.au
Website: www.supra.usyd.edu.au

University of Sydney Union (USU)

As the largest university union in Australia, the USU is a major provider of exciting cultural, social, political, and charitable activities, as well as quality on-campus food and retail services, entertainment, events and programs that service the entire university community.

The USU offers an array of programs to its members to promote cultural life on campus, including awards, grants and prizes in leadership, literature, debating, photography, film, drama, philanthropy, music and art. The USU Debating Team is a formidable force, currently ranked first in the world, and the USU also funds the oldest continuing theatre group in Australia, the Sydney University Dramatic Society.

The USU keeps the campus alive with big-name gigs and exhilarating events held throughout the year at its bars   Manning and Hermann's. Each year the USU holds major festivals and events such as O-Week, Beachball and the Verge Arts Festival.

For more information on USU, see www.usuonline.com

Access Card Benefits Program

The USU offers membership to its award-winning Access Benefits Program, your gateway to benefits and discounts at more than 55 selected food, retail and entertainment partners on and off campus, as well as access to USU's programs including internships, student positions and volunteering opportunities.

For more information, see www.accessbenefits.com.au

Clubs and societies

The USU funds, accommodates, trains and supports more than 200 clubs and societies – groups that USU members can join and operate to meet others with shared interests. Clubs and societies organise their own activities and events with funding from the USU. Being part of a club or society is the best way to connect, socialise, network and gain valuable skills, training and experience.

There are clubs and societies focused on politics, culture, the arts, the environment, religion, volunteering, faculties, games, hobbies and passions. If there isn't a club or society that suits your interests, the USU will help you start your own.

For more information, see the clubs and societies section of the USU website www.usuonline.com

C&S Office
University of Sydney Union
Level 1, Manning House, Manning Road
Phone: +61 2 9563 6161
Email: clubsandsocs@usu.usyd.edu.au

The USU Student Leadership Program

The USU offers a range of development opportunities for its student members, ranging from board director positions, club and society executives, festival directors, debate directors, editors, volunteers, and community portfolio convenors.

The USU's programs not only entertain, but teach and prepare participants for life beyond graduation. USU programs include mentoring, personal development, and leadership training, providing the opportunity to add a different dimension to your tertiary education.

For more details, see the 'Get Involved' section of www.usuonline.com

Sydney Uni Sport & Fitness

Sydney Uni Sport & Fitness invites you to enjoy a healthier University experience.

Get access to three world-class, on-campus facilities, over 40 different sports clubs, more than 30 dance, recreation and sport short courses, plus get involved in popular social sporting activities through our range of maximum value membership options.

The vast array of sports clubs for men and women ranges from AFL to water polo, with competitions ranging from local social competitions to nationwide leagues, all giving you the chance to improve your performance under the guidance of some of Australia's most accomplished coaches and sportspeople.

Purpose-built venues offer tennis and squash courts, rock-climbing, fitness equipment, a martial arts room and an Olympic-size heated swimming pool.

Check out the historic and panoramic sporting ovals, rowing sheds and a multipurpose facility at Tempe, and don't forget the on-campus Grandstand sports bar and restaurant.

Sydney Uni Sport & Fitness
University Sports & Aquatic Centre
Corner Codrington Street and Darlington Road
Phone: +61 2 9351 4960
Fax: +61 2 9351 4962
Email: admin@sport.usyd.edu.au
Website: www.susf.com.au

Facilities

Sydney Uni Sport & Fitness has three main fitness centres.

University Sports & Aquatic Centre

Corner Codrington Street and Darlington Road
Darlington Campus
Phone: +61 2 9351 4978
Email: nmrc@sport.usyd.edu.au

Facilities at the centre include:

- 50-metre heated Olympic swimming pool
- modern fitness centre
- group fitness studio
- RPM studio
- six synthetic tennis courts
- four squash courts
- multifunction sports hall
- health assessments and fitness testing
- personal training
- Sports Bistro & Mint Cafe.

Arena Sports Centre and the Ledge Climbing Centre

Western Avenue
Camperdown Campus
Phone: +61 2 9351 8111
Email: arenaman@sport.usyd.edu.au

Facilities at the Arena Sports Centre and the Ledge Climbing Centre include:

- extensive weights training room
- yoga classes
- 8-metre-tall rock climbing walls
- bouldering facilities
- personal training
- multipurpose sports hall
- two squash courts
- sports clinic
- Ralph's Café.

HK Ward Gymnasium

Between Ovals 1 and 2
Camperdown Campus
Phone: +61 2 9351 4988
Email: hk@sport.usyd.edu.au

Facilities at the gymnasium include:

- martial arts facility
- sports hall
- boxing ring and gymnasium
- group fitness studio
- boxercise and kickboxing classes
- ergometer training
- sports equipment hire.

International students

The following information is for international students studying onshore on an Australian student visa.

Completion within the expected duration

Education providers are required to ensure that international students complete their studies within the duration specified on the electronic Confirmation of Enrolment (eCoE). Extensions to a student's course duration are allowed only in limited circumstances (for example, for compassionate or compelling reasons, where an intervention strategy has been implemented or where there has been an approved leave of absence or suspension).

It is important students ensure they are on track to complete their studies within the expected duration, or that they have permission from their faculty to extend their duration.

Satisfactory academic progress

Maintaining satisfactory course progress is a mandatory student visa condition. Education providers are required to monitor course progress, intervene where students are at risk of failing to achieve satisfactory course progress, notify students who fail to achieve satisfactory course progress, and report students who fail to achieve satisfactory course progress to the Department of Immigration and Citizenship (DIAC).

It is important that every student is aware of the progress rules for their course and participates in the intervention strategies implemented by their faculty. Exclusion from a course due to unsatisfactory progress can have serious implications for student visa holders including visa cancellation and restrictions on returning to Australia.

The University provides many avenues of support for students who are struggling academically. International students who experience any difficulties with their academic progress should consult their faculty, the international student advisers in the International Office or the counsellors in the International Student Support Unit (ISSU).

Distance/web-based study

International students may undertake no more than 25 per cent of their total course by distance and/or online learning. Students must not enrol in exclusively distance or online study in any compulsory study period.

Students who are supported by United States Financial Aid are not permitted to undertake distance and/or online learning at any time during their course of study.

Work permits

International students with a work permit are permitted to work for up to 20 hours per week during semester and full-time during the University's official holiday periods. Contact the international student advisers in the International Office for more information.

Change of address

International students must notify the University of their residential address within seven days of arrival and notify any subsequent change of address within seven days. This should be done online via the University's MyUni student portal (http://myuni.usyd.edu.au).

Sponsored students

Sponsored students need permission from their sponsors before transferring courses, suspending their studies or varying their study load. Students sponsored by the Australian Government (AusAID, Endeavour), or Asia Development Bank (ADB) should contact the International Office in the early stages of considering a change to their program.

Suspension/discontinuation

The University is required to report to DIAC any international students who discontinue or suspend their studies. Students who suspend their studies for medical or compassionate reasons should contact the international student advisers in the International Office urgently.

Health cover

The Australian Government requires that all international students and their families pay for health insurance in Australia through the Overseas Student Health Cover (OSHC) scheme. The University-preferred provider is OSHC Worldcare. The International Office will, on receipt of the student's first payment of tuition fees and the OSHC premium, pay the compulsory amount to OSHC Worldcare on their behalf.

OSHC provides free access to the University health service and public hospitals. Higher-level coverage (eg access to private hospitals coverage for spouse and family) is the student's responsibility. Alternatively, international students may arrange their own OSHC through an approved provider. You can find a list of approved OSHC providers by searching for 'OSHC' on the federal government's Department of Health and Ageing website:
www.health.gov.au

The University of Sydney Foundation Program (USFP)

The University of Sydney offers its foundation program to international students as a preparation for undergraduate degrees at several Australian universities.

The Foundation Program is conducted by Taylors College on behalf of Study Group Australia and the University of Sydney. It allows both first and second semester entry to undergraduate courses at the University of Sydney and other Australian universities.

The University of Sydney Foundation Program
Taylors College
965 Bourke Street
Waterloo NSW 2017

Phone: +61 2 8303 9700
Fax: +61 2 8303 9777
Email: info@taylorscollege.edu.au
Website: www.usyd.edu.au/foundationprogram

International Office

The International Office provides advice and assistance with application, admission and enrolment procedures for international students. The International Office also includes units responsible for international marketing, government and student relations, international scholarships, including AusAID scholarships and administrative support for international financial aid programs, and compliance with government regulations related to international students.

The International Office also coordinates student exchange and study abroad programs, and other inter-institutional links. The Study Abroad and Exchange unit helps domestic and international students who wish to enrol in such programs.

International Admissions and Customer Services
Level 4, Jane Foss Russell Building, G02
The University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8300
Future student enquiries: 1800 899 376 (domestic free call)
Fax: +61 2 8627 8387
Email: info@io.usyd.edu.au
Website: www.usyd.edu.au/internationaloffice

Study Abroad
Phone: +61 2 8627 8322
Fax: +61 2 8627 8390
Email: studyabroad@io.usyd.edu.au
Website: www.usyd.edu.au/studyabroad

Student Exchange
Phone: +61 2 8627 8322
Fax: +61 2 8627 8390
Email: studyabroad@io.usyd.edu.au
Website: www.usyd.edu.au/studentexchange

International Student Support Unit

The International Student Support Unit (ISSU) provides support to international students through the provision of information, orientation programs, welfare advice and counselling.

