Bachelor of Engineering (Medical) (EN40)

Year offered: 2010
Admissions: Yes
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: February and July
International Entry: February and July
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 Gary Chadwick
Campus: Gardens Point

Why choose this course?
The Bachelor of Engineering (Medical) will provide with the skills to design, manufacture, install, monitor and maintain medical and surgical equipment and to provide advice on engineering matters to medical and allied staff.

Career outcomes
As a graduate of this degree you may find employment in a hospital as an advisor to health and medical professionals, in a firm concerned with the design, manufacture, supply and maintenance of medical, health and sporting equipment, an occupational health agency or in a research institution.

Practical teaching
High quality teaching and technical staff will provide you with the skills to design, manufacture, install, monitor and maintain medical and surgical equipment and to provide advice on engineering matters to medical and allied staff.

Industry links
The academic staff collaborate with clinicians and surgeons from local hospital departments. You will be given the opportunity to undertake Hands-on activities such as hospital and industry site visits, industry-based projects and work experience.

Course structure
As part of your studies you will undertake industrial experience in a medical engineering environment.

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 Medical Engineering:
- Design
- Problem solving
- Mathematics and physics

Recommended Study
Chemistry, Maths C and Physics.

Career Outcomes
Graduates from this degree may expect to find employment in hospitals as advisors to health and medical professionals, in firms concerned with the design, manufacture, supply and maintenance of medical, health and sporting equipment, occupational health agencies and in research institutions. In the early stages of their careers biomedical engineers might expect to be involved in the innovative use of technology, in the design of new devices and the assessment of appropriate engineering solutions to medical problems. More experienced biomedical engineers manage Biomedical Engineering Departments in hospitals and manufacturing companies and lead teams of engineers and technologists in the development of engineering solutions to improve health care.

Overview
This degree integrates physical, chemical, mathematical, and computational sciences and engineering principles to study human biology, medicine, human behaviour and health. It will provide you with the skills to design, manufacture, install, monitor and maintain medical and surgical equipment and to provide advice on engineering matters to medical and allied staff. Current issues such as total quality management and health legislation are also covered. In the final year, students undertake a design project in the biomedical field.

Professional Recognition
Full professional accreditation from Engineers Australia has been given for this course.
Special Course Requirements
Students must obtain at least 60 days of industrial employment in an engineering environment as part of the Work Integrated Learning unit. Half of this experience must be in an industry related to Biomedical Engineering.

Minors
For professional recognition you will undertake an applications minor which consists of a workplace integrated learning unit, a project unit and two specialised engineering units.

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).

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

Deferment
All domestic applicants offered admission to undergraduate award courses may apply to defer commencement of their study. A deferment application will not normally be considered for courses where specific admission requirements apply, for example submission of folios or undertaking auditions. Applicants are not entitled to hold a deferred place and hold a place in another QUT course for the same period.

Find out more on deferment.

