Bachelor of Engineering (Electrical) (EN40)

Year offered: 2011
Admissions: Yes
CRICOS code: 056529D
Course duration (full-time): 4 years
Domestic Fees (indicative): 2011: CSP $3,878 (indicative) per semester
International Fees (indicative): 2011: $12,250 (indicative) per semester
Domestic Entry: February and July
International Entry: February and July
QTAC code: 412502
Past rank cut-off: 81
Past OP cut-off: 10
OP Guarantee: Yes
Assumed knowledge: English (4, SA) and Maths B (4, SA)
Preparatory studies: For information on acquiring assumed knowledge visit http://www.qut.edu.au/assumed-knowledge
Total credit points: 384
Standard credit points per full-time semester: 48
Course coordinator: Dr R. Mahalinga-Iyer
Discipline coordinator: Dr Bouchra Senadjii
Campus: Gardens Point

Why choose this course?
Electrical Engineering at QUT is widely repected and its strong industry links ensure you will be work ready upon graduation.

Career outcomes
The range of employment opportunities is diverse and extensive. The average starting salary for graduates is approx $47,000.

Practical teaching
You will be exposed to challenging hands-on practical experience through laboratories and design projects, enabling you to making an immediate contribution to the industry. You will have the opportunity to work on projects such as electrical vehicles, remotely controlled telescopes, home automation.

Industry links
You will be exposed to the ideas and experiences of industry professionals. The School's academic staff are industry experienced and also members of international networks and collaborative research projects.

Course structure
You will have the opportunity to work with other students and staff in laboratories and on projects which will enhance your knowledge and develop your problem solving skills.

Facilities / technology
You will have first-hand experience of the latest technologies used in the industry. Experiental and practical learning opportunities are provided through specially designed learning environments that integrate virtual and web based material with physical equipment to ensure that you have the opportunity to learn by doing which is an important part of engineering education.

Convenience
You will study at QUT's Gardens Point campus in the centre of Brisbane, within easy walking distance to public transport, including buses, trains and ferries.

Who should do this course?
If you are interested in any of the following, you may enjoy a career in Electrical Engineering:
- Working with your hands
- Making things work
- Working with technical equipment.

Recommended Study
Chemistry, Maths C and Physics.

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

Second Major and Minors
You will have the opportunity to undertake either a 2nd major or two 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 civil engineering units. The second minor must be taken from an approved list outside your discipline.

Please refer to the rules at the following location before making your selection:

ELECTRICAL ENGINEERING Second Major and Minor Options
Second Major:
- Control Systems (previously Control and Manufacturing Engineering)
- Power and Energy Systems (previously Power Engineering)
- Signal Processing
- Telecommunications

Minors:
BEE Applications Minor

plus

A minor from anywhere in QUT that is outside of the course.

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).

Special Course Requirements

To graduate, students must complete at least 60 days industrial experience in an engineering environment as part of the Work Integrated Learning unit.

Further Information

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

Deferment

Domestic students can defer their offer in this course for one year. In exceptional circumstances up to 12 months of additional deferment may be granted.

Find out more on deferment.

Limits on grades of 3

A new policy concerning grades of 3 came into effect from 1 January 2009 (QUT MOPP C/5.2). With effect from this date grades of 3 are no longer considered a conceded or low pass but are classified as a fail grade. Any grades of 3 awarded prior to 1 January 2009 retain the conceded pass status and will be counted for graduation purposes up to the maximum number of grades of 3 permitted for your course. Grades of 3 incurred in units that commence after 1 January 2009 will not count towards your degree. Further information is available on the Student Services website

Full-time Course structure – Students commencing February 2010 onwards (Years 2 – 4)

Please Note:

For 1st year enrolment program please refer to EN40 Bachelor of Engineering course entry.

