Bachelor of Engineering (Electrical)/Bachelor of Information Technology (IF59)

Year offered: 2010
Admissions: No
CRICOS code: 006384G
Course duration (full-time): 5 years
Domestic fees (indicative): 2010: CSP $3,200 (indicative) per semester
International Fees (indicative): 2010: $11,500 (indicative) per semester
QTAC code: 419512
Past rank cut-off: 76
Past OP cut-off: 12
OP Guarantee: Yes
Assumed knowledge: English (4, SA) and Maths B (4, SA)
Preparatory studies: For information on acquiring assumed knowledge visit http://www.studentservices.qut.edu.au/apply/ug/info/knowledge.jsp
Total credit points: 480
Standard credit points per full-time semester: 48
Course coordinator: Dr R. Mahalinga-Iyer (Engineering), Mr Richard Thomas (Science and Technology)
Discipline coordinator: Dr Felipe Gonzalez (Engineering)
Campus: Gardens Point

DISCONTINUATION
As of Semester 1 2009, this course has been discontinued and replaced by IX54 Bachelor of Engineering (Electrical)/Bachelor of Information Technology.

Further Information
For further information about this course, please contact the following:

Engineering Coordinator
Phone +61 7 3138 2678
Fax +61 7 3138 1515
Email: bee.enquiries@qut.com

Science and Technology Coordinator
Phone: 3138 9353
Email: enquiry.scitech@qut.edu.au

Full-time Course Structure - Students who commenced in 2007 and 2008

<table>
<thead>
<tr>
<th>Year 1, Semester 1</th>
<th>Year 1, Semester 2</th>
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<tbody>
<tr>
<td>BEB100</td>
<td>MAB180</td>
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<tr>
<td>ITB001</td>
<td>Engineering Mathematics 1B</td>
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<td>MAB131</td>
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<tr>
<th>Year 2, Semester 1</th>
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<tbody>
<tr>
<td>ENB240</td>
<td>EL245</td>
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<tr>
<td>INB251</td>
<td>OR (prior to 2008)</td>
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<tr>
<td>ITB006</td>
<td>Networks</td>
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<tr>
<td>INB271</td>
<td>The Web</td>
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<tr>
<td>MAB233</td>
<td>Engineering Mathematics 3</td>
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<tr>
<th>Year 3, Semester 1</th>
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<tbody>
<tr>
<td>ENB242</td>
<td>ENB244</td>
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<tr>
<td>ENB340</td>
<td>Microprocessors and Digital Systems</td>
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<tr>
<td>IT Elective Unit</td>
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Published on: 16 May 2011
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Year, Semester</th>
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<tbody>
<tr>
<td>ENB345</td>
<td>Advanced Design and Professional Practice</td>
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<tr>
<td>ENB342</td>
<td>Signals, Systems and Transforms</td>
<td>Year 4, Semester 1</td>
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<tr>
<td>ENB343</td>
<td>Fields, Transmission and Propagation</td>
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<td>ENB350</td>
<td>Real-time Computer-based Systems</td>
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<tr>
<td>ENB344</td>
<td>Industrial Electronics</td>
<td>Year 4, Semester 2</td>
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<tr>
<td>ENB346</td>
<td>Digital Communications</td>
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<tr>
<td>INB301</td>
<td>The Business of IT</td>
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<td>OR</td>
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<tr>
<td>INB309-1</td>
<td>Core Project Management</td>
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<td>ITB009</td>
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<td>ENB301</td>
<td>Instrumentation and Control</td>
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<td>BEB801</td>
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<td>INB309-1</td>
<td>Major Project</td>
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<td>ITB009</td>
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<td>BEB701</td>
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<tr>
<td>BEB802</td>
<td>Project 2</td>
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<td>INB309-2</td>
<td>Major Project</td>
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<td>Electrical Engineering Selective</td>
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<td>ENB231</td>
<td>Materials and Manufacturing 1</td>
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<td>ENB334</td>
<td>Design For Manufacturing</td>
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<td>ENB350</td>
<td>Real-time Computer-based Systems</td>
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<td>ENB352</td>
<td>Communication Environments For Embedded Systems</td>
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<td>ENB436</td>
<td>Mechatronics System Design</td>
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<td>ENB440</td>
<td>RF and Applied Electromagnetics</td>
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<td>ENB441</td>
<td>Applied Image Processing</td>
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<td>ENB445</td>
<td>RF Communication Technologies</td>
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<td>ENB446</td>
<td>Wireless Communications</td>
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<td>ENB448</td>
<td>Signal Processing and Filtering</td>
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<td>ENB452</td>
<td>Advanced Power Systems Analysis</td>
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<td>ENB453</td>
<td>Power Equipment and Utilisation</td>
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<td>ENB454</td>
<td>Power System Management</td>
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<td>ENB455</td>
<td>Power Electronics</td>
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<td>ENB456</td>
<td>Energy</td>
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<td>ENB457</td>
<td>Controls, Systems and Applications</td>
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<td>ENB458</td>
<td>Modern Control Systems</td>
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<td>INB353</td>
<td>Wireless and Mobile Networks</td>
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<td>INB860</td>
<td>Computational Intelligence for Control and Embedded Systems</td>
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<td>IT Elective units - please see IT Elective Unit list</td>
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**Full-time Course structure - Students who commenced in 2006**