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)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ENB211</td>
<td>Dynamics</td>
</tr>
<tr>
<td>ENB212</td>
<td>Strength of Materials</td>
</tr>
<tr>
<td>ENB231</td>
<td>Materials and Manufacturing 1</td>
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<tr>
<td>MAB127</td>
<td>Mathematics for Engineering 2</td>
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<td>OR</td>
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<tr>
<td>MAB233</td>
<td>Engineering Mathematics 3</td>
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Year 2 - Semester 2 (to be introduced in 2011)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ENB205</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td>ENB215</td>
<td>Fundamentals of Mechanical Design</td>
</tr>
<tr>
<td>ENB221</td>
<td>Fluid Mechanics</td>
</tr>
<tr>
<td>LSB255</td>
<td>Human Anatomy</td>
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Year 3 - Semester 1 (to be introduced in 2012)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ENB222</td>
<td>Thermodynamics 1</td>
</tr>
<tr>
<td>ENB311</td>
<td>Stress Analysis</td>
</tr>
<tr>
<td>ENB319</td>
<td>Biomechanical Engineering Design</td>
</tr>
<tr>
<td>LSB451</td>
<td>Human Physiology</td>
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Year 3 - Semester 2 (to be introduced in 2012)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ENB313</td>
<td>Automatic Control</td>
</tr>
<tr>
<td>ENB322</td>
<td>Biofluids</td>
</tr>
<tr>
<td>ENB338</td>
<td>Biomaterials</td>
</tr>
<tr>
<td>MAB233</td>
<td>Engineering Mathematics 3</td>
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<td>OR</td>
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<td></td>
<td>Selective</td>
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Year 4 - Semester 1 (to be introduced in 2013)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BEB701</td>
<td>Work Integrated Learning 1</td>
</tr>
<tr>
<td>BEB801</td>
<td>Project 1</td>
</tr>
<tr>
<td>ENB318</td>
<td>Biomechanical Engineering Systems</td>
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<td></td>
<td>Selective</td>
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</tbody>
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Year 4 - Semester 2 (to be introduced in 2013)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BEB802</td>
<td>Project 2</td>
</tr>
<tr>
<td>ENB335</td>
<td>Modelling and Simulation For Medical Engineers</td>
</tr>
<tr>
<td>ENB437</td>
<td>Health Legislation in the Medical Environment</td>
</tr>
<tr>
<td>PCB605</td>
<td>Biomedical Instrumentation</td>
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Medical Engineering Selectives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BSB115</td>
<td>Management</td>
</tr>
<tr>
<td>HMB384</td>
<td>Injury Prevention and Rehabilitation</td>
</tr>
<tr>
<td>MAB220</td>
<td>Computational Mathematics 1</td>
</tr>
<tr>
<td>MAB422</td>
<td>Mathematical Modelling</td>
</tr>
<tr>
<td>PCB593</td>
<td>Digital Image Processing</td>
</tr>
<tr>
<td>PCN112</td>
<td>Medical Imaging Science</td>
</tr>
<tr>
<td>PCN211</td>
<td>Physics of Medical Imaging</td>
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<tr>
<td>PUB112</td>
<td>Workplace Health and Safety</td>
</tr>
<tr>
<td>PYB012</td>
<td>Psychology</td>
</tr>
<tr>
<td>SCB384</td>
<td>Forensic Sciences - From Crime Scene to Court</td>
</tr>
</tbody>
</table>

Full-time Course structure – Students commencing Mid-
Year 2010 onwards (Years 2 – 5)

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)
ENB211 Dynamics
ENB212 Strength of Materials
ENB231 Materials and Manufacturing 1
MAB127 Mathematics for Engineering 2
OR
MAB233 Engineering Mathematics 3

Year 2 - Semester 2 (to be introduced in 2011)
ENB150 Introducing Engineering Design
ENB200 Introducing Sustainability
ENB221 Fluid Mechanics
LSB255 Human Anatomy

Year 3 - Semester 1 (to be introduced in 2012)
ENB222 Thermodynamics 1
ENB311 Stress Analysis
LSB451 Human Physiology

Year 3 - Semester 2 (to be introduced in 2012)
ENB205 Electrical and Computer Engineering
ENB215 Fundamentals of Mechanical Design
ENB322 Biofluids
ENB338 Biomaterials

Year 4 - Semester 1 (to be introduced in 2013)
ENB319 Biomechanical Engineering Design
MAB233 Engineering Mathematics 3
OR
Selective

Year 4 - Semester 2 (to be introduced in 2013)
ENB313 Automatic Control
ENB335 Modelling and Simulation For Medical Engineers
ENB437 Health Legislation in the Medical Environment
PCB605 Biomedical Instrumentation

Year 5 - Semester 1 (to be introduced in 2014)

BEB701 Work Integrated Learning 1
BEB801 Project 1
BEB802 Project 2
ENB318 Biomechanical Engineering Systems

Medical Engineering Selectives
BSB115 Management
HMB384 Injury Prevention and Rehabilitation
MAB220 Computational Mathematics 1
MAB422 Mathematical Modelling
PCB593 Digital Image Processing
PCN112 Medical Imaging Science
PCN211 Physics of Medical Imaging
PUB112 Workplace Health and Safety
PYB012 Psychology
SCB384 Forensic Sciences - From Crime Scene to Court

Potential Careers:
Biomechanical Engineer, Biomedical Engineer, Engineer, Mechanical Engineer.