The ISSU provides advice to international students on:

- preparations before leaving their home country
- what to expect upon arrival in Sydney
- emotional changes that can take place when moving to a different country
- academic concerns, including understanding the University system and liaising with staff members
- organising letters for family visits
- preparing to return to their home country.

The ISSU has two offices:

Darlington Campus
Level 5, Jane Foss Russell Building, G02
University of Sydney
NSW 2006 Australia

Phone: +61 2 8627 8437
Fax: +61 2 8627 8482
Email: info@issu.usyd.edu.au
Website: www.usyd.edu.au/stuserv/issu

Cumberland Campus
Ground Floor, A Block, C42
75 East St, Lidcombe
NSW 2141 Australia

Phone: +61 2 9351 9638
Email: ISSU.Cumberland@stuserv.usyd.edu.au
Website: www.usyd.edu.au/stuserv/issu

Essential information for students

Calendar

The annual *University of Sydney Calendar* and its online updates are the University of Sydney's central source of official information.

The *Calendar* provides general and historical information about the University of Sydney, the statutes and regulations under which it operates and the resolutions of the Senate relating to constitutions of and courses in each faculty. The statutes and regulations, as well as some resolutions of the Senate, also appear in Policy Online (www.usyd.edu.au/policy).

Along with the University of Sydney handbooks, the *Calendar* forms the official legal source of information relating to study at the University of Sydney.

The latest *Calendar* is available in hard copy from the Student Centre. It is also available online, at www.usyd.edu.au/calendar. The PDF and Word document files can be downloaded and printed if required.

Coursework Rule

It is very important that students are aware of the *University of Sydney (Coursework) Rule 2000 (as amended)*, which governs all coursework award courses in the University.

The Coursework Rule relates to:

- award course requirements
- credit points and assessment
- enrolment
- credit
- cross-institutional study and its upper limits
- progression
- discontinuation of enrolment and suspension of candidature
- unsatisfactory progress and exclusion
- exceptional circumstances
- award of degrees
- diplomas and certificates
- transitional provisions.

It should be read in conjunction with two other documents:

- The *University of Sydney (Amendment Act) Rule 1999*
- Senate and faculty resolutions relating to each award course (found in the relevant faculty handbook).

The Coursework Rule can be found in the following places:

- The *Univerity of Sydney Calendar* (print or online version): www.usyd.edu.au/calendar
- Policy Online: (www.usyd.edu.au/policy)
- Handbooks Online: www.usyd.edu.au/handbooks/university_information/01_uni_coursework_rule

PhD Rule

The *University of Sydney (Doctor of Philosophy (PhD)) Rule 2004* deals with matters relating to the degree of Doctor of Philosophy, including admission, probation, supervision and submission of theses.

It should be read in conjunction with two other documents:

- The *University of Sydney (Amendment Act) Rule 1999*
- Senate and faculty resolutions relating to each award course (found in the relevant faculty handbook).

The PhD Rule can be found in the following locations:

- The *University of Sydney Calendar* (print or online version): www.usyd.edu.au/calendar
- Policy Online: www.usyd.edu.au/policy
- Handbooks Online: www.usyd.edu.au/handbooks/postgrad_hb/ap04_phd_rule.shtml

Plagiarism

The University of Sydney is opposed to and will not tolerate plagiarism. It is the responsibility of all students to:

- ensure that they do not commit or collude with another person to commit plagiarism
- report possible instances of plagiarism
- comply with the University's policy and procedure on plagiarism.

The policy and procedure on plagiarism can be found at the Policy Online website (www.usyd.edu.au/policy).

The Policy Online website (www.usyd.edu.au/policy) also lists related policies and procedures, including:

- *Academic Honesty in Coursework (plagiarism)* policy
- *Code of Conduct for Responsible Research Practice and Guidelines for Dealing with Allegations of Research Misconduct*.

The University will treat all identified cases of student plagiarism seriously, in accordance with this policy and procedure, and with Chapter 8 of the *University of Sydney By-law 1999 (as amended)*, which deals with student discipline.

Students at Risk Policy

The Students at Risk Policy enables early detection of students who are making poor or unsatisfactory progress and are therefore at risk of exclusion from their degree.

The policy outlines procedures and processes to support students in their ongoing studies, including:

- timely intervention and the provision of advice and assistance
- regularly and effectively advising students of progress requirements
- identifying students at risk
- alerting students that they are at risk
- providing assistance to address the risk
- tracking the progress of students after they are identified as being at risk.

For more information on this policy, please see the Secretariat website (www.usyd.edu.au/secretariat/students/riskstudents).

Grievance procedure

The University's policy and procedures document on student grievances, appeals and applications for review is available on the Policy Online website (www.usyd.edu.au/policy).

The *Grievance Procedure* document is a statement of the University's processes for handling student grievances, appeals and applications for review regarding academic and non-academic matters.

Study at the University presents opportunities for interacting with other members of the University community. The University recognises and values the diversity of student experiences and expectations, and is committed to treating students, both academically and administratively, in a fair and transparent manner.

Abbreviations

Listed below are commonly used acronyms that appear in University documents and publications. (See also the Glossary.)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A	
AARNet	Australian Academic Research Network
AAM	Australian Awards for University Teaching
AAUT	Annual Average Mark
ABC	Activity-based costing
ABSTUDY	Aboriginal Study Assistance Scheme
AC21	Academic Consortium 21
ACER	Australian Council for Educational Research
ALTC	Australian Learning and Teaching Council
ANZAAS	Australian and New Zealand Association for the Advancement of Science
APA	Australian Postgraduate Awards
APAC	Australian Partnership for Advanced Computing
APAI	Australian Postgraduate Awards (Industry)
APA-IT	Australian Postgraduate Awards in Information Technology
APDI	Australian Postdoctoral Fellowships Industry
APD	Australian Postdoctoral FellowshipAsia-Pacific Economic Cooperation
APEC	Asia-Pacific Economic Cooperation
APF	Australian Professorial Fellowship
APRU	Association of Pacific Rim Universities
AQF	Australian Qualifications Framework
ARC	Australian Research Council
ARTS	Automated Results Transfer System
ASDOT	Assessment Fee Subsidy for Disadvantaged Overseas Students
ATAR	Australian Tertiary Admissions Rank
ATN	Australian Technology Network
ATP	Australian Technology Park
AUQA	Australian Universities Quality Agency
AusAID	Australian Agency for International Development
AUTC	Australian Universities Teaching Committee
AWA	Australian Workplace Agreements

B	
BAA	Backing Australia's Ability
BITLab	Business Intelligence Lab

C	
CAF	Cost adjustment factor
CCE	Centre for Continuing Education
CDP	Capital Development Program
CEP	Country Education Profile
CEQ	Course Experience Questionnaire
CFO	Chief Financial Officer
CHESSN	Commonwealth Higher Education System Student Number
CIO	Chief Information Officer
CIS	Campus Infrastructure Services
COE	Confirmation of Enrolment
CPSU	Community and Public Sector Union
CR	Credit (grade)
CRC	Cooperative Research Centre
CREO	Centre for Regional Education, Orange

C	
CRICOS	Commonwealth Register of Institutions and Courses for Overseas Students
CRRI	Centre for Rural and Regional Innovation
CSG	Cumberland Student Guild
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSP	Commonwealth Supported Place
CULT	Combined Universities Language Test
CUTSD	Committee for University Teaching and Staff Development

D	
D	Distinction (grade)
DAC	Data Audit Committee
DEEWR	Commonwealth Department of Education, Employment and Workplace Relations
DEST	Commonwealth Department of Education, Science and Training (now known as DEEWR)
DET	NSW Department of Education and Training
DIAC	Department of Immigration and Citizenship
D-IRD	Discovery-Indigenous Researchers Development Program
DOGS	Director of Graduate Studies
DVC	Deputy Vice-Chancellor

E	
EB	Enterprise bargaining
EFTSL	Equivalent full-time student load
EFTSU	Equivalent full-time student unit (replaced by EFSTL)
EIP	Evaluations and Investigations Program
ELICOS	English Language Intensive Course of Study
EMU	Electron Microscope Unit
ESOS Act	Education Services for Overseas Student Act

F	
F	Fail
FEE-HELP	Fee - Higher Education Loan Program
FlexSIS	Flexible Student Information System
FFT	Fractional full-time (equivalent staff)
FHS	Faculty of Health Sciences
FOS	Field of study
FTE	Full-time equivalent (staff)

G	
GATS	General Agreement on Trade in Services
GCCA	Graduate Careers Council of Australia
GDS	Graduate destination survey
Go8	Group of Eight
GPOF	General Purpose Operating Funds
GSA	Graduate Skills Assessment
GSG	Graduate School of Government
GWSLN	Greater Western Sydney Learning Network