**Full-time Course Structure - Year 1, Semester 1**
- ITB001 Problem Solving and Programming
- ITB006 Networks
- PCB136 Engineering Physics 1C
- MAB131 Engineering Mathematics 1A
- OR
- MAB180 Engineering Mathematics 1B

**Year 1, Semester 2**
- BEB100 Introducing Professional Learning
- ENB103 Electrical Engineering
- ITB003 Object Oriented Programming
- MAB132 Engineering Mathematics 2A
- OR
- MAB182 Engineering Mathematics 2B

**Year 2, Semester 1**
- ENB240 Introduction To Electronics
- ITB004 Database Systems
- ITB008 Modelling Analysis and Design
- MAB233 Engineering Mathematics 3
UNIT SYNOPSES

BEB100 INTRODUCING PROFESSIONAL LEARNING
This unit will introduce students to a range of skills and knowledge sets required to support professional practice in design, engineering and urban development disciplines. It will include information literacy and communication skills and knowledge development. In addition, the unit will provide orientation to design, engineering and urban development professions through an introduction to their history, their place in society, the importance of ethical conduct to their practice and to the particular qualities of professional knowledge especially with regard to practice knowledge. The importance of integrated scholarship and collaborative links with other professions will be highlighted.

Equivalents: BNB007, CNB190, PSB414
Credit points: 12
Contact hours: 3 per week
Campus: Gardens Point
BEB200 INTRODUCING SUSTAINABILITY
This unit will address issues of sustainability from a number of perspectives including indigenous and other cultural perspectives, and from ecological, economic and technological perspectives. It will demonstrate to students the ways in which contrasting, and sometimes conflicting, ideas about sustainability are prioritised and how these priorities contribute to the impact that design, engineering and urban development professions have on a sustainable future.

Equivalents: PSB422  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point

BEB701 WORK INTEGRATED LEARNING 1
This unit aims to provide you with the opportunity to learn in a workplace environment. It will involve attendance, participation, observation, critical reflection, and report writing on workplace activities. The emphasis of your critical reflection and report writing will be on identifying and describing aspects of professional relevance incorporating: collaboration and teamwork; work place, health and safety; professional conduct; ethical responsibility, and other aspects of your work place experience.

This unit may form part of your (compulsory) course core (as required by professional accrediting bodies e.g. Engineers Australia, Australian Institute of Building, Royal Institution of Chartered Surveyors), or it may be one of several work integrated learning (WIL) units (selected as part of a Minor).

Prerequisites: 192cp of completed studies  Credit points: 12  Campus: Gardens Point  Teaching period: 2010 SEM-1, 2010 SEM-2 and 2010 SUM

BEB801 PROJECT 1
This unit is usually taken in the final year of study. Students complete an individual project involving the application of skills and knowledge attained during the earlier years of their degree program. For some students, this unit will be taken one of two 'project' units related to the same student project; in such cases this unit may be a pre-requisite or co-requisite to the second unit (or a follow-on from the first unit). The final 'deliverable' for this unit may vary for each discipline and details will be provided in lectures/tutorials and on the Blackboard website.