UNIT SYNOPTES

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.

**Equivalent**: 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

**ENB222 THERMODYNAMICS 1**

This unit introduces single and three phase power, electrical machines, principles of transformers, electronic circuits and
sensors, filters, operational amplifier applications. It also
covers computing fundamentals, programming in MATLAB and Excel using applications in electrical and computer
engineering.

**Prerequisites**: ENB120 or ENB103  
**Credit points**: 12  
**Contact hours**: 4 per week  
**Campus**: Gardens Point

**ENB205 ELECTRICAL AND COMPUTER ENGINEERING**

This unit introduces single and three phase power, electrical
machines, principles of transformers, electronic circuits and
sensors, filters, operational amplifier applications. It also
covers computing fundamentals, programming in MATLAB and Excel using applications in electrical and computer
engineering.

**Prerequisites**: ENB120 or ENB103  
**Credit points**: 12  
**Contact hours**: 4 per week  
**Campus**: Gardens Point

**ENB2211 DYNAMICS**

Fundamental equations of particle kinetics; energy, power, impulse and momentum; kinematics of rigid bodies in plane
motion, relative motion and motion relative to rotating axes;
kinetcs of rigid bodies, Basic machine components, (Gears, clutches, brakes etc.), Single degree of freedom system.

**Prerequisites**: (MAB126 or MAB180 or MAB131) and
(ENB130 or PC1836 or PC150)  
**Assumed knowledge**: ENB110 or ENB101 are assumed knowledge.  
**Equivalents**: MMB212  
**Credit points**: 12  
**Contact hours**: 4 per week  
**Campus**: Gardens Point  
**Teaching period**: 2010 SEM-1

**ENB2212 STRENGTH OF MATERIALS**

This unit introduces the analysis of stress and strain in simple
engineering components and systems such as uniaxial and bending stresses, deflection of beams, torsion, thin walled
structures, combined loading, yield criteria, and introduces the finite element method (FEA).

**Prerequisites**: ENB110 or ENB101 and ENB104  
**Credit points**: 12  
**Contact hours**: 5 per week  
**Campus**: Gardens Point

**ENB215 FUNDAMENTALS OF MECHANICAL DESIGN**

Basic procedures of design, design for sustainability, universal design, Concept development, creative problem
solving, Basic component design, computational scheme in
design, manufacture & materials.

**Assumed knowledge**: MAB126 or MAB180 or MAB131, and ENB101 or ENB110, and ENB104 or ENB110 are assumed knowledge.  
**Equivalents**: MMB281  
**Credit points**: 12  
**Contact hours**: 5 per week  
**Campus**: Gardens Point  
**Teaching period**: 2010 SEM-2

**ENB221 FLUID MECHANICS**

This unit introduces the basic concepts of fluid mechanics and applies them to some simple engineering problems.