Year 2 - Semester 1 (to be introduced in 2011)

ENB240 Introduction To Electronics
ENB246 Engineering Problem Solving
ENB250 Electrical Circuits
MAB127 Mathematics for Engineering 2

OR

MAB233 Engineering Mathematics 3

Year 2 - Semester 2 (to be introduced in 2011)

ENB242 Introduction To Telecommunications
ENB243 Linear Circuits and Systems
ENB244 Microprocessors and Digital Systems
ENB245 Introduction To Design and Professional Practice

Year 3 - Semester 1 (to be introduced in 2012)

ENB241 Software Systems Design
ENB301 Instrumentation and Control
ENB340 Power Systems and Machines
ENB342 Signals, Systems and Transforms

Year 3 - Semester 2 (to be introduced in 2012)

ENB343 Fields, Transmission and Propagation
ENB344 Industrial Electronics
ENB345 Advanced Design and Professional Practice
MAB233 Engineering Mathematics 3

OR

Selective

Please note:

Students wishing to undertake CEED based Industry Project should consult the Subject Area Coordinator to provide a program for the final year. CEED program requires that you undertake units BEB701, BEB801 and BEB802 together in either Semester 1 or 2.

Year 4 - Semester 1 (to be introduced in 2013)

BEB801 Project 1
ENB346 Digital Communications

Second Major/Minor unit
Second Major/Minor unit

Year 4 - Semester 2 (to be introduced in 2013)

BEB701 Work Integrated Learning 1
BEB802 Project 2

Second Major/Minor unit
Second Major/Minor unit

Electrical Engineering Selectives

ENB339 Introduction to Robotics
ENB448 Signal Processing and Filtering
ENB452 Advanced Power Systems Analysis
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENB453</td>
<td>Power Equipment and Utilisation</td>
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<tr>
<td>ENB456</td>
<td>Energy</td>
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<tr>
<td>ENB457</td>
<td>Controls, Systems and Applications</td>
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<td>ENB352</td>
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<td>ENB440</td>
<td>RF Techniques and Modern Applications</td>
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<tr>
<td>ENB441</td>
<td>Applied Image Processing</td>
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<tr>
<td>ENB446</td>
<td>Wireless Communications</td>
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<tr>
<td>ENB454</td>
<td>Power System Management</td>
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<tr>
<td>ENB455</td>
<td>Power Electronics</td>
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</tbody>
</table>

Course structure - Control Systems 2nd major (commencing 2010 onwards)

**Year 1 - Semester 1**
- ENB100  Engineering and Sustainability
- ENB110  Engineering Statics and Materials
- ENB130  Mechanical and Thermal Energy
- MAB125  Foundations of Engineering Mathematics
- OR
- MAB126  Mathematics for Engineering 1

**Year 1 - Semester 2**
- ENB120  Electrical Energy and Measurements
- ENB150  Introducing Engineering Design
- ENB200  Introducing Engineering Systems
- MAB126  Mathematics for Engineering 1
- OR
- MAB127  Mathematics for Engineering 2

**Year 2 - Semester 1 (to be introduced in 2011)**
- ENB240  Introduction To Electronics
- ENB246  Engineering Problem Solving
- ENB250  Electrical Circuits
- MAB127  Mathematics for Engineering 2
- OR
- MAB233  Engineering Mathematics 3

**Year 2 - Semester 2 (to be introduced in 2011)**
- ENB242  Introduction To Telecommunications
- ENB243  Linear Circuits and Systems

- ENB244  Microprocessors and Digital Systems
- ENB245  Introduction To Design and Professional Practice

**Year 3 - Semester 1 (to be introduced in 2012)**
- ENB241  Software Systems Design
- ENB301  Instrumentation and Control
- ENB340  Power Systems and Machines
- ENB342  Signals, Systems and Transforms

**Year 3 - Semester 2 (to be introduced in 2012)**
- ENB344  Industrial Electronics
- ENB345  Advanced Design and Professional Practice
- ENB458  Modern Control Systems
- MAB233  Engineering Mathematics 3
- OR
- Selective

Please note:
Students wishing to undertake CEED based Industry Project should consult the Subject Area Coordinator to provide a program for the final year. CEED program requires that you undertake units BEB701, BEB801 and BEB802 together in either Semester 1 or 2.

**Year 4 - Semester 1 (to be introduced in 2013)**
- BEB801  Project 1
- ENB346  Digital Communications
- ENB350  Real-time Computer-based Systems
- INB860  Computational Intelligence for Control and Embedded Systems

**Year 4 - Semester 2 (to be introduced in 2013)**
- BEB701  Work Integrated Learning 1
- BEB802  Project 2
- ENB352  Communication Environments For Embedded Systems
- ENB457  Controls, Systems and Applications

**Control System Selectives**
- ENB339  Introduction to Robotics
- ENB436  Mechatronics System Design
- ENB448  Signal Processing and Filtering
- INB unit with permission from coordinator.