Equivalents: CEB411, CEB420, CNB434, EEB781-1, EEB889-1  Credit points: 12  Contact hours: 2 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1 and 2010 SEM-2

BEB802 PROJECT 2
This unit is usually taken in the final year of study, and is only taken by students completing a two unit project. Students complete an individual project involving the application of skills and knowledge attained during the earlier years of their degree program. This unit will be taken as the second of two 'project' units related to the same student project.

Equivalents: CEB415, EEB782-2, EEB889-2  Credit points: 12  Contact hours: 2  Campus: Gardens Point  Teaching period: 2010 SEM-1 and 2010 SEM-2

ENB103 ELECTRICAL ENGINEERING
Fundamental quantities in circuits and network laws, response to sinusoidal sources, and circuit measurements, real and reactive power calculation, power factor improvement, electric and magnetic fields, three-phase system and applications, transformer theory.
Prerequisites: MAB126 or MAB131 or MAB180  Equivalents: EEB213  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

ENB231 MATERIALS AND MANUFACTURING 1
Materials and their engineering applications, Manufacturing systems and technology, material properties and manufacturing, material selection, failure, graphical communication.
Assumed knowledge: ENB104 or ENB110 is assumed knowledge.  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1

ENB240 INTRODUCTION TO ELECTRONICS
Module Electronics A provides a basic understanding of the characteristics and operation of discrete semiconductor components. Electronic circuit design is introduced with emphasis on the small signal low and high frequency response of those circuits. Module Digital Electronics gives students a good grounding in the basic principles of digital design, with particular regard to the fundamentals of digital number systems, Boolean algebra, combinational and sequential logic design.
Prerequisites: ENB103 or ENB120  Equivalents: EEB312  Credit points: 12  Contact hours: 5 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1

ENB241 SOFTWARE SYSTEMS DESIGN
The unit introduces students to Software Engineering by considering a whole Software Lifecycle. Each step of the lifecycle is treated in detail, such as concept phase, requirement definition, software design, human-computer interaction, implementation, audits, and maintenance. Software design principles and techniques are presented as well as real-time system design. CASE development tools
are briefly introduced as well as object oriented programming for which a structured Object Oriented Analysis and Design are considered.  

**Prerequisites:** ENB246 or INB104  
**Equivalents:** EEB612  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB242 INTRODUCTION TO TELECOMMUNICATIONS**  
Telecommunications systems and the principles underlying their operations are introduced starting from mathematical preliminaries such as the Fourier series and the Fourier transform. Analogue modulation techniques (AM and FM), systems and circuits for generation and demodulation, analogue to digital conversion, pulse modulation and baseband digital data communication techniques are studied using time and frequency domain analyses.  

**Prerequisites:** (ENB120 or ENB103) and (MAB126 or MAB110 or MAB111)  
**Equivalents:** EEB340  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**ENB243 LINEAR CIRCUITS AND SYSTEMS**  
Network analysis; Laplace transform of signals and transfer functions of systems, time and frequency responses of linear circuits, feedback configurations and transfer functions, analyse and designing analogue systems using transistors and operational amplifiers, designing and synthesising analogue filters, signal conditioning.  

**Prerequisites:** ENB120 and MAB126  
**Assumed knowledge:** ENB240 is assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB244 MICROPROCESSORS AND DIGITAL SYSTEMS**  
This unit covers the basis for electronic circuit design in general but also in connection with microprocessor systems, theory and design of advanced embedded digital systems and practical implementation. The practical application of these circuits including interfacing and environment factors will be considered.  

**Prerequisites:** ENB240  
**Assumed knowledge:** ENB246 or INB104 is assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB245 INTRODUCTION TO DESIGN AND PROFESSIONAL PRACTICE**  
Introduction to general principles of electronic circuit and electrical equipment design and realisation; design and implementation of basic electronic circuits; experience in undertaking engineering projects, in report writing, and working in teams. The unit gives students the opportunity to apply their theoretical knowledge to real-life engineering problems.  