**Assumed knowledge**: MAB126 or MAB180 or MAB131, and ENB101 or ENB110 are assumed knowledge.  
**Credit points**: 12  
**Contact hours**: 4 per week  
**Campus**: Gardens Point

**ENB222 THERMODYNAMICS 1**
ENB321 MATERIALS AND MANUFACTURING 1
Materials and their engineering applications, Manufacturing systems and technology, material properties and manufacturing, material selection, failure, graphical communication.
Assumed knowledge: ENB104 or ENB110 is assumed knowledge. Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

ENB338 BIOMATERIALS
Thermodynamic behaviour of substances; theory and application of the 1st and 2nd laws of thermodynamics; thermodynamic cycles, including gas cycles, vapour power cycles and refrigeration cycles; gas-vapour mixtures and the principles of air-conditioning; fuels and combustion.
Assumed knowledge: MAB127 or MAB182 or MAB132, and ENB130 or PCB136 are assumed knowledge. Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-2

ENB311 STRESS ANALYSIS
Further analysis of stress and strain; torsion of prismatic sections and thin-walled sections; axisymmetric problems; energy methods; thin plates. Introduction to FEA including the use of a FEA software.
Prerequisites: ENB102 or ENB212 Equivalents: MMB212 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

ENB313 AUTOMATIC CONTROL
This unit introduces you to the theory and practice of control systems engineering. The unit introduces system modelling principles for mechanical, electrical and electromechanical systems, using the Laplace transform to build transfer-function models of system components. The unit emphasizes the practical application of control theory to the analysis and design of feedback systems to ensure stability, reduce steady state errors and improve transient response.
Prerequisites: ENB211 Antirequisites: ENB301 Assumed knowledge: ENB312 is assumed knowledge. Credit points: 12 Contact hours: 5 per week Campus: Gardens Point

ENB318 BIOMECHANICAL ENGINEERING SYSTEMS
Topics covered in this unit include an appreciation of the mechanics of the tissues of the joints (micro mechanics or tissue mechanics) and the function of the body during normal activities (macro-mechanics or biomechanics). This unit is designed to develop an understanding of the complex properties of the individual tissues and practical competencies in the evaluation of human function and performance from a biomechanical perspective. Biomedical engineers require the ability to analyse the mechanics of the human body for applications such as prosthetic design (both artificial limbs and replacement joints), design of assistive devices for people with disabilities, sporting performance, ergonomic tasks, and other health related areas.
Prerequisites: ENB211 Assumed knowledge: LSB131 and LSB451 are assumed knowledge. Equivalents: MMB391 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-2

ENB319 BIOMECHANICAL ENGINEERING DESIGN
This unit is structured to further develop the engineering design skills of students, with particular emphasis on the role of computer-aided design (CAD), materials selection, manufacturing processes, assembly and maintenance in the design and management of bio-engineering devices. A knowledge of manufacturing processes, fundamentals of engineering design, engineering drawing and engineering materials is assumed. Contents include design for manufacture, materials selection, computer-aided design and solid modelling, rapid prototyping techniques, user interface, and case studies of selected medical devices.
Prerequisites: ENB215 Equivalents: MMB392 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

ENB322 BIOFLUIDS
The mechanics of fluids in biological and biomedical systems differs from industrial applications as most of the fluids encountered exhibit viscosity that changes in a non-linear manner with shear rate. It is therefore necessary, when designing a second course in the mechanics of fluids for medical engineers, to examine the particular properties of the fluids that might be encountered and to introduce techniques to analyse their behaviour. It is also important to consider how the properties of the fluids relate to their biological function and the relevance of their properties to the design of associated equipment.
Prerequisites: ENB201 or ENB221 Equivalents: MMB362 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point

ENB335 MODELLING AND SIMULATION FOR MEDICAL ENGINEERS
Traditional experimentation techniques can often not be applied to investigate the mechanics of biological systems. Medical engineers are often then required to use modelling and simulation techniques to understand the behaviour of biomechanical components and/or systems. This unit introduces you to some of the fundamental principles of modelling and simulation techniques and their applications in Biomedical Engineering.
Prerequisites: ENB318 Equivalents: MMB496 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point