Course structure - Power and Energy Systems 2nd major (commencing 2010 onwards)
Year 1 - Semester 1
- ENB100 Engineering and Sustainability
- ENB110 Engineering Statics and Materials
- ENB130 Mechanical and Thermal Energy
- MAB125 Foundations of Engineering Mathematics OR
- MAB126 Mathematics for Engineering 1

Year 1 - Semester 2
- ENB120 Electrical Energy and Measurements
- ENB150 Introducing Engineering Design
- ENB200 Introducing Engineering Systems
- MAB126 Mathematics for Engineering 1 OR
- MAB127 Mathematics for Engineering 2

Year 2 - Semester 1 (to be introduced in 2011)
- ENB240 Introduction To Electronics
- ENB246 Engineering Problem Solving
- ENB250 Electrical Circuits
- MAB127 Mathematics for Engineering 2 OR
- MAB233 Engineering Mathematics 3

Year 2 - Semester 2 (to be introduced in 2011)
- ENB242 Introduction To Telecommunications
- ENB243 Linear Circuits and Systems
- ENB244 Microprocessors and Digital Systems
- ENB245 Introduction To Design and Professional Practice

Year 3 - Semester 1 (to be introduced in 2012)
- ENB241 Software Systems Design
- ENB301 Instrumentation and Control
- ENB340 Power Systems and Machines
- ENB342 Signals, Systems and Transforms

Year 3 - Semester 2 (to be introduced in 2012)
- ENB344 Industrial Electronics
- ENB345 Advanced Design and Professional Practice
- ENB452 Advanced Power Systems Analysis
- MAB233 Engineering Mathematics 3 OR

Selective

Please note:
Students wishing to undertake CEED based Industry Project should consult the Subject Area Coordinator to provide a program for the final year. CEED program requires that you undertake units BEB701, BEB801 and BEB802 together in either Semester 1 or 2.

Year 4 - Semester 1 (to be introduced in 2013)
- BEB801 Project 1
- ENB346 Digital Communications
- ENB454 Power System Management
- ENB455 Power Electronics

Year 4 - Semester 2 (to be introduced in 2013)
- BEB701 Work Integrated Learning 1
- BEB802 Project 2
- ENB453 Power Equipment and Utilisation
- ENB456 Energy

Power and Energy Systems Selectives
- ENB339 Introduction to Robotics
- ENB448 Signal Processing and Filtering
- ENB457 Controls, Systems and Applications
- ENB458 Modern Control Systems

Course structure - Signal Processing 2nd major (commencing 2010 onwards)

Year 1 - Semester 1
- ENB100 Engineering and Sustainability
- ENB110 Engineering Statics and Materials
- ENB130 Mechanical and Thermal Energy
- MAB125 Foundations of Engineering Mathematics OR
- MAB126 Mathematics for Engineering 1

Year 1 - Semester 2
- ENB120 Electrical Energy and Measurements
- ENB150 Introducing Engineering Design
- ENB200 Introducing Engineering Systems
- MAB126 Mathematics for Engineering 1 OR
- MAB127 Mathematics for Engineering 2
### Year 2 - Semester 1 (to be introduced in 2011)

- **ENB240**  Introduction To Electronics
- **ENB246**  Engineering Problem Solving
- **ENB250**  Electrical Circuits
- **MAB127**  Mathematics for Engineering 2
  - OR
- **MAB233**  Engineering Mathematics 3

### Year 2 - Semester 2 (to be introduced in 2011)

- **ENB242**  Introduction To Telecommunications
- **ENB243**  Linear Circuits and Systems
- **ENB244**  Microprocessors and Digital Systems
- **ENB245**  Introduction To Design and Professional Practice

### Year 3 - Semester 1 (to be introduced in 2012)

- **ENB241**  Software Systems Design
- **ENB301**  Instrumentation and Control
- **ENB340**  Power Systems and Machines
- **ENB342**  Signals, Systems and Transforms

### Year 3 - Semester 2 (to be introduced in 2012)

- **ENB344**  Industrial Electronics
- **ENB345**  Advanced Design and Professional Practice
- **MAB210**  Statistical Modelling 1
- **MAB233**  Engineering Mathematics 3
  - OR

### Selective

**Please note:**

Students wishing to undertake CEED based Industry Project should consult the Subject Area Coordinator to provide a program for the final year. CEED program requires that you undertake units BEB701, BEB801 and BEB802 together in either Semester 1 or 2.

