Bachelor of Engineering (Computer Systems) (EN40)

Year offered: 2010
Admissions: No
CRICOS code: 056529D
Course duration (full-time): 4 years
Domestic fees (indicative): 2010: CSP $3,800 (indicative) per semester
International Fees (indicative): 2010: $12,000 (indicative) per semester
Domestic Entry: This course is open to continuing students only. NO NEW OFFERS WILL BE MADE AFTER 2009.
International Entry: This course is open to continuing students only. NO NEW OFFERS WILL BE MADE AFTER 2009.
QTAC code: 412502
Past rank cut-off: 79
Past OP cut-off: 11
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: 384
Standard credit points per full-time semester: 48
Course coordinator: Dr R.Mahalinga-Iyer
Discipline coordinator: Dr Jasmine Banks
Campus: Gardens Point

Discontinuation
From Semester 1 2010, this primary major has been discontinued. A second major in this discipline is currently under development.

Recommended Study
Chemistry, Maths C and Physics.

Career Outcomes
Graduates will be employed as design engineers, software engineers, hardware engineers, computer system engineers, information systems engineers, research and development engineers and project managers.

Overview
Students will study units from both electrical engineering and computing from a computer-based systems perspective. The course aims to produce students who are employable as design engineers, software and hardware engineers, computer systems engineers, and information systems engineers.

Professional Recognition
Full professional accreditation from Engineers Australia has been given for this course.

Optional Pathways
Students entering the Bachelor of Engineering (Electronics)/Bachelor of Information Technology course or the Bachelor of Engineering (Telecommunications) course can change to the Bachelor of Engineering (Computer Systems) at the end of the first year without loss of credit, subject to approval from the course coordinator and meeting minimum course requirements.

Minors
For professional recognition you will undertake an Applications minor which consists of a Work Place Integrated Learning unit, a project unit and two specialised engineering units.

Special Course Requirements
Students must complete at least 60 days industrial experience as part of the Work Integrated Learning unit in order to graduate.

Further Information
School of Engineering Systems - Phone +61 7 3138 1993, Fax +61 7 3138 1516, email: bee.enquiries@qut.com

International Student Entry
International students must maintain an enrolment program that will allow them to complete their course within the specified timeframe of their eCoE (electronic Confirmation of Enrolment).

Deferment
QUT allows current Year 12 school leavers to defer their undergraduate admission offer for one year, or for six months if offered mid-year admission, except in courses using specific admission requirements such as questionnaires, folios, auditions, prior study or work experience.

Non-year 12 students may also request to defer their QTAC offer on the basis of demonstrated special circumstances.

Find out more on deferment.

Full-time Course structure - Commencing February 2009

Year 1 - Semester 1
BEB100 Introducing Professional Learning
ENB101 Engineering Mechanics 1
ENB104  Engineering Materials
MAB131  Engineering Mathematics 1A
OR
MAB180  Engineering Mathematics 1B

Year 1 - Semester 2
BEB200  Introducing Sustainability
ENB103  Electrical Engineering
MAB132  Engineering Mathematics 2A
OR
MAB182  Engineering Mathematics 2B
PCB136  Engineering Physics 1C

Year 2 - Semester 1
ENB240  Introduction To Electronics
ENB242  Introduction To Telecommunications
INB104  Building IT Systems
MAB233  Engineering Mathematics 3

Year 2 - Semester 2
ENB243  Linear Circuits and Systems
ENB244  Microprocessors and Digital Systems
ENB245  Introduction To Design and Professional Practice
INB270  Programming

Year 3 - Semester 1
ENB301  Instrumentation and Control
ENB342  Signals, Systems and Transforms
ENB350  Real-time Computer-based Systems
INB371  Data Structures and Algorithms

Year 3 - Semester 2
ENB345  Advanced Design and Professional Practice
ENB346  Digital Communications
ENB352  Communication Environments For Embedded Systems
INB251  Networks

Year 4 - Semester 1
BEB701  Work Integrated Learning 1
BEB801  Project 1
ENB441  Applied Image Processing

Applications Minor Selective

Year 4 - Semester 2
BEB802  Project 2
ENB448  Signal Processing and Filtering
ENB458  Modern Control Systems
INB365  Systems Programming

Applications Minor Selectives

Semester 1:
INB340  Database Design
INB355  Cryptology and Protocols
INB373  Web Application Development
INB381  Modelling and Animation Techniques

Semester 2:
INB272  Interaction Design
INB374  Enterprise Software Architecture
INB382  Real Time Rendering Techniques

Full-time Course structure - Commencing February 2006 - 2008

Year 1 - Semester 1
BEB100  Introducing Professional Learning
MAB131  Engineering Mathematics 1A
OR
MAB180  Engineering Mathematics 1B
PCB136  Engineering Physics 1C
INB104  Building IT Systems
OR (prior to 2009)
ITB001  Problem Solving and Progamming