ENB338 BIOMATERIALS
Topics covered in this unit include: an understanding of the relationships between the properties, failure mechanisms, processing and microstructures of various materials used for medical applications and their interaction with human tissues; an understanding of the fundamentals of the use of materials in a medical environment and an understanding of the fundamentals of materials properties and processing; consideration of metallic, ceramic, polymeric implant materials; composites as biomaterials; structure-property relationships of biomaterials; tissue response to implants; soft tissue replacements; hard tissue replacements. **Assumed knowledge:** LSB131, LSB451 and ENB231 are assumed knowledge. **Equivalents:** MMB292 **Credit points:** 12 **Contact hours:** 4 per week **Campus:** Gardens Point **Teaching period:** 2010 SEM-2

**ENB437 HEALTH LEGISLATION IN THE MEDICAL ENVIRONMENT**

This unit provides an introduction to the types of legislative control in the health and medical industries. It highlights the minimum requirements in relation to the role of medical engineers and their contribution to successful and ethical relationships with medical, health legislative and regulatory affairs professionals. Content includes: national and international legislative controlling bodies and codes (EC, TGA, FDA); structure and sources of legal system (State and Federal); Good Manufacturing Practice (GMP); ISO9000 Quality Systems; Total Quality Management; ethics committees and clearance; industry case studies. **Equivalents:** MMB492 **Credit points:** 12 **Contact hours:** 4 per week **Campus:** Gardens Point **Teaching period:** 2010 SEM-2

**HMB384 INJURY PREVENTION AND REHABILITATION**

This unit considers the following: epidemiology and nature of common injuries that occur at home, school, work and during sporting activities; current philosophies of preventative measures and strategies for the treatment and rehabilitation of injuries; the role of health training, exercise and fitness in injury prevention, treatment and rehabilitation regimes; the pathology of injuries and repair processes highlighted by examining specific examples. **Prerequisites:** HMB274 **Credit points:** 12 **Contact hours:** 3 per week **Campus:** Kelvin Grove **Teaching period:** 2010 SEM-2

**LSB255 HUMAN ANATOMY**

The medically oriented biological scientist requires a detailed understanding and knowledge of human anatomy. This unit exposes the student to the theoretical and practical facets of both microscopic and macroscopic anatomy of the human body with the emphasis on the microscopic anatomy. **Prerequisites:** SCB112 or LSB118 **Antirequisites:** LSB152 **Credit points:** 12 **Contact hours:** 4 per week

**MAB127 MATHEMATICS FOR ENGINEERING 2**

This unit extends the areas of function, calculus, matrices and vectors introduced in MAB125 by introducing functions of more than one variable, partial derivatives and multiple integrals, vector valued functions, and matrix methods for the solution of systems of ordinary differential equations. Each of these topics is realised by contextualised engineering related 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:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**MAB220 COMPUTATIONAL MATHEMATICS 1**

This unit includes: sources of error; computer arithmetic; solution of nonlinear equations in one variable; solution of systems of linear equations; interpolation; finite differences; numerical differentiation and integration; solution of first order linear differential equations; MATLAB programming. Students without an exit level of Sound Achievement in four semesters of Senior Mathematics C need to be concurrently enrolled in MAB100 if not completed earlier. **Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 and corequisite MAB120 or MAB125 or MAB100 or MAB180 if you don't have Senior Mathematics C is assumed knowledge. **Credit points:** 12 **Contact hours:** 4 per week **Campus:** Gardens Point **Teaching period:** 2010 SEM-1 and 2010 SEM-2

**MAB233 ENGINEERING MATHEMATICS 3**

This unit is mostly introductory statistics for engineering but also includes a small component on foundations of computational mathematics. Statistics includes: the planning, execution, analysis and reporting of data investigations; use of a statistical package; modelling data; relationships between variables; estimation; confidence intervals; tolerance limits; hypothesis testing; fitting and investigating relationships; regression; design and analysis of experiments; risk; random variables; special distributions; linear combinations of correlated variables; reliability. The introduction to computational mathematics includes: function approximation; polynomial interpolation; numerical
solution of ordinary differential equations.