H	
HD	High distinction
HDR	Higher degree research
HECS	Higher Education Contribution Scheme (replaced by HECS-HELP)
HECS-HELP	Higher Education Contribution Scheme - Higher Education Loan Program
HEEP	Higher Education Equity Program
HEIMS	Higher Education Information Management System
HEIP	Higher Education Innovation Program (DEEWR)
HELP	Higher Education Loan Program
HEO	Higher education officer
HEP	Higher education provider
HERDC	Higher Education Research Data Collection
HESA	Higher Education Support Act
HOA	Head of administrative unit
HOD	Head of department
HOS	Head of school

I	
IAF	Institutional Assessment Framework
IAS	Institute of Advanced Studies
ICT	Information and communication technology
IELTS	International English Language Testing Scheme
IGS	Institutional Grants Scheme (DEEWR)
IO	International Office
IP	Intellectual property
IPRS	International Postgraduate Research Scholarships
IREX	International Researcher Exchange Scheme
ISFP	Indigenous Support Funding Program
ISIG	Innovation Summit Implementation Group
ISSU	International Student Services Unit
ITL	Institute for Teaching and Learning

J	
JASON	Joint Academic Scholarships Online Network

L	
LBOTE	Language background other than English

M	
MISG	Management Information Steering Group
MNRF	Major National Research Facilities Scheme
MOU	Memorandum of understanding
MRB	Medical Rural Bonded Scholarship Scheme

N	
NBCOTP	National Bridging Courses for Overseas Trained Program
NCG	National Competitive Grant
NESB	Non-English-speaking background
NHMRC	National Health and Medical Research Council
NOIE	National Office for the Information Economy
NOOSR	National Office for Overseas Skill Recognition
NRSL	Non-recent school leaver
NSW VCC	New South Wales Vice-Chancellors' Conference
NTEU	National Tertiary Education Industry Union
NUS	National Union of Students

O	
OECD	Organisation for Economic Cooperation and Development
OLA	Open Learning Australia
OPRS	Overseas Postgraduate Research Scholarships

O	
OS-HELP	Overseas Student - Higher Education Loan Program

P	
P	Pass
PCON	Pass (Concessional)
PELS	Postgraduate Education Loans Scheme
PSO	Planning Support Office
PVC	Pro-Vice-Chancellor

Q	
QA	Quality assurance
QACG	Quality Advisory and Coordination Group

R	
R&D	Research and development
R&R	Restructuring and Rationalisation Program
RC	Responsibility Centre
REG	Research and earmarked grants
REP	Research Education Program
RFM	Relative Funding Model
RIAP	Research Institute for Asia and the Pacific
RIBG	Research Infrastructure Block Grant (DEEWR)
RIEF	Research Infrastructure Equipment and Facilities Scheme
RIMS	Research Information Management System
RISF	Restructuring Initiatives Support Fund
RMO	Risk Management Office
ROA	Record of Achievement
RQ	Research Quantum
RQF	Research Quality Framework
RQU	Recognition Quality Unit (Higher Education Division, DEEWR)
RRTMR	Research and Research Training Management Reports
RSL	Recent school leaver
RTS	Research Training Scheme (DEEWR)

S	
SASCA	Student Association of Sydney College of the Arts
SCA	Sydney College of the Arts
SCEQ	Sydney Course Experience Questionnaire
SCM	Sydney Conservatorium of Music
SCR	Science Capability Review
SDF	Strategic Development Fund
SEG	Senior Executive Group
SES	Socioeconomic status
SI	Scholarship Index
SLE	Student Learning Entitlement
SNA	Safety net adjustment
SPR	Student Progress Rate
SRC	Students' Representative Council
SSP	Special Studies Program
SSR	Student–staff ratio
STABEX	Study Abroad Exchange (database)
SUPRA	Sydney University Postgraduate Representative Association
SUSF	Sydney Uni Sport & Fitness

T	
TAFE	Technical and Further Education
TOEFL	Test of English as a foreign language
TPI	Teaching performance indicator

U	
UAC	Universities Admissions Centre
UAI	Universities Admission Index (replaced by ATAR)
UMAP	University Mobility in Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNSW	University of New South Wales
UPA	University Postgraduate Awards
USU	University of Sydney Union
UTS	University of Technology, Sydney

V	
VCAC	Vice-Chancellor's Advisory Committee
VET	Vocational Education and Training
VSU	Voluntary Student Unionism

W	
WAM	Weighted Average Mark
WRP	Workplace Reform Program
WTO	World Trade Organization

Y	
YFE	Year of first enrolment

Glossary

For a table of commonly used acronyms and abbreviations that appear in University documents and publications, see Abbreviations.

This glossary describes terminology in use at the University of Sydney.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A

Academic Board
The senior academic body within the University. The Academic Board has, as principal responsibility, to maintain the highest standards in teaching, scholarship and research at the University and advises Senate and the Vice-Chancellor in that regard. In conjunction with faculties, the Academic Board has responsibility for approving new or amended courses and endorsing faculty development of units of study. The Board is also responsible for the formulation and review of policies, guidelines and procedures in relation to academic matters. For further information, see the *University of Sydney (Academic Governance) Rule 2003 (as amended)*.

Academic Consortium 21 (AC21)
An international network, of which the University is a member, which comprises educational, research and industrial organisations throughout the world with the objective of encouraging the further advancement of global cooperation to the benefit of higher education and to contribute to world and regional society.

Academic cycle
The program of teaching sessions offered over a year. Currently the cycle runs from the enrolment period for Semester One to the completion of the processing of results at the end of Semester Two. See also 'Academic year', 'Stage'.

Academic dishonesty
Academic dishonesty occurs when one person presents another person's ideas, findings or written work as his or her own by copying or reproducing them without due acknowledgement of the source and with intent to deceive. Academic dishonesty also covers recycling, fabrication of data, engaging another person to complete an assessment or cheating in exams. See also 'Plagiarism'.

Academic record
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 and is not released to a third party without the written authorisation of the student. See also 'Academic transcript'.

Academic transcript
A printed statement setting out a student's academic record at the University. There are two forms of academic transcript: external and internal. See also 'Academic record', 'External transcript', 'Internal transcript'.

Academic year
The current calendar year in which a student is enrolled. See also 'Academic cycle', 'Stage'.

Ad eundem gradum
Long-standing full-time members of the University's academic and general staff who are not graduates of the University may be considered by Senate, upon their retirement, for admission *Ad eundem gradum* ('to the same degree') to an appropriate degree of the University.

Admission
Governed by the University's admission policy, this is the process for identifying applicants eligible to receive an initial offer of enrolment in a course at the University. Admission to most undergraduate courses is based on performance in the HSC, with applicants ranked on the basis of their Australian Tertiary Admissions Rank (ATAR).

Other criteria such as a portfolio, interview, audition, or results in standard tests may also be taken into account for certain courses. Admission to postgraduate courses is normally on the basis of performance in a prior undergraduate degree and other criteria as specified in the relevant degree resolutions.

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 Australian Tertiary Admissions Rank (ATAR).

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. (Note: this policy is currently under review.)

Admission mode
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.

Admission year
The year the student expects to begin the course. See also 'Commencement date'.

Advanced diplomas
See 'Course'.

Advanced standing
See 'Credit'.

Aegrotat
In exceptional circumstances involving serious illness or death of a student prior to completion of their course, the award of an aegrotat, or posthumous degree or diploma, may be conferred.

Alumni
See 'Graduate'.

Alumni sidneiensis
A searchable database of graduates of the University from 1857 to approximately 30 years prior to the current year.

Annual average mark (AAM)
The average mark over all units of study attempted in a given academic year (equivalent to the calendar year). The formula for this calculation is:

$$AAM = \frac{\sum(marks \times credit\ point\ value)}{\sum(credit\ point\ value)}$$

(Sums over all units of study completed in the selected period.)

The mark is the actual mark obtained by the student for the unit of study, or in the case of a failing grade with no mark – 0. Pass/fail assessed subjects and credit transfer subjects (from another institution) are excluded from these calculations. However, the marks from all attempts at a unit of study are included.

Annual progress report
A form 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 their nominee). The completed form is attached to the student's official file.

Annual Report
The University's yearly financial and audit report, submitted to the NSW Parliament. It also includes a broad range of the University's activities and the strength of their performance in relation to the University's stated roles, values and goals.

Appeals
Students may lodge an appeal against academic or disciplinary decisions. See also 'Student Appeals Body', 'Student Disciplinary Appeals Committee'.

Appeals against an academic decision
A student may appeal to the Student Appeals Body against a decision by the University that affects the academic assessment or progress of a student within his or her award course, including a decision:

(a) to exclude a student in accordance with the *University of Sydney (Coursework) Rule 2000 (as amended)*
(b) not to readmit or re-enrol a student following exclusion in accordance with the *University of Sydney (Coursework) Rule 2000 (as amended)*
(c) to terminate a student's candidature for a postgraduate award.

Appeal against a disciplinary decision
A student may appeal to the Student Disciplinary Appeals Committee against a determination being:

(a) a finding by the Vice-Chancellor or the Student Proctorial Board that the student is guilty of misconduct
(b) the imposition of a penalty upon the student by the Vice-Chancellor or the Student Proctorial Board
(c) an order made by the Vice-Chancellor or the Student Proctorial Board.