Year 1 - Semester 1
BEB200  Introducing Sustainability
ENB103  Electrical Engineering
MAB132  Engineering Mathematics 2A
OR
MAB182  Engineering Mathematics 2B
INB270  Programming
OR (prior to 2009)
ITB003  Object Oriented Programming

Year 2 - Semester 1
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<tr>
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<tbody>
<tr>
<td>ENB240</td>
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<td>ENB242</td>
<td>Introduction To Telecommunications</td>
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<tr>
<td>MAB233</td>
<td>Engineering Mathematics 3</td>
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<td>INB371</td>
<td>Data Structures and Algorithms</td>
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**Year 2 - Semester 2**

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<td>Microprocessors and Digital Systems</td>
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<td>Introduction To Design and Professional Practice</td>
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**Year 3 - Semester 1**

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<td>Instrumentation and Control</td>
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<td>ENB342</td>
<td>Signals, Systems and Transforms</td>
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<td>Digital Communications</td>
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<td>Systems Programming</td>
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**Year 4 - Semester 1**

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<td>BEB801</td>
<td>Project 1</td>
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<td>ENB441</td>
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**Year 4 - Semester 2**

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<td>BEB802</td>
<td>Project 2</td>
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<td>ENB448</td>
<td>Signal Processing and Filtering</td>
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<td>ENB458</td>
<td>Modern Control Systems</td>
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<td>IT Elective 3</td>
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**IT Electives**

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<td>Any level 2 IT unit (INB200 level) approved by the Subject Area Coordinator.</td>
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**Potential Careers:**
Computer Systems Engineer, Electrical and Computer Engineer, Engineer, Systems Programmer.

**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 thus providing students with a variety of lenses on the ways in which the human-made environment impacts on the future of human settlement. The unit will include an introduction to sustainability from a variety 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; workplace, health and safety; professional conduct; ethical responsibility, and other aspects of your workplace 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

ENB101 ENGINEERING MECHANICS 1
Introduction to statics, forces, moments and couples; resolution and resultant of forces acting on a particle or rigid body; equilibrium of particle or rigid body under forces and/or moments; analytical methods for plane truss analysis; shear force and bending moment in beams; the properties of sections. Dynamics (for electrical engineering students).

Equivalents: CEB109  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1

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

ENB104 ENGINEERING MATERIALS
Atomic Bonding; Crystal Structure; Elastic Deformation; Elasticity Case Study; Plastic Deformation; Defects; Alloving and Strengthening in Metals; Diffusion; Fracture, Fatigue and Creep; Phase and Phase Diagrams; Iron-Carbon Phase Diagram; Transformation of Phases; Introductory to Corrosion; Ceramics, Polymers and Composite Materials, Electronic Materials.

Equivalents: MMB131  Credit points: 12  Contact hours: 5 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

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, anagoue 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)  

**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-1

**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:** EE6584  
**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

**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

**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:** EE6684  
**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:** EE6560  
**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

### 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

### 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

### 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

### INB104 BUILDING IT SYSTEMS

This team-based unit is an integrated introduction to information technology designed to engage, inspire and inform and will demonstrate the important role that technical system design and development plays in achieving robust operation of a large variety of technological solutions. This unit will give you substantial hands-on, practical learning experiences and will motivate you through engagement in the creative, explorative and meaningful development of technological artefacts that operate in real world contexts.

**Antirequisites:** ITB001  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1 and 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

### INB270 PROGRAMMING

This unit aims to give you a positive introduction to the skills required in solving computational problems and implementing solutions in a programming or scripting language. Although some theoretical aspects of computer programming are introduced briefly, the overall emphasis of the unit is programming practice. The unit emphasises generic programming concepts and related problem-solving strategies. The skills you learn in this unit will be applicable to a wide variety of commonly-used, industrially-significant programming and scripting languages.

**Prerequisites:** INB104 or ENB246  
**Antirequisites:** ITB003, ITB112, ITB411, INN270  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

### INB272 INTERACTION DESIGN

Published on: 16 May 2011

Page 6/9
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

**INB340 DATABASE DESIGN**
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.

**Prerequisites:** INB210 or ITB004  
**Antirequisites:** ITB229  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**INB350 INTERNET PROTOCOLS AND SERVICES**
An understanding of the theoretical and practical concepts of network protocols and services is highly useful and relevant to network engineers and others working in the Information Processing industries. This unit introduces you to Internet protocols and the design, implementation and operation of network based applications. Theory and practical skills taught in this unit will be useful if you intend undertaking further networking units.

**Prerequisites:** INB251 or ITB006 or ITB510  
**Antirequisites:** ITB264, ITB629, ITB720, ITN525, ITN667, ITN720  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**INB351 COMPUTER NETWORK ADMINISTRATION**
The aim of this unit is to provide students with a working knowledge of the technical aspects and theory of network administration and management. The unit uses the Unix environment as the learning platform for attaining technical skills and for the development of problem solving skills necessary to be a successful networking professional.