**Assumed knowledge:** ENB240 and ENB246 or INB104 is assumed knowledge.  
**Equivalents:** EEB584  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB301 INSTRUMENTATION AND CONTROL**  
The unit introduces the student to classical control systems, analysis and synthesis, and implementation in an industrial control context. It introduces the principles of electrical measurements and instrumentation, sensors, PLC, DSC and industrial networks, and foundation of feedback control theory for engineers.  

**Prerequisites:** MAB126 or MAB182 or MAB132  
**Assumed knowledge:** ENB105 or ENB205 or ENB243 are assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**ENB334 DESIGN FOR MANUFACTURING**  
Topics covered in this unit include: basic concepts in the analysis of a mechanical engineering design, relating the design requirements to a range of manufacturing processes; an understanding of the complete manufacturing specifications for mechanical designs based on functional requirements, manufacturing processes, interchangeability and standardisation; introduction to the basic principles in the design of jigs and fixtures in manufacturing.  

**Assumed knowledge:** ENB231 is assumed knowledge.  
**Equivalents:** MMB374  
**Credit points:** 12  
**Contact hours:** 5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB340 POWER SYSTEMS AND MACHINES**  
This is a core unit that develops the basic topics essential for an electrical engineer working in areas that include the resources sector, the process industries, electrical power utilisation, electric power generators as well as the electricity supply industry. Topics covered in machines include magnetic circuits, single phase and three phase transformers; electric machines including electromechanical energy conversion, reluctance motors, induction motors, synchronous machines, D.C. machines, stepper motors, P.C. motors; motor control; heating, cooling and rating. Power system topics include power generation and energy sources, electricity market operation, fault calculations, basic protection and power system operation, in particular real and reactive power control.  

**Prerequisites:** ENB103 or ENB250  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**ENB342 SIGNALS, SYSTEMS AND TRANSFORMS**  
The unit covers the area of Signals in Linear Systems for which a detailed study of Fourier theory applied to both analogue and discrete-time signals and to the analysis of linear systems will be given. Systems will be represented in
time as well as in frequency and various characteristics and relationships in the two domains will be discussed. The students will be introduced to the fundamentals of analogue and discrete-time signal processing; analogue and discrete Fourier transform; linear and discrete convolution. Finally, the students will learn the fundamentals of digital filter design and implementation, with examples and applications arising from various disciplines.

**Prerequisites:** ENB242  
**Assumed knowledge:** ENB243 and ENB246 are assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**ENB343 FIELDS, TRANSMISSION AND PROPAGATION**  
Fundamental concepts of static and time varying electromagnetic fields; Maxwell’s equations and the characteristics of their solution, such as wave equations, losses in various media and energy flow; numerical methods; transmission line theory, terminated line, Smith Circle Chart usage and lattice diagram; propagation modes in waveguides and optical fibre; free-space propagation, reflection, refraction, diffraction; basic antenna theories and antenna parameters, Frii’s transmission equation, half-wave dipole, two-element array.

**Prerequisites:** ENB103 or ENB250  
**Assumed knowledge:** MAB127 or MAB182 or MAB132 is assumed knowledge.  
**Equivalents:** EEB641  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**ENB344 INDUSTRIAL ELECTRONICS**  
The unit gives a basic understanding of linear and switching applications in industrial electronics. Practical knowledge associated with interfacing and design is developed. Students will also study the theory and design of advanced digital embedded systems as well as the practicalities associated with implementation. It also covers power rectification, controlled rectification, inverters, AC and DC drives, uninterruptible power supplies and power switching components.

**Prerequisites:** ENB240  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB345 ADVANCED DESIGN AND PROFESSIONAL PRACTICE**  
Detailed design and realisation of typical electronic subsystems used in all areas of electrical and electronic systems engineering. The unit enhances the student’s ability in solving complex engineering problems. The design builds on the theoretical knowledge gained in other units. The student is required to write a detailed technical report and also give an oral presentation on her/his design.