Assessment
The process of measuring the performance of students in units of study and courses. Performance may be assessed by examinations, essays, laboratory projects, assignments, theses, treatises or dissertations. See also 'Result processing'.

Formative assessment
Used principally to provide students with feedback on their progress in learning. It reinforces successful learning, and is an opportunity for students to expose the limits in their knowledge and understanding.

Summative assessment
Summative assessment is used to certify competence, or to rank students by order of merit. It certifies the attainment of a standard, and is used as the basis for progression to the next part of a program, or to graduation.

Associate supervisor
A person who is appointed in addition to the supervisor of a research student to provide particular expertise or additional experience in supervision. See also 'Instrumental supervisor/teacher', 'Research supervisor', 'Supervision'.

Association of Pacific Rim Universities (APRU)
A consortium of leading research universities in the Pacific Rim, of which the University is a member. APRU aims to foster education, research and enterprise, thereby contributing to economic, scientific and cultural advancement in the Pacific Rim.

Assumed knowledge
For some units of study, a student is assumed to have passed a relevant subject in the HSC – 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 that unit of study. See also 'Prerequisite'.

Attendance mode or attendance pattern
The attendance pattern for a course is full-time, part-time or external, depending on the student attendance requirements and student load.

Australian Qualifications Framework (AQF)
The framework for recognition and endorsement of qualifications established by the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA).

Australian Tertiary Admissions Rank (ATAR)
A measure of overall academic achievement in the HSC that helps universities rank applicants for university selection. The ATAR is a rank of any student's performance relative to other students. It is calculated from the aggregate of scaled marks in 10 units of the HSC (two best English units plus eight other units, including only two category B units) and is presented as a number between 0.00 and 99.95 with increments of 0.05. The ATAR replaced the Universities Admissions Index (UAI) in June 2009.

Austudy
Provides financial help to students who are 25 years old or over who meet the required criteria, and are undertaking an approved full-time course at an approved institution. See also 'Youth allowance'.

Automated Results Transfer System (ARTS)
This system was developed by the Australasian Conference of Tertiary Admissions Centres (ACTAC) to allow access to a student's electronic academic record, via an admission centre or tertiary institution.

B

Bachelor's degree
The highest undergraduate award offered at the University. A bachelor's degree course normally requires three or four years of full-time study or the part-time equivalent. See also 'Course'.

Board of studies
An academic body that supervises a course or courses, and is similar to a faculty except that it is headed by a chair rather than a dean.

Bursaries
Financial award made to a student, based primarily on need. See also 'Scholarships'.

C

Cadigal program
A program, named in recognition of the Aboriginal people of the land on which the University is located, designed to increase the successful participation of Aboriginal and Torres Strait Islander people in degree courses in all faculties at the University of Sydney.

Calendar
See 'University Calendar'.

Campus
The grounds on which the University is situated. There are 10 campuses of the University of Sydney:

- Burren Street (Institute for International Health, Institute of Transport and Logistics Studies)
- Camperdown and Darlington (formerly known as Main Campus)
- Camden (Agriculture, Food and Natural Resources; and Veterinary Science)
- Conservatorium (Sydney Conservatorium of Music)
- Cumberland (Health Sciences)
- Mallett Street (Nursing and Midwifery)
- Rozelle (Sydney College of the Arts)
- St James (Law teaching spaces)
- Surry Hills (Dentistry).

Cancellation of enrolment
The University may cancel a student's enrolment for non-payment of fees.

Candidature
A person is 'admitted to candidature' on the date on which he or she accepts the University's offer of admission to an award course, in accordance with University and government requirements as amended from time to time. There are maximum periods and in some cases minimum periods of candidature depending on the award course and whether the candidate is a full-time or part-time student.

Census date
The date at which a student's enrolment, load and HECS liability are finalised before this information is reported to DEEWR. See also 'Commonwealth Supported Place', 'HECS-HELP'.

Ceremony
See 'Graduation ceremony'.

Chancellor
The non-executive head of the University. An honorary position, the Chancellor presides over meetings of the University's governing body, the Senate, and important ceremonial occasions such as graduations.

Clinical experience
Students undertake clinical placements in a professional environment as part of their course requirements. Many require University-approved supervision. In order to undertake clinical placements a student may be required to fulfil additional requirements.

Combined degree
A single program with a single set of course resolutions leading to the award of two degrees (unless otherwise specified in the resolutions). See also 'Double degree'.

Commencement date
The date a student commences their candidature.

Commonwealth Supported Place (CSP)
(Previously known as a HECS Place.) A student in a Commonwealth Supported Place makes a contribution towards the cost of their education (known as the student contribution) while the Australian Government contributes the majority of the cost.

Confirmation of Enrolment notice (COE)
This notice is issued to each student after enrolment, showing the course and the units of study in which the student is enrolled, together with the credit point value of the units of study and the student-contribution weights. Until all fees are paid, it is issued provisionally. A new confirmation of enrolment notice is produced every time a student's enrolment is varied.

Conjoint ventures
This is when two or more institutions cooperate to provide a unit or course of study to postgraduate coursework students. In these arrangements, students enrolled for a degree at one institution complete one or more units of study at the other institution to count towards the award program at their 'home' institution.

Continuing professional education
A process which provides a number of programs of continuing education courses for professionals as they move through their career. These programs are currently administered by the Centre for Continuing Education (CCE) and a number of departments and foundations across the University. This process supports the whole of life learning concept and involves the maintenance of a long-term relationship between the student and the University.

Convocation
A body that comprises: the Fellows and former Fellows of the Senate of the University of Sydney; members of the former governing bodies of the institutions with which the University has amalgamated or their predecessors; the graduates of the University of Sydney, including graduates of the institutions with which the University has amalgamated or their predecessors; professors and other full-time members of the academic staff of the University; and principals of the incorporated colleges.

Core unit of study
A unit of study that is compulsory for a particular course or subject area. See also 'Unit of study'.

Corequisite
A unit of study that must be taken in the same semester or year as a given unit of study (unless it has already been completed). These are determined by the faculty or board of studies concerned, published in the faculty handbook and shown in FlexSIS. See also 'Prerequisite', 'Waiver'.

Cotutelle Scheme
Agreement between the University and any overseas university for joint supervision and examination of a PhD student as part of an ongoing cooperative research collaboration. If successful, the student receives a doctorate from both universities with each testamur acknowledging the circumstances under which the award was made.

Course
A program of study at the University of Sydney. The main types of course are:

Award course
A formal course of study that will see attainment of a recognised award. Award courses are approved by Academic Board and endorsed by Senate. The University broadly classifies courses as undergraduate, postgraduate coursework or postgraduate research. See also 'Bachelor's degree', 'Course rules', 'Diploma', 'Doctorate', 'Major', 'Master's degree', 'Minor', PhD, 'Stream'.

Non-award course
Studies undertaken by students that do not lead to an award from the University. Non-award courses include professional development programs. See also 'Cross-institutional enrolment'.

Coursework
An award course not designated as a research award course. While the program of study in a coursework award course may include a component of original work, other forms of instruction and learning will normally be dominant.

Research
A course in which at least 66 per cent of the overall course requirements involve students undertaking supervised research over a prescribed period of time, leading to the production of a thesis or other piece of written or creative work.

Course alias
A unique five character alpha-numeric code which identifies a University course.

Course code
See 'Course alias'.

Course leave
Students are permitted to apply for a period away from their course without losing their place. Course leave is formally approved by the supervising faculty for a minimum of one semester. Students on leave are regarded as having an active candidature, but they are not entitled to a student card. At undergraduate level, leave is not counted towards the total length of the course. Students who are absent from study without approved leave may be discontinued and may be required to formally reapply for admission. See also 'Progression'.

Course rules
Rules that govern the allowable enrolment of a student in a course. Course rules may be expressed in terms of types of units of study taken, length of study, and credit points accumulated. For example, a candidate may not enrol in units of study that have a total value of more than 32 credit points per semester.

Course rules also govern the requirements for the award of the course. For example, in many cases a candidate must complete a minimum of 144 credit points. See also 'Course', 'Corequisite', 'Prerequisite'.

Course transfer
Applies to students transferring between courses, either within the University of Sydney or between institutions. In some circumstances a student may be eligible to transfer to a course directly, ie without reapplying for admission.

Credit
The recognition of previous studies successfully completed at the University of Sydney (or another university or tertiary institution recognised by the University of Sydney), as contributing to the requirements of the course to which the applicant requesting such recognition has been admitted. It may be granted as specified credit or non-specified credit.

Specified credit
The recognition of previously completed studies as directly equivalent to units of study.

Non-specified credit
A 'block credit' for a specified number of credit points at a particular level. These credit points may be in a particular subject area but are not linked to a specific unit of study. See also 'Annual average mark (AAM)', 'Waiver', 'Weighted average mark (WAM)'.

Credit points
The value of the contribution each unit of study provides towards meeting course completion requirements. Each unit of study normally has a six credit point value assigned to it. The total number of credit points required for completion of award courses will be specified in the Senate resolutions relevant to the award course.

Cross-institutional enrolment
Enrolment in units of study to count towards an award course at another university. See also 'Course (Non-award course)'.