### Year 4 - Semester 1 (to be introduced in 2013)

- **BEB801**  Project 1
- **ENB346**  Digital Communications
- **ENB441**  Applied Image Processing
  - Selective

### Year 4 - Semester 2 (to be introduced in 2013)

- **BEB701**  Work Integrated Learning 1
- **BEB802**  Project 2

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**Information for future students**

Published on: 13 June 2012

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**Signal Processing Selectives**

<table>
<thead>
<tr>
<th>Semester 1:</th>
<th>Semester 2:</th>
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<tbody>
<tr>
<td><strong>ENB350</strong> Real-time Computer-based Systems</td>
<td><strong>ENB339</strong> Introduction to Robotics</td>
</tr>
<tr>
<td><strong>MAB314</strong> Statistical Modelling 2</td>
<td><strong>ENB452</strong> Advanced Power Systems Analysis</td>
</tr>
<tr>
<td><strong>INB355</strong> Cryptology and Protocols</td>
<td><strong>MAB422</strong> Mathematical Modelling</td>
</tr>
</tbody>
</table>

**Course structure - Telecommunications 2nd major**

(commencing 2010 onwards)

### Year 1 - Semester 1

- **ENB100**  Engineering and Sustainability
- **ENB110**  Engineering Statics and Materials
- **ENB130**  Mechanical and Thermal Energy
- **MAB125**  Foundations of Engineering Mathematics
  - OR
- **MAB126**  Mathematics for Engineering 1

### Year 1 - Semester 2

- **ENB120**  Electrical Energy and Measurements
- **ENB150**  Introducing Engineering Design
- **ENB200**  Introducing Engineering Systems
- **MAB126**  Mathematics for Engineering 1
  - OR
- **MAB127**  Mathematics for Engineering 2

### Year 2 - Semester 1 (to be introduced in 2011)

- **ENB240**  Introduction To Electronics
- **ENB246**  Engineering Problem Solving
- **ENB250**  Electrical Circuits
- **MAB127**  Mathematics for Engineering 2
  - OR
- **MAB233**  Engineering Mathematics 3

### Year 2 - Semester 2 (to be introduced in 2011)

- **ENB242**  Introduction To Telecommunications
- **ENB243**  Linear Circuits and Systems
- **ENB244**  Microprocessors and Digital Systems

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**Course structure - Telecommunications 2nd major (commencing 2010 onwards)**

### Year 1 - Semester 1

- **ENB100**  Engineering and Sustainability
- **ENB110**  Engineering Statics and Materials
- **ENB130**  Mechanical and Thermal Energy
- **MAB125**  Foundations of Engineering Mathematics
  - OR
- **MAB126**  Mathematics for Engineering 1

### Year 1 - Semester 2

- **ENB120**  Electrical Energy and Measurements
- **ENB150**  Introducing Engineering Design
- **ENB200**  Introducing Engineering Systems
- **MAB126**  Mathematics for Engineering 1
  - OR
- **MAB127**  Mathematics for Engineering 2

### Year 2 - Semester 1 (to be introduced in 2011)

- **ENB240**  Introduction To Electronics
- **ENB246**  Engineering Problem Solving
- **ENB250**  Electrical Circuits
- **MAB127**  Mathematics for Engineering 2
  - OR
- **MAB233**  Engineering Mathematics 3

### Year 2 - Semester 2 (to be introduced in 2011)

- **ENB242**  Introduction To Telecommunications
- **ENB243**  Linear Circuits and Systems
- **ENB244**  Microprocessors and Digital Systems

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**Course structure - Telecommunications 2nd major**

(commencing 2010 onwards)

### Year 1 - Semester 1

- **ENB100**  Engineering and Sustainability
- **ENB110**  Engineering Statics and Materials
- **ENB130**  Mechanical and Thermal Energy
- **MAB125**  Foundations of Engineering Mathematics
  - OR
- **MAB126**  Mathematics for Engineering 1