**Prerequisites:** MAB131 or MAB182 or MAB121 or MAB126 or MAB127

**Antirequisites:** BSB123

**Credit points:** 12

**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

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**MAB422 MATHEMATICAL MODELLING**

This unit includes models developed with the "real world" description. These models are taken from the areas of cancer research, population growth and engineering. Emphasis is on mathematical modelling and not on the development of new mathematical content.

**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:** 2010 SEM-2

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**PCB593 DIGITAL IMAGE PROCESSING**

This unit provides students with a basic understanding of the computer techniques used in image processing and reconstruction. Specific areas of study include the following: the structure of a digital image; image display techniques; grey scale palettes and look-up tables; Fourier transform theory; convolution theory; image processing hardware; image processing techniques, eg analysis, enhancement and restoration; spatial filtering; Fourier space filtering; methods of image reconstruction; 3D volume and surface rendering; applications of image processing in medicine, astronomy and remote sensing, etc.

**Prerequisites:** PCB375-2 or PCB496 or PQB250

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

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**PCB605 BIOMEDICAL INSTRUMENTATION**

This lecture/tutorial program includes an integrated practical component. The topics include the following: transducers; signal conditioning; sources of noise; guarding and shielding; analogue to digital and digital to analogue conversion; computer interfacing; data acquisition; sampling theorem; signal averaging; application of Fourier transforms; signal processing (digital filters); statistics of physical measurements; significance testing; least squares methods; interfacing microcontrollers to analogue circuits.

**Credit points:** 12  
**Contact hours:** 5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

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**PCN112 MEDICAL IMAGING SCIENCE**

This unit offers an introduction to programming techniques and algorithms and digital image processing; the principles of display, perception and interpretation of medical images; image quality. The second part, nuclear medicine, describes radioactive decay, radionuclide production, imaging systems and internal dosimetry.

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

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**PCN211 PHYSICS OF MEDICAL IMAGING**

This unit addresses the physical principles involved in the production of radiographic, ultrasonic and magnetic resonance images, and quality control protocols.

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

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**PUB112 WORKPLACE HEALTH AND SAFETY**

Introduces students to the basic concepts and theoretical framework of occupational health and safety such that they can identify health and safety problems in the workplace; be aware of strategies for dealing with such problems; and become familiar with the legislation, government agencies and health personnel associated with the working environment. Topics covered will include the physical, chemical and biological environments, and ergonomics. The students will also develop knowledge and skills associated with the actual measurement of the physical and chemical working environment and evaluation of the data collected.

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** External  
**Teaching period:** 2010 SEM-1

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**PYB012 PSYCHOLOGY**

The body of knowledge which defines Psychology as a discipline is basic to an understanding of human behaviour and interaction. Psychological theories, concepts and methods of investigation provide ways of evaluating personal and professional practice. Informed practice can then seek to meet the needs of individuals, groups and communities. All professional people need to have frameworks for understanding their own behaviour and that of others. This unit provides students with essential knowledge as a basis for their personal and professional effectiveness. It is the foundation for understanding further study in psychology and its many applications.

**Equivalents:** PYB100, PYB101  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point and Kelvin Grove  
**Teaching period:** 2010 SEM-1 and 2010 SEM-2

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**SCB384 FORENSIC SCIENCES - FROM CRIME SCENE TO COURT**

This unit provides an introduction to two fundamental areas in forensic science, crime scenes and justice. Mock crime scenes involving real life scenarios are used to provide hands-on training on crime scene management and examination protocols. The principles for forensic examination of crime scenes involving fire, explosion, murder, etc, are introduced through lectures, workshops and practical exercises. Also an overview of the techniques used in forensic photography, fingerprinting as well as Legal procedures at court is presented. This unit is provided by professional forensic practitioners with practical real life
experience being transferred to new generations. This head start provides a unique advantage for a strong career in forensics.

**Credit points:** 12  
**Contact hours:** 4.5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1