D

Data Audit Committee (DAC)
The Data Audit Committee's role is to oversee the integrity and accuracy of the course and unit of study data as strategic University data. It also advises the Academic Board on suggested policy changes related to course and unit of study data. A subcommittee of the VCAC Enrolment Working Party, it is chaired by the Registrar, with membership including the deans, the Student Centre, FlexSIS and Planning and Statistics.

Deadlines (Enrolment variations)
See 'Enrolment variation'.

Deadlines (Fees)
The University has deadlines for the payment of course and other fees. 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 'Cancellation of enrolment'.

Dean
The head of a faculty, or the principal/director of a college, such as the Sydney Conservatorium of Music, or Sydney College of the Arts.

Dean's Certificate
A statement from a faculty 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 Dean's Certificates. In faculties that do, qualified students have 'Dean's Certificate' noted on their academic record.

Deferment (Deferral)
See also 'Admission (Deferment)', 'Course leave'.

Degree
See also 'Bachelor's degree', 'Course'.

Delivery mode
Indicates how students receive the instruction for a unit of study. The delivery mode must be recorded for each unit as distinct from the attendance mode of the student. For example, an internal student may take one or more units by distance mode and an external student may attend campus for one or more units.

Distance education
Where subject matter is delivered in a more flexible manner, such as correspondence notes, a student may only attend campus if required. See also 'Distance education', 'Extended semester', 'International student (Offshore studies)'.

Intensive on-campus
Core content is delivered with support learning in an intensive (one or more days) format on campus. Participation is usually compulsory. Previously this may have been called residential, block mode, or weekend workshop.

On-campus (normal)
Attendance of scheduled lectures, tutorials etc at a campus of the University.

Department
A department is the academic unit responsible for teaching and examining a unit of study. It may be called a school, a department, a centre or a unit within the University. See 'School'.

Department of Education, Employment and Workplace Relations (DEEWR)
The federal government department responsible for higher education.

Department of Education, Science and Training (DEST)
Previous name of the federal government department now known as DEEWR.

Diploma
The award granted following successful completion of diploma course requirements. A diploma course usually requires less study than a degree course. See also 'Course'.

Direct admissions
For some courses, applications may be made directly to the University. Applications are received by faculties or the International Office, and considered by the relevant department or faculty body. Decisions are recorded and letters are forwarded to applicants advising them of the outcome. See also 'Admission', 'Universities Admissions Centre'.

Disability information
Students may inform the University of any temporary or permanent disability which affects their life as a student. Disability information is recorded but is only available to authorised users because of its sensitive nature. Students will be informed about how it is used.

Disciplinary action
Undertaken as the result of academic or other misconduct, for example plagiarism, cheating, security infringement, criminal activity.

Discipline
A defined area of study, such as chemistry, physics or economics.

Discipline group
A DEEWR code used to classify units of study 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 written exposition of a topic which 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 Law, and Architecture, Design and Planning.

Distance education
Where a student does not attend campus on a daily basis for a given course or unit of study. See also 'Delivery mode', 'Extended semester'.

Doctorate
A high-level postgraduate award. A doctorate course may involve research only or a mixture of research and coursework; the candidate submits a thesis that is an original contribution to the field of study. See also 'Course', 'PhD'.

Domestic student
A student who is not an international student. See also 'Local student'.

Double degree
A double degree is a program where students are permitted by participating faculties (and/or by specific resolutions within a single award) to transfer between courses in order to complete two awards.

Downgrade
In some circumstances a student enrolled in a PhD may transfer to a master’s by research, either on the recommendation of the University on the basis that the research they are undertaking is not at an appropriate level for a PhD, or at the student’s own request for personal or academic reasons.

E

Elective
A unit of study within a degree, usually an option within a course. Electives allow more detailed study of a particular subject.

Embedded courses
Award courses in the graduate certificate, graduate diploma and master's degree by coursework sequence which allow unit of study credit points to count in more than one of the awards, for example the Graduate Certificate in Information Technology, Graduate Diploma in Information Technology, and Master of Information Technology.

Enrolled student
A person enrolled in an award course of the University.

Enrolment
Refers to a period of time in a student's candidature. This period:

(a) commences at the time the student has complied with all government and University requirements for enrolment
(b) unless the student re-enrols, ceases at the date on which:
   i. the University cancels, or the student withdraws from or discontinues enrolment; or
   ii. the next new enrolment period commences.

A student enrols in a course by registering with the supervising faculty in the units of study or program of research to be taken in the coming year, semester or session.

Commencing
An enrolment is classified as commencing if a student has enrolled in a particular degree or diploma for the first time.

Continuing
Students already in a course at the University re-enrol each year or semester. Most continuing students are required to pre-enrol. See also 'Pre-enrolment'.

Enrolment list
A list of all currently enrolled students in a particular unit of study. See also 'Unit of study'.

Enrolment variation
Students may vary their enrolment at the start of each semester. Each faculty determines its deadlines for variations, but student-contribution liability depends on the Commonwealth census date. See also 'Commonwealth Supported Place'.

Equivalent full-time student load (EFTSL)
The equivalent full-time student load for a year. It represents the annual study load of a student undertaking a particular course of study on a full-time basis.

Equivalent full-time student unit (EFTSU)
See 'Equivalent full-time student load'

Examination
A set of questions or exercises evaluating on a given subject given by a department or faculty. See also 'Assessment', 'Examination period'.

Examination period
The time set each semester for the conduct of formal examinations.

Examiner (Coursework)
The person assessing a student or group of students, for example through oral or written examinations, coursework assignments, and presentations.

Exchange student
Either a University of Sydney student participating in a formally agreed program involving study at an overseas university, or an overseas student studying here on the same basis. The International Office provides administrative support for some exchanges.

Exclusion
A faculty may ask a student whose academic progress is considered to be unsatisfactory to 'show good 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 or faculty.

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 exclusions is set out in the *Calendar*. See also 'Appeals', 'Progression'.

Exemption
A decision made at a sub-unit of study level to allow a student to complete a unit of study without also completing all the prescribed components of coursework and/or assessment. See also 'Credit', 'Waiver'.

Expulsion
The ultimate penalty of disciplinary action is to expel the student from the University. The effect of expulsion is:

- the student is not allowed to be admitted or to re-enrol in any course at the University
- the student does not receive their results
- the student is not allowed to graduate
- the student does not receive a transcript or testamur.

Extended semester
A distance-learning student may be allowed more time to complete a module or program if circumstances beyond the student's control, such as illness, affect the student's ability to complete the module or program in the specified time. See also 'Distance education'.

External
See 'Attendance mode or attendance pattern', 'Distance education'.

External transcript
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, the final course result, and all units of study attempted within each course. It also acknowledges prizes the student has received. Marks can be included or omitted, as required. See also 'Academic transcript', 'Internal transcript'.

F

Faculty
A formal part of the University's academic governance structure, consisting mainly of academic staff members and headed by a dean, which is responsible for all matters concerning the award courses that it supervises. Usually, a faculty office administers the faculty and student or staff enquiries related to its courses. The *University Calendar* sets out the constitution of each of the University's faculties. See also 'Board of studies', 'Supervising faculty'.

Faculty handbook
An annual University publication for each faculty, that provides detailed information about the faculty, its courses and resolutions.

FEE-HELP
An interest-free loan facility available to fee-paying postgraduate students who are undertaking coursework programs.

Fee-paying students
Students who pay tuition fees to the University and are not liable for student contributions to a Commonwealth Supported Place. The Commonwealth does not contribute towards the cost of the education of fee-paying students. Annual fees vary between the faculties. Students pay a per-semester fee.

Fellows of Senate
Members of the governing body of the University who are either elected, appointed or ex-officio.

Flexible learning
See 'Delivery mode', 'Distance education'.

Flexible start date
Full fee-paying distance students are not restricted to the same enrolment time frames as campus-based or Commonwealth-supported students.

Flexible Student Information System (FlexSIS)
The computer-based Flexible Student Information System at the University of Sydney. FlexSIS holds details of courses and units of study being offered by the University and the complete academic records of all students enrolled at the University.

Formative assessment
See also 'Assessment'.

Full-time student
See 'Attendance mode', 'Equivalent full-time student load'.

G

Grade
The outcome for a unit of study linked with a mark range. For example, a mark in the range 85 to 100 attracts the grade 'high distinction' (HD). See also 'Mark'.

Graduand
A student who has completed all the requirements for an award course but has not yet graduated. See also 'Graduation', 'Potential graduand'.

Graduate
A person who holds an award from a recognised tertiary institution. See also 'Graduand', 'Graduation'.

Graduate certificate/graduate diploma
See 'Course'.

Graduate-entry degree
A bachelor's degree (or other undergraduate degree), that requires another undergraduate degree as a prerequisite of entry. Examples of graduate-entry degrees at the University of Sydney include the Medical Program, Graduate Law and the Bachelor of Dentistry.

Graduation
The formal conferring of awards either at a ceremony or in absentia. See also 'In absentia', 'Potential graduand'.

Graduation ceremony
A ceremony where the Chancellor confers awards upon graduands.