### Year 1 - Semester 2

- **ENB120**  Electrical Energy and Measurements
- **ENB150**  Introducing Engineering Design
- **ENB200**  Introducing Engineering Systems
- **MAB126**  Mathematics for Engineering 1
  - OR
- **MAB127**  Mathematics for Engineering 2

### Year 2 - Semester 1 (to be introduced in 2011)

- **ENB240**  Introduction To Electronics
- **ENB246**  Engineering Problem Solving
- **ENB250**  Electrical Circuits
- **MAB127**  Mathematics for Engineering 2
  - OR
- **MAB233**  Engineering Mathematics 3

### Year 2 - Semester 2 (to be introduced in 2011)

- **ENB242**  Introduction To Telecommunications
- **ENB243**  Linear Circuits and Systems
- **ENB244**  Microprocessors and Digital Systems
ENB245  Introduction To Design and Professional Practice

Year 3 - Semester 1 (to be introduced in 2012)
ENB241  Software Systems Design
ENB301  Instrumentation and Control
ENB340  Power Systems and Machines
ENB342  Signals, Systems and Transforms

Year 3 - Semester 2 (to be introduced in 2012)
ENB344  Industrial Electronics
ENB345  Advanced Design and Professional Practice
ENB343  Fields, Transmission and Propagation
MAB233  Engineering Mathematics 3
OR
Selective

Please note:
Students wishing to undertake CEED based Industry Project should consult the Subject Area Coordinator to provide a program for the final year. CEED program requires that you undertake units BEB701, BEB801 and BEB802 together in either Semester 1 or 2.

Year 4 - Semester 1 (to be introduced in 2013)
BEB801  Project 1
ENB346  Digital Communications
ENB440  RF Techniques and Modern Applications
Selective

Year 4 - Semester 2 (to be introduced in 2013)
BEB701  Work Integrated Learning 1
BEB802  Project 2
ENB446  Wireless Communications
Selective

Telecommunications Selectives
Semester 1:
ENB350  Real-time Computer-based Systems
INB350  Internet Protocols and Services
INB353  Wireless and Mobile Networks
Semester 2:
ENB339  Introduction to Robotics
ENB352  Communication Environments For Embedded Systems
ENB448  Signal Processing and Filtering

INB251  Networks
INB unit with permission from the coordinator.

Potential Careers:
Electrical and Computer Engineer, Electrical Engineer, Engineer.

UNIT SYNOPSIS

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).

Assumed knowledge: This unit is not designed for first year students. It is recommended that you check WIL Community Blackboard site for information on enrolment pattern. If you are EN40 student you can only enrol after completing a minimum of 192 cp.

Credit points: 12
Campus: Gardens Point
Teaching period: 2011 SEM-1, 2011 SEM-2 and 2011 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: 2011 SEM-1 and 2011 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:** 2011 SEM-1 and 2011 SEM-2

### ENB100 ENGINEERING AND SUSTAINABILITY

This unit introduces you to the essential professional skills and practices of engineers in the context of sustainable development.

**Antirequisites:** DEB100 and UDB100  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

### ENB110 ENGINEERING STATICS AND MATERIALS

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

### ENB120 ELECTRICAL ENERGY AND MEASUREMENTS

This unit introduces you to basic electrical circuit concepts. It requires you to perform circuit analysis, circuit synthesis, and the measurement and testing of relevant quantities within circuits.

**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2 and 2011 SUM

### ENB130 MECHANICAL AND THERMAL ENERGY

Engineers work with numerous kinds of systems where consideration must be given to the motion within, and associated energy of, the system. This unit introduces the student to the concepts of mechanical and thermal energy in the context of real engineering systems. The inter-relationships of between forces, motion and energy is described as related to the flow of energy within these engineering systems. After an introduction to engineering units, concepts and data, Newton’s first and second laws are used in the description of system motion and the concepts of force and energy, conservation of momentum and conservation of energy are introduced and described. Thermodynamic processes, certain thermo-physical parameters and the first and second law of thermodynamics are introduced and used to describe simple engineering systems. This is then expanded to include the generation and transport of energy through these systems in terms of convection, conduction and radiation heat transfer.