**Prerequisites:** ENB245  
**Equivalents:** EEB684  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB346 DIGITAL COMMUNICATIONS**  
Revolutionary developments in the field of Digital Communication Technology have enabled improvement in the characteristics of communication systems in order to meet the performance requirements for transmission of information for private, business and industrial applications. This unit which covers Elements of a Digital Communication System aims at providing the students with an in-depth understanding of the theory and applications of digital communication systems and technology.

**Prerequisites:** ENB342  
**Assumed knowledge:** MAB233 is assumed knowledge.  
**Equivalents:** EEB560  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB350 REAL-TIME COMPUTER-BASED SYSTEMS**  
This unit covers the area of embedded systems and real-time kernels. C programming is reviewed in the context of real-time applications where it is often mixed with assembly language. Data representations, input-output programming, concurrency, scheduling, memory management and system initialisation are discussed. Programming laboratory exercises introduce development tools and reinforce fundamental concepts such as polling, interrupt driven input-output, serial port communication, pre-emptive and non pre-emptive scheduling, resource sharing, priority inversion and deadlock. Students develop a simple real-time process control application using programmable logic and micro-controllers.

**Prerequisites:** ENB244  
**Equivalents:** EEB566  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**ENB352 COMMUNICATION ENVIRONMENTS FOR EMBEDDED SYSTEMS**  
This unit addresses the following: computer networks; network programming; open network foundations; embedded systems; client/server; bus architectures; network controllers; distributed systems in automation and process control; embedded Java; distributed objects; distributed databases; distributed operating systems.

**Prerequisites:** ENB350  
**Equivalents:** EEB666  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**ENB436 MECHATRONICS SYSTEM DESIGN**  
This unit provides students with an understanding of design and interpretation of hydraulic and pneumatic circuits (including graphical symbols, fluid logic and components of fluid systems) and a basic understanding of PLC programming for control of manufacturing systems with the emphasis on hands on practice of developing a control system for a given process. Topics include the following:
mechatronics systems design; power supply; introduction to fluid power and graphical symbols; hydraulic and pneumatic systems; simple circuits; fluid logic; logic symbols and circuits; hydraulic components, fluids, system design, circuits; pressure compensated flow control.

Prerequisites: ENB334  
Equivalents: MMB478  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**ENB440 RF AND APPLIED ELECTROMAGNETICS**

This unit addresses the following: lumped and distributed microwave and RF circuits, including [y], [t] and [s] parameters; impedance matching techniques; passive and active microwave devices; RF circuit design techniques; microwave and RF measurement techniques; linear antennas and microwave antennas; analysis and synthesis of antenna arrays; specialised antennas and antenna measurements; EMC definition, standards and regulations; test plan; measurements; interference coupling; susceptibility; EMC design techniques, component selection, circuit layouts, grounding, shielding, filters, suppressors, isolation and safety; EMC management; propagation of electromagnetic fields in electrical materials; application of numerical methods.

Prerequisites: ENB343  
Antirequisites: ENB445  
Assumed knowledge: ENB242 and ENB244 are assumed knowledge.  
Equivalents: EEB961  
Credit points: 12  
Contact hours: 5 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-1

**ENB441 APPLIED IMAGE PROCESSING**

The aim of this unit is to introduce the fundamentals and applications of image processing to the students. The unit covers topics such as image acquisition, image representation, image enhancement, image segmentation, and image filtering. These topics will be introduced using a project based approach with applications to engineering practical problems.

Prerequisites: ENB342  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-1

**ENB445 RF COMMUNICATION TECHNOLOGIES**

The unit covers various communication and signal processing technologies that are used in point to point and point to multi-point; wired and wireless communications including microwave terrestrial and satellite communication; last miles solutions including ADSL, VDSL and wireless local loops; ad hoc radio transmission such as the Bluetooth and Home RF; Wireless LANs including wireless infrared transmission and IEEE802.11 standard.