Group of Eight (Go8)
The Group of Eight represents Australia's major research-intensive universities. Its membership comprises the vice-chancellors (presidents) of the Australian National University, Monash University, the University of Adelaide, the University of Melbourne, the University of New South Wales, the University of Queensland, the University of Sydney and the University of Western Australia. The Go8 works to ensure a consistent and sustainable policy environment which maximises the wide-ranging economic, social and cultural benefits to the Australian community of higher education and ensures Australian universities are recognised as among the best in the world.

Group work
A formally established project to be carried out by a number of students working together, resulting in a single piece (or assorted pieces) of assessment. See also 'Legitimate cooperation'.

H

Handbook
See 'Faculty handbook'.

Head of department/Head of school (HOD/HOS)
The head of the academic unit that has responsibility for the relevant unit of study, or equivalent program leader.

Higher Education Contribution Scheme (HECS)
See 'HECS-HELP'.

HECS-HELP
An eligible student in a Commonwealth Supported Place can apply for assistance in paying their student contribution. This may take the form of a HECS-HELP loan to pay for all or some of the student's contribution, or a HECS-HELP discount if all (or at least $500) of the student's contribution is paid by the census date.

Honorary degrees
A degree *honoris causa* is conferred on a person whom the University wishes to honour. It derives from the Latin translation of 'for the purpose of honouring'.

Honours
Some degrees may be completed 'with honours'. This may involve the completion of a separate honours year or additional work in the later years of the course. Honours are awarded in a class (Class I, Class II, which may have two divisions, or Class III).

NSW Higher School Certificate (HSC)
The NSW Higher School Certificate (HSC), which is normally completed at the end of year 12 of secondary school. The Australian Tertiary Admissions Rank (ATAR) is computed from a student's performance in the HSC and gives a maximum rank of 99.95.

I

In absentia
Latin for 'in the absence of'. Awards are conferred *in absentia* when graduands do 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 Sydney Conservatorium of Music have an instrumental teacher appointed. See also 'Associate supervisor', 'Research supervisor', 'Supervision'.

Internal mode
See 'Attendance mode or attendance pattern'.

Internal transcript
A record of a student's academic record for the University's own internal use. It includes the student's name, student identifier (SID), address, all courses in which the student was enrolled and the final course result, and all units of study attempted within each course, together with the unit of study result. See also 'Academic transcript', 'External transcript'.

International student
Any student who is not an Australian or New Zealand citizen or a permanent resident of Australia. An international student is required to hold a visa that allows study in Australia and may be liable for international tuition fees.

Fee-paying
A private international student who is liable to pay tuition fees for their studies with the University.

Fee-paying – outgoing exchange
An international fee-paying student undertaking short-term study at a recognised overseas institution with which the University has a student exchange agreement. Exchange study counts towards the student's University of Sydney award, and students remain enrolled in their University of Sydney course during the period of exchange.

International – non-award or cross-institutional
An international fee-paying student undertaking non-award study at the University on a cross-institutional basis. They are liable to pay fees for the study they undertake at the University, but there is no compliance reporting requirement – this rests with their 'home' institution.

International – sponsored
A private international student who is fully sponsored for their tuition. Their sponsorship may also include overseas health cover and compulsory subscriptions.

Offshore studies
International offshore students undertake their program of study at one of the University's offshore campuses and do not enter Australia. Therefore they do not require a visa. They are distinct from international students who are on outbound exchange programs as they never enter Australia during their program of study.

Short course
An international fee-paying student undertaking a short course with the University of Sydney such as international development programs, executive training or study visits. The study undertaken by these students is non-award and generally a student visa is not required.

Sponsored award
An international student sponsored by the Australian Government, undertaking a program of study at the University. Currently, holders of Australian Development Scholarships funded by AusAID are the only students in this category. These students are fully sponsored for their tuition and other costs such as travel and health cover, and are paid a stipend.

Study Abroad
An international student who is undertaking short-term study at the University under the Study Abroad scheme. Study Abroad students must have completed at least one year of study towards a degree at a recognised institution in their home country and must be continuing towards the degree of their home institution. See also 'Local student', 'Student type'.

L

Learning entitlement
See 'Student learning entitlement'.

Leave
See 'Course leave'.

Legitimate cooperation
Any constructive educational and intellectual practice that aims to facilitate optimal learning outcomes through student interaction. See also 'Group work'.

Load
The sum of the weights of all the units of study in which a student is enrolled. The weight is determined by the proportion of a full year's work represented by the unit of study in the degree or diploma for which the student is a candidate. Student load is measured in terms of Equivalent Full-Time Student Load (EFTSL). See also 'Equivalent full-time student load'.

Local student
Local students are defined as an Australian or New Zealand citizen or an Australian permanent resident. See also 'Commonwealth Supported Place', 'Domestic student', 'International student'.

M

Major
A field of study, chosen by a student to represent their principal interest. This is comprised of 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 awarded upon the graduand's assessment of study. See also 'Course', 'Minor', 'Stream'.

Major timetable clash
The term used when a student attempts to enrol in units of study that have so much overlap in the teaching times that it is decided they may not enrol in the units simultaneously.

Mark
An integer (rounded if necessary) from 0 to 100 indicating a student's performance in a unit of study. 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 'Course'.

Mature-age student
A student who is 21 years or older on 1 March of the year in which they commence studies, and who has not completed the high school qualifications normally needed to gain entry.

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 (Coursework)', 'Course (Research)'.

Mid-year intake
Admission to degree programs for Semester Two.

Minor
Studies undertaken to support a major. Minor studies require 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 awarded upon the graduand's assessment of study. See also 'Course', 'Major', 'Stream'.

Mixed mode
See 'Attendance mode or attendance pattern'.

MPhil
The Master of Philosophy (MPhil) is a master's by research degree offered by some (but not all) of the University's faculties. See also 'Course', 'Master's degree'.

Mutually exclusive units of study
See 'Prohibited combinations of units of study'.

MyUni
The University of Sydney's student portal system. It provides access to email, library services, student self-administration, support services, e-learning software such as Blackboard and WebCT, as well as information about the University and its courses.

N

Non-award course
See 'Course'.

Non-standard session
A teaching session other than the standard Semester One and Semester Two sessions – such as Sydney Summer School or Winter School, in which units of study are delivered and assessed in an intensive mode during January or July respectively. See also 'Semester', 'Session'.

O

Orientation Week
Orientation Week, or 'O Week', takes place in the week before lectures begin in Semester One. 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.

P

Part-time student
See also 'Attendance mode or attendance pattern', 'Equivalent full-time student load'.

Permanent home address
The address used for all official University correspondence with a student, both inside and outside of semester time (eg during semester breaks), unless the student provides a different address for use during the semester. See also 'Semester address'.

PhD
The Doctor of Philosophy (PhD) and other doctorate awards are the highest awards available at the University. A PhD course is normally purely research-based; the candidate submits a thesis that is an original contribution to the field of study. See also 'Course', 'Doctorate'.

Plagiarism
Presenting another person's ideas, findings or work as one's own by copying or reproducing them without acknowledging the source. See also 'Academic dishonesty'.

Policy Online
The website which provides access to the University's current policies, procedures and guidelines.

Postgraduate
A term used to describe a course leading to an award such as a graduate diploma, a master's degree or a PhD, which usually requires prior completion of a relevant undergraduate degree (or diploma) course. A 'postgraduate' is a student enrolled in such a course. See also 'Course (Coursework)', 'Course (Research)'.

Postgraduate Education Loans Scheme (PELS)
See 'FEE-HELP'.

Potential graduand
A student who has been identified as being eligible to graduate on the satisfactory completion of their current studies. See also 'Graduand', 'Graduation'.

Pre-enrolment
Pre-enrolment – also known as provisional re-enrolment – takes place in October, when students indicate their choice of unit of study enrolment for the following year. After results are approved, pre-enrolment students are regarded as enrolled in those units of study for which they are qualified. Their status is 'enrolled' and remains so provided they pay any money owing and comply with other requirements by the due date.

Students who do not successfully pre-enrol 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. See also 'Enrolment'.

Prerequisite
A unit of study that is required to be successfully completed before another unit of study can be attempted. Prerequisites can be mandatory (compulsory) or advisory. See also 'Assumed knowledge', 'Corequisite', 'Qualifier', 'Waiver'.

Prizes
Awarded in recognition of outstanding performance, academic achievement or service to the community or University.

Probationary candidature
A student who is enrolled in a postgraduate course on probation for a period of time up to one year. The head of department/school 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.

Professional practice
Some students undertake placement in a professional practice as part of their course requirements. This may require University-approved supervision. Professional placements are located in a wide range of professional practice environments, and may not require additional criteria to be fulfilled.

Program
Each degree is composed of various units of study. The way the units are put together for a degree is referred to as a student's 'program'.

Progression
Satisfactory progression is satisfying all course and faculty rules (normally assessed on an annual basis) to enable the completion of the chosen award within the (maximum) completion time allowed. See also 'Exclusion'.

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. See also 'Unit of study'.

Provisional re-enrolment
See 'Pre-enrolment'.

Q

Qualification
An academic attainment recognised by the University.

Qualifier
A mandatory (compulsory) prerequisite unit of study which must have a grade of pass or better. See also 'Assumed knowledge', 'Corequisite', 'Prerequisite', 'Waiver'.