**Equivalents:** PCB150  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

### ENB150 INTRODUCING ENGINEERING DESIGN

This unit introduces you to engineering design. A multi-disciplinary approach is taken with an emphasis in engineering systems, technical design and project management.

**Assumed knowledge:** ENB110 is assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

### ENB200 INTRODUCING ENGINEERING SYSTEMS

This unit will enable you as a graduating Built Environment and Engineering professional to take active and positive steps to transform professional practice in ways that promote the sustainability of our planet, our economy and our society. As future professionals in the fields of Design, Urban Development and Engineering Systems, you will need to understand and apply the concepts of sustainability in your professional practice if we are to achieve sustainable development in the 21st Century.

**Credit points:** 12  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

### 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:** 2011 SUM

### 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:** 2011 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, 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:** 2011 SEM-1 and 2011 SEM-2

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### 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 syntheising analogue filters, signal conditioning.

**Prerequisites:** ENB240 and MAB126

**Assumed knowledge:** ENB240 is assumed knowledge.

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-2

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### 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:** 2011 SEM-2

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### 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:** 2011 SEM-2

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### ENB246 ENGINEERING PROBLEM SOLVING

This unit introduces students to the use of computers as tools for solving engineering problems. MATLAB is introduced as a numerical computing environment with the capacity to support complex mathematics and to be programmed to solve specific engineering problems. Stand alone application development using C++ is introduced as a means of exposing students to the high and low level computer programming concepts that are necessary to the implementation of engineering solutions in hardware specific programming environments.

**Assumed knowledge:** MAB126 or MAB180 or MAB131, and ENB103 or ENB120 is assumed knowledge.

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-1

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### ENB250 ELECTRICAL CIRCUITS

This unit introduces you to electrical circuit analysis. It shows how to determine the transient and steady state solution in single and three phase circuits as well as the interaction of fluxes and currents in transformers and electrical machines.

**Prerequisites:** ENB120

**Antirequisites:** ENB103

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-1

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### 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:** 2011 SEM-1

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### ENB339 INTRODUCTION TO ROBOTICS

This unit introduces you to the components, systems and mathematical foundations of robotics. The unit introduces the technologies and methods used in the design and programming of modern intelligent robots, and encourages critical thinking about the use of robotic technologies in various applications. The unit emphasizes the practical application of robotic theory to the design and synthesis of robotic systems that respond accurately and repeatably.

**Assumed knowledge:** ENB201 or ENB221 and ENB222 are assumed knowledge.

**Equivalents:** MMB451

**Credit points:** 12

**Contact hours:** 5 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-2

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### 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 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 
resources, 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:** 2011 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:** 2011 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:** 2011 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:** 2011 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:** 2011 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:** 2011 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:** 2011 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:** 2011 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:** 2011 SEM-1

### ENB440 RF TECHNIQUES AND MODERN APPLICATIONS

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.  
**Credit points:** 12  
**Contact hours:** 5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 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:** 2011 SEM-1

### 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:** 2011 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:** 2011 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:** 2011 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:** 2011 SEM-2

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**Information for future students**

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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.
Prequisites: ENB301  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

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.
Prequisites: ENB344  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 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: 2011 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.
Prequisites: ENB301  Assumed knowledge: This unit is limited to 30 enrolments  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 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.
Prequisites: ENB301  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 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: INN251  Equivalents: ITB006  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

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.
Prequisites: INB251 or ITB006 or ITB510  Antirequisites: ITB624, ITB629, ITB720, ITN525, ITN667, ITN720  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

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:** 2011 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:** 2011 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.

**Assumed knowledge:** Knowledge of a programming language like Python, Java or C is assumed.  
**Equivalents:** ITB847  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**MAB125 FOUNDATIONS OF ENGINEERING MATHEMATICS**

A sound understanding of the language and techniques of mathematics is essential for any quantitative discipline. This unit provides an introduction to the aspects of mathematics especially applicable to engineering and is directed at those students whose mathematics preparation does not include Maths C or an equivalent. For this purpose, it’s located in first semester of the first year of your course. This unit introduces you to the fundamental mathematical ideas of function, calculus, vectors and matrices, through the use of contextualised engineering related problems. In solving these problems you will develop both an understanding of the mathematical concepts and competency in appropriate solution methods.