Prerequisites: ENB343  
Assumed knowledge: ENB242 and ENB244 are assumed knowledge.  
Equivalents: EEB766  
Credit points: 12  
Contact hours: 5 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**ENB446 WIRELESS COMMUNICATIONS**

This unit addresses the following: cellular mobile radio system concepts; mobile radio propagation; spread spectrum techniques and CDMA; speech coding modulation and channel coding techniques for GSM and CDMA; fading mitigation through diversity; inter-symbol interference mitigation; the GSM and CDMA standards; the WAP and the GPRS; introductions to UMTS/IMT2000; introduction to personal communications; introduction to blue tooth technology; other wireless systems including wireless LAN, wireless local loop, microwave local multipoint distribution systems (LMDS) and LEO satellite communication.

Prerequisites: ENB346  
Equivalents: EEB960  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**ENB448 SIGNAL PROCESSING AND FILTERING**

This unit gives a comprehensive introduction to the representation and processing of signals distorted or corrupted by noise, and the systems needed to process them. Techniques for estimating signal parameters for the detection of signals in the presence of noise will be discussed. The methods presented will be tested on real data drawn from different engineering applications, such as wireless communications, biomedical EEG signals and brain models, speech and music synthesis, and radars.

Prerequisites: ENB342  
Assumed knowledge: MAB233 is assumed knowledge.  
Equivalents: EEB941  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**ENB452 ADVANCED POWER SYSTEMS ANALYSIS**

The aim of this unit is to introduce you to the basic topics of power system analysis relevant to engineers involved in both operations and planning. Specific tasks will be evaluation of faults on lines, load flow and stability analyses using commercial packages.

Prerequisites: ENB340  
Assumed knowledge: ENB301 is assumed knowledge.  
Credit points: 12  
Contact hours: 3 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**ENB453 POWER EQUIPMENT AND UTILISATION**

The unit emphasises the use of relevant standards to the specification and design of electrical equipment for the use of electrical energy supply for buildings and lighting. Design approaches emphasise current engineering practise.

Prerequisites: ENB340  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**ENB454 POWER SYSTEM MANAGEMENT**

The aim of this subject is to develop skills in the operational management and the overall system management of Power
systems. There are many decisions to be made in the context of imperfect information. This subject provides tools to provide a degree of structure to the decision process, whether at purchase time or in daily operation. These tools cover the areas of risk analysis, reliability and asset management and extend to the operational areas of utilization of equipment and quality of supply. The outcome is to achieve a balance between maintenance and capital purchases between investment and reliability.

**Prerequisites:** ENB340  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1

### ENB455 POWER ELECTRONICS

The unit introduces the student to advanced industrial electronics and power converters with different applications. Students learn how to model power converters, design a controller and simulate power electronic systems using Matlab/Simulink software for different applications. They also learn practical issues such as EMI, efficiency and losses to design a controller and power circuits.

**Prerequisites:** ENB344  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1

### ENB456 ENERGY

Renewable energy sources including solar and wind energies are becoming more important than ever due to increasing energy demand, dwindling oil and gas supplies, increasing pollution levels in the atmosphere and the associated global warming effects. Renewables may also help improve competitiveness and have a positive impact on regional development and employment.

An overview of the different energy sources will be covered followed by an understanding of the characteristics of solar energy, radiation calculation, measurements and applications in remote, hybrid and grid interactive configurations. Students will be equipped with fundamentals of alternative energy sources including solar thermal, photovoltaics and wind conversion technologies.

**Assumed knowledge:** MAB126 or MAB180 or MAB131 are assumed knowledge. **Equivalents:** EEB911  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

### ENB457 CONTROLS, SYSTEMS AND APPLICATIONS

Control systems are playing an increasingly important role in process control, energy management and utility management. This unit is concerned with the application of advanced control systems with an emphasis on physical architectures and implementations. Topics covered include control system actuators, sensors and controllers, control system architectures, human machine interfacing, adaptive control strategies and intelligent control.

**Prerequisites:** ENB301  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

### ENB458 MODERN CONTROL SYSTEMS

This unit introduces the student to the following concepts: Discrete time control systems and their design, state space modelling and control system design using state space techniques, linear optimal control, non-linear systems, and adaptive control with applications of neuro-computing and fuzzy logic.

**Prerequisites:** ENB301  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

### INB210 DATABASES

The aim of this unit is to help you develop your knowledge, understand a formal specification tool (ORM) for modelling information systems unambiguously and to apply this formal technique to conceptualise information systems found in many real world application domains.