R

Recycling
The submission for assessment of one's own work, or of work which is substantially the same, that has previously been counted towards the satisfactory completion of another unit of study, and credited towards a university degree, and where the examiner has not been informed that the student has already received credit for that work.

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 supervisor will be a full-time member of the academic staff or a person external to the University recognised for their association with the clinical teaching or the research work of the University. See also 'Associate supervisor', 'Instrumental supervisor/teacher', 'Supervision'.

Research Training Scheme (RTS)
The RTS provides Commonwealth-funded higher degree by research (HDR) students with an 'entitlement' to a HECS exemption for the duration of an accredited HDR course, up to a maximum period of four years full-time equivalent study for a doctorate by research and two years full-time equivalent study for a master's by research.

Result
The official statement of a student's performance in each unit of study attempted as recorded on the academic transcript, usually expressed as a mark and grade. See also 'Grade', 'Mark'.

Result processing
Refers to the processing of assessment results for units of study. For each unit of study, departments/schools tabulate results for all assessment activities and assign preliminary results. See also 'Assessment', 'Examination period', 'Formative assessment'.

Result processing schedule
The result processing schedule will be determined for each academic cycle. All schools and faculties are expected to comply with this schedule. See also 'Assessment', 'Examination period'.

S

Scholarships
Financial or other form of support made available to enable students to further their studies. See also 'Bursaries'.

School
A school or academic unit that encourages and facilitates teaching, scholarship and research, and coordinates the teaching and examining duties of members of staff in their subjects or courses of study.

Semester
A half-yearly teaching session, the dates for which are determined by the Academic Board. Normally all undergraduate sessions will conform to the semesters approved by the Academic Board. Any offering of an undergraduate unit not conforming to the semester dates (non-standard session) must be given special permission by the Academic Board. See also 'Non-standard session', 'Session'.

Semester address
The address to which all official University correspondence is sent during semester time, if different to the permanent address.

Senate
The governing body of the University. See the *University Calendar* (www.usyd.edu.au/calendar) for more details of its charter and powers.

Session
Any period of time during which a unit of study is taught. A session differs from a semester in that it need not be a six-month teaching period, but it cannot be longer than six months. Each session maps to either Semester One or Two for DEEWR reporting purposes. Session offerings are approved by the relevant dean, taking into account all the necessary resources, including teaching space and staffing. The Academic Board must approve variation to the normal session pattern. See also 'Non-standard session', 'Semester'.

Session address
See 'Semester address'.

Short course
A fee-paying student undertaking a short course with the University of Sydney such as professional development or executive training. The study undertaken by these students is a non-award course.

Show cause
See 'Exclusion', 'Progression'.

Special consideration
Candidates who suffer serious illness or misadventure which may affect performance in any assessment may request that they be given special consideration in relation to the determination of their results.

Special Studies Program (SSP)
A period of release from normal duties to allow academic staff to undertake a planned program of academic activity and development.

Sponsorship
Financial support of a student by a company or government body.

Stage
A normal full-time course of study taken in a year. See also 'Course rules', 'Equivalent full-time student load', 'Progression'.

Strategic Directions
See also 'University Strategic Directions'.

Stream
A defined award course, which requires the completion of set units of study as specified by the course rules for the particular stream, in addition to the core program specified by the course rules. A stream will appear with the award course name on testamurs, eg Bachelor of Engineering in Civil Engineering (Construction Management). See also 'Course', 'Major', 'Minor'.

Student
A person enrolled as a candidate for an award course or unit of study.

Student Appeals Body
Any student may appeal to the Student Appeals Body against an academic decision on the ground that due academic process has not been observed by the relevant faculty in relation to the academic decision. Refer to the *University of Sydney (Student Appeals against Academic Decisions) Rule 2006* for more details. See also 'Appeals'.

Student Disciplinary Appeals Committee
Any student may appeal to the Student Disciplinary Appeals Committee against a misconduct determination by the Vice-Chancellor or a Student Proctorial Board. See also 'Appeals'.

Student identifier (SID)
A nine-digit number that uniquely identifies a student at the University.

Student ID Card
All full-time or part-time students who successfully enrol at the University of Sydney will receive a Student Card. New students will have their card issued in person at the time of enrolment. Successful re-enrolling students will receive their card by mail.

The Student Card includes the student's name, student identification number (SID), a digitised photo and the library borrower's number and barcode. Where applicable, it will also display a travel concession logo from the Ministry of Transport (if student eligibility requirements are met).

The card has a number of interoperable uses, such as the ability to purchase printing and photocopying services at the University's libraries and gain access to certain secure buildings. The card identifies the student as eligible to attend classes and must be displayed at formal examinations. It must also be presented to secure student concessions and to borrow books from all sections of the University Library.

For more information about Student ID Cards please visit the Card Centre (or see the website: www.usyd.edu.au/card_centre).

Student learning entitlement
All Australian citizens, New Zealand citizens and holders of a permanent visa are allocated a Student Learning Entitlement (SLE) of up to seven years equivalent full-time study. This is measured in equivalent full-time student load (EFTSL), which is the proportion of a full-time load that a unit of study represents. The University sets an EFTSL value for each unit of study it offers. To be Commonwealth-supported for a unit, a student must have enough SLE to cover the EFTSL value of that unit.

Student progress rate (SPR)
A calculation that measures the rate at which the load undertaken is passed annually in each award program.

Student type
Student type identifies whether a student is local or international and the type of study the student is undertaking. See also 'Domestic student', 'Exchange student', 'International student'.

Study Abroad program
A scheme administered by the International Office that allows international students who are not part of an exchange program to take units of study at the University of Sydney, but not towards an award program. In most cases the units of study taken here are credited towards an award at the student's 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, for example the unit of study 'History of Momoyama and Edo Art' may count towards the requirements for the subject areas 'Art History and Theory' and 'Asian Studies'.

Summative assessment
See 'Assessment'.

Summer School
See 'Sydney Summer School'.

Supervising faculty
The faculty which has the responsibility for managing the academic administration of a particular course, such as 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. 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.

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 role. See also 'Associate supervisor', 'Instrumental supervisor/ teacher', 'Research supervisor'.

Suspension of candidature
See also 'Course leave'.

Suppression of results
Results for a particular student can be suppressed by the University when the student has an outstanding debt to the University (this particularly applies to international students who have not paid their tuition fees), or when the student is facing disciplinary action. A student may also request a suppression for personal reasons.

Sydney Summer School
A program of accelerated, intensive study running for approximately six weeks during January and February each year. Both undergraduate and postgraduate units are offered. Sydney Summer School provides an opportunity for students at Sydney and other universities to catch up on required units of study, to accelerate completion of a course or to undertake a unit that is outside their award course. All units attract full fees, but some scholarships are available.

Sydney Winter School
An intensive session offered by the University in July during the mid-year break. See 'Sydney Summer School'.

T

Teaching department
See 'School'.

Teaching end date
Official finish date of formal timetabled classes.

Teaching start date
Official commencement date of formal timetabled classes.

Terminated
Term used when a student's candidature has been officially closed because they are not able to complete the course requirements. See also 'Candidature'.

Testamur
A certificate of award provided to a graduand, usually at a graduation ceremony. The University award conferred is displayed along with other appropriate details.

Thesis
A major work that is the product of an extended period of supervised independent research. See also 'Course (Research)'.

Timetable
The schedule of lectures, tutorials, laboratories and other academic activities that a student must attend.

Transcript
See 'Academic transcript'.

Transfer
See 'Course transfer'.

Tuition fees
Tuition fees may be charged to students in designated tuition fee-paying courses. Students who pay fees are not liable for HECS.

U

Universities Admissions Centre (UAC)
The UAC receives and processes applications for admission to undergraduate courses at recognised universities in NSW and the ACT. Most local undergraduate students at the University of Sydney apply through the UAC.

Universities Admission Index (UAI)
A measure of overall academic achievement in the HSC that helps universities rank applicants for university selection. The UAI is a rank of any student's performance relative to other students. It is calculated from the aggregate of scaled marks in 10 units of the HSC (two best English units plus eight other units, including only two category B units) and is presented as a number between 0.00 and 99.95 with increments of 0.05.

In June 2009 the UAI was replaced by the Australian Tertiary Admissions Rank (ATAR). See 'Australian Tertiary Admissions Rank'.

Under examination
Indicates that a research student has submitted their written work (thesis) for assessment, and is awaiting the finalisation of the examiners' outcome and recommendation.

Undergraduate
A term used to describe both a course leading to a diploma or bachelor's degree and a student enrolled in such a course.

Unit of study
Unit of study or unit means a stand-alone component of an award course. Each unit of study is the responsibility of a department. See also 'Prohibited combinations of unit of study'.

Unit of study enrolment status
This indicates whether the student is still actively attending the unit of study (currently enrolled) or is no longer enrolled. See also 'Cancellation of enrolment', 'Discontinuation'.

Unit of study level
Units of study are divided into junior, intermediate, senior, honours, Year 5, and Year 6. 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, the term 'University' in this document refers to the University of Sydney.

University Calendar
The annual University publication available in print and online that provides general and historical information about the University of Sydney, the statutes and regulations under which it operates and the Senate resolutions relating to constitutions and courses in each faculty.