**Prerequisites:** INB350  
**Equivalents:** ITB721, ITB625, ITB535, ITB525  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB352 NETWORK PLANNING AND DEPLOYMENT**
The unit draws together subject matter from a number of different networking-related areas. The aim of the unit is to assemble the previously acquired knowledge and techniques and apply it in a cohesive fashion to the task of network planning.

**Prerequisites:** INB350  
**Antirequisites:** ITB551, ITB628, ITB722, INN352, ITN551, ITN722  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**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

**INB355 CRYPTOLOGY AND PROTOCOLS**
Cryptographic techniques are widely used to implement computer and network security. As an IT security professional you may be required either to evaluate or implement information systems using cryptographic algorithms and protocols. This elective unit covers the main cryptographic technical concepts including encryption, digital signatures and cryptographic protocols.

**Antirequisites:** ITB646, ITB548, ITB566  
**Assumed knowledge:** Maths B or equivalent is assumed knowledge  
**Equivalents:** ITB732  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**INB365 SYSTEMS PROGRAMMING**
Systems programming is an essential part of any computer-science education. This unit uses operating system concepts to teach the foundations of systems programming and advanced concepts for producing softwares that provide services to computer hardware. Through this study, you will be able to demonstrate knowledge of the principles and techniques of process management, memory and file management, protection & security, and distributed systems.

**Prerequisites:** INB270  
**Antirequisites:** INN365, ITB745, ITB706  
**Assumed knowledge:** Fundamentals of computer architecture; high level programming languages (such as C, C++, Java Python) is assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2
INB370 SOFTWARE DEVELOPMENT
Understanding software development is an integral part of the IT industry for software engineers. Software development relies on object technologies, programming techniques and numerous code libraries provided by language developers and third-party vendors. Integrated Development Environments, unit testing frameworks, automated and continuous build tools and versioning systems are all becoming part of the toolset modern software developers must be familiar with. This unit is designed to introduce these technologies and techniques to show how software can be rapidly developed.

Prerequisites: INB270 or ITB003 or INN270 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB371 DATA STRUCTURES AND ALGORITHMS
The purpose of this unit is to ensure that you have a sound knowledge of modern programming techniques and their use in providing medium-scale software solutions. This unit will teach you to decompose a problem and produce a modular solution to a programming task. The principles to analyse algorithms for efficiency will also be introduced. In addition, you will acquire the necessary skills for you to use the tools available in common development environments, such as Microsoft Visual Studio.

Prerequisites: INB270 or ITB003 Antirequisites: ITB711, ITB702, INN371 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB372 AGILE SOFTWARE DEVELOPMENT
This unit introduces you to the software development process. You will look at each of the major activities involved in developing a software system. You will also learn how to manage and control the software development process for a large project when a number of team members are involved in the development. This unit develops the professional practice of working on large software systems.

Prerequisites: INB370 Antirequisites: INN372, ITB612, ITB712 Assumed knowledge: Good programming, debugging, testing and software development skills. Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

INB373 WEB APPLICATION DEVELOPMENT
This unit will provide you with an understanding of the issues, structure and technologies used for developing web-based systems. The unit will provide you with the theoretical and practical skills needed to develop enterprise critical applications designed with an n-tier architecture using state of the art technologies. A comparative technology approach is taken, including an analysis of how web technologies have evolved to date, in order to identify common themes and to better enable you to comprehend and critically evaluate future web technology offerings.

Prerequisites: INB271 or ITB007 Antirequisites: INN373 Equivalents: ITB716 and ITN716 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB374 ENTERPRISE SOFTWARE ARCHITECTURE
This unit aims to introduce you to the field of enterprise architecture. It attempts to give you a grounding in the basic knowledge and skills required by an enterprise architect. This includes a solid understanding of the IT challenges currently facing medium to large size organizations, the theory and technologies currently used to address them and an appreciation of the business imperative for which they are utilized.

Prerequisites: INB270 or ITB003 Equivalents: ITB717 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

INB381 MODELLING AND ANIMATION TECHNIQUES
The unit will provide you with the knowledge and skills to use an industry standard graphics API to implement graphics applications and to develop a basic real time animation system using an industry standard language.

Prerequisites: INB371 and MAB281 Equivalents: ITB746 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1 and 2010 SEM-2

INB382 REAL TIME RENDERING TECHNIQUES
This unit will provide you with knowledge and skills in basic to advanced techniques in real-time rendering using shading languages. You will be able to implement a high-quality real-time rendering system in an industry standard API.

Prerequisites: INB371, INB381 and MAB281 Antirequisites: ITB648 and ITB649 Equivalents: ITB747 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

MAB131 ENGINEERING MATHEMATICS 1A
This unit includes the following: trigonometry, complex numbers, differentiation with applications, integration with applications, matrices, linear systems and vector algebra. Students must have completed at least four semesters of...
both Senior Mathematics B and C with an exit level of Sound Achievement (or equivalent).

**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  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2009 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  
**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.

**Prerequisite(s):** 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