**Antirequisites:** MAN120  
**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 is assumed knowledge  
**Equivalents:** MAB100, MAB120, MAB180  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1, 2011 SEM-2 and 2011 SUM

**MAB126 MATHEMATICS FOR ENGINEERING 1**

Building upon the foundations established in MAB125 or Senior Maths C, this unit addresses the significant role of mathematical modelling using differential equations for the description and resolution of simple and complex problems relevant to the discipline of engineering. The formulation and solution of such problems is supported by appropriate advanced mathematical concepts used for function approximation, differentiation and integration. The unit is located in first year for application in core engineering units throughout the rest of the course. Undertaking this unit will allow you to develop your problem solving skills, especially in the context of mathematical techniques applied to ordinary differential equations used to model engineering relevant problems.

**Antirequisites:** MAN121  
**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics C (or equivalent) or MAB125 or MAB180 or MAB120 is assumed knowledge  
**Equivalents:** MAB111, MAB121, MAB131, MAB182  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1, 2011 SEM-2 and 2011 SUM

**MAB127 MATHEMATICS FOR ENGINEERING 2**

Building upon the foundations established in MAB125 or Senior Maths C, this unit addresses the significant role of mathematical modelling using vectors, matrices and multivariable calculus for the description and resolution of simple and complex problems relevant to the discipline of engineering. The formulation and solution of such problems is supported by appropriate advanced mathematical concepts used for function approximation, differentiation and integration. You will complete this unit in first year or first semester of second year depending on your initial maths background. Undertaking this unit will allow you to develop your problem solving skills, especially in the context of advanced mathematical techniques applied to vectors and matrices used to model engineering relevant problems.

**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics C (or equivalent) or
MAB125 or MAB120 or MAB131 or MAB182 is assumed knowledge

**Equivalents:** MAB112, MAB122, MAB132

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1, 2011 SEM-2 and 2011 SUM

**MAB210 STATISTICAL MODELLING 1**

This unit is intended for all mathematics degree students, all double degree students with mathematics, secondary education students with mathematics as a teaching area, and quantitatively-oriented students in other courses, particularly in Science, Information Technology, Engineering and areas of Business. The unit will provide you with fundamental skills and operational knowledge for all further study in statistics, and highly relevant foundations for other areas of mathematics such as mathematical modelling and operations research. The unit will also help you develop fundamental problem-solving skills in statistics and mathematics.

**Prerequisites:** MAB121 or MAB122  
**Antirequisites:** MAN210  
**Assumed knowledge:** Grade of Sound Achievement in Senior Mathematics C (or equivalent) or MAB120 is assumed knowledge. Students are advised to enrol in either MAB121 or MAB122 in the same semester if not previously completed.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

**MAB233 ENGINEERING MATHEMATICS 3**

This unit will provide you with the foundation knowledge and skills to carry out a statistical data investigation including defining the problem, planning the investigation, collecting and analysing data, and reporting conclusions in context. It will also provide you with foundation knowledge and concepts of probability, random variables and distributions for further learning in engineering.

**Prerequisites:** MAB131 or MAB182 or MAB121 or MAB126 or MAB127  
**Antirequisites:** BSB123, MAB101, MAN101  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

**MAB314 STATISTICAL MODELLING 2**

This unit includes: models for stochastic processes and statistical methods, which have applications in engineering, information technology, finance, and physical and life sciences. Markov chains; random walks; branching processes; queueing processes; long-term behaviour of processes; use of generating functions; bivariate and conditional distributions; transformations of random variables; beta and gamma distributions; mixture distributions; order statistics, minimum and maximum.

**Prerequisites:** MAB112 and MAB210  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**MAB422 MATHEMATICAL MODELLING**

In this unit you will develop skills in the formulation and interpretation of mathematical models of 'real-world' problems drawn from the literature, the media and the lecturer's own research areas. You will also develop and extend your skills in the use of mathematical software to investigate solutions of some of these models. By emphasising the need to write clear mathematical arguments and to explain in logical and clear English the conclusions drawn from the mathematical models developed in the unit, you will also develop your written communication skills.

**Prerequisites:** MAB121  
**Antirequisites:** MAN422  
**Assumed knowledge:** MAB220 is recommended for prior/concurrent study for exposure to MATLAB  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2