University Medal
A faculty may recommend the award of a University Medal to a student qualified for the award of an undergraduate honours degree whose academic performance is judged to be outstanding.

University Strategic Directions
This refers to the University of Sydney *Strategic Plan* 2007–2010. A new plan is currently in development.

Upgrade
Where a student enrolled in a master's by research course is undertaking research at such a standard that either the University recommends that the student upgrade their degree to a PhD, or the student seeks to upgrade to a PhD and this is supported by the University.

V

Variation of enrolment
See 'Enrolment variation'.

Vice-Chancellor and Principal
The chief executive officer of the University, responsible for its leadership and management. The Vice-Chancellor and Principal is head of both academic and administrative divisions.

W

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. Unlike credit, waivers do not involve a reduction in the number of credit points required for a course. See also 'Credit', 'Exemption'.

WAM weight
A weight assigned to each unit of study to assist in the calculation of WAMs.

Weighted average mark (WAM)
This mark uses the unit of study credit point value in conjunction with an agreed 'weight'. The formula for this calculation is:

$$WAM = \frac{\sum (W_c \times M_c)}{\sum (W_c)}$$

(Sums over all units of study completed in the selected period.)

The mark is the actual mark obtained by the student for the unit of study, or in the case of a failing grade with no mark – 0. Pass/Fail assessed subjects and credit transfer subjects (from another institution) are excluded from these calculations. However, the marks from all attempts at a unit of study are included. (Effective from 1 January 2004.)

In addition, faculties may adopt other average mark formulae for specific progression or entry requirements. If such a formula is not specified in the faculty resolutions, the formula outlined above is used. See also 'WAM weight'.

Winter School
See 'Sydney Winter School'.

Y

Year of first enrolment (YFE)
The year in which a student first enrols at the University. See also 'Commencement date'.

Youth allowance
Youth allowance is payable to a full-time student or trainee aged 16 to 24 years of age who is enrolled at an approved institution such as a school, college, TAFE or university, and who is undertaking at least 15 hours a week face-to-face contact.

Index by alpha code

G

H

Index by name

A

B

C

The University of Sydney

2010

2010 handbook maps

Quick links:
www.usyd.edu.au/maps
Campuses
Bicycle map
Precincts
Disability access
Parking layout

Set a course for Handbooks online: www.usyd.edu.au/handbooks

Map Code: 0102_MAIN

Camperdown and Darlington Campuses

Directory

University buildings

O6 Aeronautical Engineering Building
J4 Anderson Stuart Building

G3 Badham Building
H3 Bank Building
L2 Baxter's Lodge
L8 Biochemistry and Microbiology Building
E6 Blackburn Building
E7 Bosch Building 1A
E7 Bosch Building 1B
H3 Brennan MacCallum Building
E6 Bruce Williams Pavilion

L6 Carslaw Building
F4 Chaplaincy
M8 Chemical Engineering Building
J5 Chemistry Building
N8 Civil Engineering Building
N9 Civil Engineering Workshop
K10 Clark Building

J9 Darlington Centre
J10 Darlington House
K9 Darlington Road Terraces
L10 Demountable Village

K5 Eastern Avenue Auditorium & Lecture Theatre Complex
L9 Economics and Business Building
H2 Edgeworth David Geology Building
G4 Education Building
G4 Education Building Annexe
H5 Edward Ford Building
N7 Electrical Engineering Building
N7 Engineering Link Building
C3 Evelyn Williams Building

K3 Fisher Library
K4 Fisher Library Stack
G2 Footbridge Theatre

C3 Gatekeeper's Lodge
J7 Gatekeeper's Lodge (City Road)
M8 Gordon Yu-Hoi Chui Building
J2 Great Hall
G3 Griffith Taylor Building

D4 HK Ward Gymnasium
F2 Heydon-Laurence Building
G2 Holme Building

N5 Information Technologies
K8 Institute Building
N5 International House
J10 IXL Building

D3 JD Stewart Building
F2 JRA McMillan Building
L7 Jane Foss Russell Building
F3 John Woolley Building

L4 Law School

F1 Mackie Building
H3 MacLaurin Hall
H2 Macleay Building
G1 Margaret Telfer Building
J6 Madsen Building
H4 Manning House
H4 Manning Squash Courts
D3 McMaster Annexe
D3 McMaster Building
O6 Mechanical Engineering Building
A2 Medical Foundation Building
K8 Merewether Building

L4 New Law Building
E1 No. 1-3 Ross Street

M7 Old School Building
F4 Old Teachers' College

H3 Pharmacy Building
H6 Physics Annexe
G5 Physics Building
N8 PNR Building

E6 Queen Elizabeth II Research Institute

H5 RC Mills Building
F2 RD Watt Building
D4 RMC Gunn Building
M9 Raglan Street Building
N7 Rose Street Building
E2 Ross Street Building

G2 Science Road Cottage
E1 Selle House
M10 Services Building
N6 Seymour Centre
K10 Shepherd Centre
O6 Shepherd Street Carpark
K9 Storie Dixson Wing
L4 Sydney Law School

K5 Teaching Building
F5 The Arena Sports Centre
J3 The Quadrangle
J5 Transient Building

L10 University Computing Centre
M9 University Sports & Aquatic Centre

D3 Veterinary Science Conference Centre
E6 Victor Coppleson Building

F3 Wallace Theatre
K7 Wentworth Building
E7 Western Avenue Carpark
M6 WH Maze Building
M6 Wilkinson Building

Childcare centres

K11 Boundary Lane
F9 Carillon Avenue
N9 KU Union
H1 Laurel Tree House

Colleges & residential accommodation

J10 Darlington House
K9 Darlington Road Terraces
N5 International House
L10 Mandelbaum House
A4 Sancta Sophia College
C8 St Andrew's College
B5 St John's College
L6 St Michael's College
G7 St Paul's College
E1 Selle House
D10 Sydney University Village
F7 Wesley College
G8 Women's College

Computer Access Centres

H3 Brennan
G4 Education
K3 Fisher
N7 Link
L6 McGrath (Carslaw)
H3 Pharmacy

Cultural venues

H2 Macleay Museum
J3 Nicholson Museum
N6 Seymour Centre
K7 Sir Hermann Black Gallery
M6 Tin Sheds Gallery
J2 University Art Gallery

Faculties (offices)

F2 Agriculture, Food and Natural Resources
M6 Architecture
H3 Arts
K8 Economics & Business
G4 Education and Social Work
N7 Engineering
L4 Law
H5 Medicine
H3 Pharmacy
L6 Science
D3 Veterinary Science

Libraries

G3 Badham
H5 Burkitt-Ford
K3 Fisher
L4 Freehills Law Library
E7 Medical
H5 Schaeffer Fine Arts
L7 SciTech

Retail

H3 Australia Post Office
J9 Darlington Centre
G2 Holme Building
L7 Jane Foss Russell Building
H4 Manning House
F5 The Arena Sports Centre
M9 University Copy Centre
K7 University Health Service
M9 University Sports & Aquatic Centre
M9 University Co-op Bookshop
C3 Valentine Charlton Cat Centre
C3 Veterinary Hospital & Clinic
K7 Wentworth Building

Security

M10 Emergency Services
M10 Lost Property
M10 Traffic & Parking

Sports & recreational venues

K2 Fisher Tennis Courts
D4 HK Ward Gymnasium
H5 Lawn Tennis Courts
H4 Manning Squash Courts
F5 The Arena Sports Centre
G5 The Square
E5 University Oval No. 1
E3 University Oval No. 2
M9 University Sports & Aquatic Centre

Unions & associations (offices)

K7 Students' Representative Council (SRC)
M9 Sydney University Postgraduate Representative Association (SUPRA)
M9 Sydney Uni Sport & Fitness
G2 University of Sydney Union

University administration, centres & services

L7 Accommodation Service
H3 Alumni Relations Office

L7 Careers Centre
L7 Cashier
D10 Centre for Continuing Education
K7 Centre for English Teaching
H3 Chancellor
L7 Counselling Service

L7 Disability Services

L7 Equity Support Services
H2 Executive Offices

L7 Financial Assistance Office
G1 Financial Services

J3 Information Centre
L10 Information and Communications Technology Services
L7 International Office
L7 International Student Support Unit

G4 Learning Centre

L6 Mathematics Learning Centre
H2 Media Office

G1 Office of General Counsel

L7 Research Office

L7 Scholarships and Prizes Office
L7 Student Centre
L7 Student Support Services
K8 Summer School
K8 Support Sydney
M10 SydneyPeople – HR Service Centre
D9 SydneyPeople – Learning Solutions
E1 SydneyPeople – Unistaff
L7 Sydney Talent
O5 Sydnovate

F3 United States Studies Centre
G2 University of Sydney Venue Collection

C3 Veterinary Hospital & Clinic
H2 Vice-Chancellor

Course planner

Year	Semester	Unit of study 1 & credit points		Unit of study 2 & credit points		Unit of study 3 & credit points		Unit of study 4 & credit points		Total credit points
1	1									
	2									
2	summer									
	1									
	winter									
	2									
3	summer									
	1									
	winter									
	2									
4	summer									
	1									
	winter									
	2									
5	summer									
	1									
	winter									
	2									
									Total credit points	