**Assumed knowledge:** Students are expected to have solid IT background knowledge (e.g., completion of at least 192 credit points)  **Equivalents:** ITB004, ITB115  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

### INB251 NETWORKS

Computer systems and communications networks are essential to the activities of modern organisations. When you graduate from a course in Information Technology, employers expect you to have a sound understanding of the terminology and concepts of computer systems, communications networks, and network services. This unit provides you with an introductory study of communications network technologies and network applications. The unit serves as an entry point to further specialised studies in the field of computer network systems.

**Antirequisites:** ITB006  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

### INB271 THE WEB

The aims of the unit are to give you a thorough understanding of what the web is, how it works and what it has to offer. Additionally, the unit aims to give you a general understanding and basic skills in developing dynamic web applications, including an appreciation of the variety of implementation technologies available. Through an understanding of how web technologies have evolved to date, you will appreciate the necessity for lifelong learning and become an insightful predictor of future developments in this area. You will learn to critically analyse technological
alternatives in order to adapt to and innovate with technologies that presently do not exist. You will appreciate the business or organizational context within which web applications exist and be skilled in communicating within that environment. You will appreciate the social and ethical issues relating to web based systems including accessibility, globalization, privacy, and piracy.

**Prerequisites:** INB104  **Antirequisites:** INB373 and INN373 and ITB007 and ITB227 and ITN007 and ITN227  
**Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1

**INB272 INTERACTION DESIGN**
The aim of this unit is to provide you with an understanding of the theory, practices and challenges associated with the development of creative interactive design and human computer interaction.

**Prerequisites:** INB103 or INB181  **Equivalents:** ITB254  
**Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-2

**INB301 THE BUSINESS OF IT**
As an IT professional you are more and more evaluated in terms of the business value that you produce. This unit will prepare you for professional practice by making you "business savvy," i.e. giving you the business knowledge and skills that will help you with your future career and job. In particular the unit will address three themes: (1) career planning and job applications, (2) entrepreneurship & innovation, and (3) business and IT strategy. You will be introduced to career development tools that enable you to self-manage your career and life. You will learn how to critically think about the requirements of a job and reflect upon your own experiences and learn how to communicate them. You will also learn about the entrepreneurial process of identifying a business opportunity and how to take advantage of that opportunity. In addition, you will gain an understanding of core strategic concepts and models, discuss typical strategy tools and then apply them to the 'Business of IT'.

**Antirequisites:** ITB009  **Assumed knowledge:** Completion of 120 credit points within BIT is assumed  
**Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1 and 2010 SEM-2

**INB309 MAJOR PROJECT**
This unit gives you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial development project over two semesters. The ability to apply technical knowledge and skills to real-life situations is essential for information technology professionals. A substantial project, under academic supervision, will develop your initiative and ability to apply your knowledge and skills in a professional capacity. Completing the project will also enable you to appreciate the complementary nature of the course material in total, particularly the need for careful project management.

**Prerequisites:** INB309-1 (can be enrolled in the same teaching period)  **Antirequisites:** ITB844  **Assumed knowledge:** Completion of at least 144 credit points of IT units, including INB101, INB102, INB103, INB104, and INB201 and four Breadth option and one specialisation option units is assumed knowledge.  
**Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**INB353 WIRELESS AND MOBILE NETWORKS**
This unit provides you with the skills to be able to design and understand the issues involved with different types of wireless communications systems. It develops your knowledge of Wide Area Networks (WANs), Local Area Networks (LANs) and Personal Area Networks (PANs) as well as skills in programming for mobile handsets. You will also develop knowledge of the different types of wireless communications technologies available and when each is most applicable in a particular situation.

**Prerequisites:** INB251 or ITB006  **Antirequisites:** ITN723  **Assumed knowledge:** Networks or equivalent networking knowledge is assumed knowledge  
**Equivalents:** ITB723  
**Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1
INB860 COMPUTATIONAL INTELLIGENCE FOR CONTROL AND EMBEDDED SYSTEMS
This is a specialisation unit in the area of Infomechatronics that introduces five methods from the field of computational intelligence and relates them to applications on real time control and embedded systems. The methods are: Knowledge Base Systems, Fuzzy Control, Neural Networks, Reinforcement Learning and Evolutionary Computation. The unit is also intended to teach the specific design and programming skills that will enable you to solve problems using computational intelligence methods in real-time embedded systems. It is assumed that you already have knowledge of programming.

Prerequisite(s): At least SA in both Senior Mathematics B and Senior Mathematics C or MAB100 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2009 SEM-1 Incompatible with: MAB180

MAB132 ENGINEERING MATHEMATICS 2A
This unit includes the following: vector calculus; differentiation of vectors; velocity and acceleration; relative velocity; vector algebra; equivalent systems of forces; functions of several variables; partial derivatives; hyperbolic functions; inverse functions; inverse trigonometric and hyperbolic functions; partial derivatives; numerical methods; differential equations; multiple integrals; areas and volumes; Laplace transforms; Fourier series.

Prerequisite(s): MAB131 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2008 SEM-2 Incompatible with: MAB182

MAB132 ENGINEERING MATHEMATICS 2A
This unit includes the following: vector calculus; differentiation of vectors; velocity and acceleration; relative velocity; vector algebra; equivalent systems of forces; functions of several variables; partial derivatives; hyperbolic functions; inverse functions; inverse trigonometric and hyperbolic functions; partial derivatives; numerical methods; differential equations; multiple integrals; areas and volumes; Laplace transforms; Fourier series.

Prerequisite(s): MAB131 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2008 SEM-2 Incompatible with: MAB182

MAB180 ENGINEERING MATHEMATICS 1B
This unit includes: sine and cosine functions; logarithmic functions; exponential functions; complex numbers; determinants; vector algebra in 2 and 3 dimensions; derivatives and their applications (differentiation, chain rule, higher derivatives); integrals and their applications. Students must have completed four semesters of Senior Mathematics B with an exit level of Sound Achievement, or have passed MAB105 (or equivalent). Incompatible with MAB131. Students with an exit level of High Achievement or better in Senior Mathematics C are advised to take MAB131.

Prerequisite(s): At least SA in Senior Mathematics B (four semesters) or equivalent or MAB105 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2009 SEM-1 and 2009 SEM-2 Incompatible with: MAB131, HA in Senior Mathematics C
MAB182 ENGINEERING MATHEMATICS 2B
Prerequisite(s): MAB180 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2008 SEM-1, 2008 SEM-2 and 2008 SUMMER Incompatible with: MAB112, MAB132

MAB182 ENGINEERING MATHEMATICS 2B
Prerequisite(s): MAB180 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2009 SEM-1, 2009 SEM-2 and 2009 SUM Incompatible with: MAB112, MAB132

MAB233 ENGINEERING MATHEMATICS 3
This unit is mostly introductory statistics for engineering but also includes a small component on foundations of computational mathematics. Statistics includes: the planning, execution, analysis and reporting of data investigations; use of a statistical package; modelling data; relationships between variables; estimation; confidence intervals; tolerance limits; hypothesis testing; fitting and investigating relationships; regression; design and analysis of experiments; risk; random variables; special distributions; linear combinations of correlated variables; reliability. The introduction to computational mathematics includes: function approximation; polynomial interpolation; numerical solution of ordinary differential equations.
Prerequisites: MAB131 or MAB182 or MAB121 or MAB126 or MAB127 Antirequisites: BSB123 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

PCB136 ENGINEERING PHYSICS 1C
This introductory unit covers: dynamics (motion in 1D, vectors, Newton's Laws, motion in 2D (including circular motion), uniform circular motion, work, energy and power potential energy and conservation of energy, linear momentum and collisions); waves (oscillatory motion, wave motion, sound waves, superposition and standing waves); geometrical optics (reflection, refraction, dispersion, Huygens' principle, image formation by mirrors and lenses, optical instruments); physical optics (interference of light, diffraction); thermal physics (temperature, thermometry, thermal expansion, heat and thermal energy, heat capacity and specific heat, latent heat, heat transfer).
Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2009 SEM-1 and 2009 SEM-2