Bachelor of Engineering (Mechatronics) (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: $12,125 (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 Gary Chadwick
Campus: Gardens Point

Why choose this course?
This leading edge degree will provide you with the combined skills of mechanical engineering, electrical and electronic engineering and information technology.

Career outcomes
Graduates from this degree may expect to find employment as consultants, project managers, designers, maintenance and instrumentation engineers in a wide variety of work situations. The range of employment opportunities is diverse and extensive. The average starting salary for graduates is approx $40,000.

Practical teaching
In your final year you will undertake a project that will intergrate and reinforce what you have learned through the application in a real world setting.

Facilities / technology
Our programs are responsive and relevant to the changing needs of the industry and the society we live in. Experiential and practical learning opportunities are provided through specially designed learning environments and tradition laboratory areas. Facilities that integrate virtual and web based material with physical equipment ensure that students get the opportunity to learn by doing that 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.

Please Note:
As from 2011, Infomechatronics will become Mechatronics.

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

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 obtain at least 60 days of industrial work experience in an engineering environment as part of the Work Integrated Learning unit.

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

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:
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)
ENB215 Fundamentals of Mechanical Design
ENB221 Fluid Mechanics
ENB331 Materials and Manufacturing 2
INB104 Building IT Systems

Year 3 - Semester 1 (to be introduced in 2012)
ENB222 Thermodynamics 1
ENB240 Introduction To Electronics
ENB250 Electrical Circuits
ENB334 Design For Manufacturing

Year 3 - Semester 2 (to be introduced in 2012)
ENB243 Linear Circuits and Systems
ENB244 Microprocessors and Digital Systems
ENB436 Mechatronics System Design
INB270 Programming

Year 4 - Semester 1 (to be introduced in 2013)
ENB301 Instrumentation and Control
INB370 Software Development
INB860 Computational Intelligence for Control and Embedded Systems
MAB233 Engineering Mathematics 3
OR
Selective

Year 4 - Semester 2 (to be introduced in 2013)
BEB701 Work Integrated Learning 1
BEB801 Project 1
BEB802 Project 2
ENB333 Operations Management

Mechatronics Selectives
ENB245 Introduction To Design and Professional Practice
ENB457 Controls, Systems and Applications
OR any INB unit with permission from Coordinator.

Potential Careers:
Engineer, Manufacturer, Mechanical Engineer.

UNIT SYNOPSES

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).

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

**ENB211 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; kinetics of rigid bodies. Basic machine components, (Gears, clutches, brakes etc.), Single degree of freedom system.

**Prerequisites:** (MAB126 or MAB180 or MAB131) and (ENB130 or PCB136 or PCB150)  **Assumed knowledge:** ENB110 or ENB101 are assumed knowledge.

**Equivalents:** MMB112  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1

**ENB212 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  **Teaching period:** 2011 SEM-1

**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:** 2011 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  **Teaching period:** 2011 SEM-2

**ENB222 THERMODYNAMICS 1**
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:** 2011 SEM-2

**ENB231 MATERIALS AND MANUFACTURING 1**
Materials and their engineering applications, Manufacturing systems and technology, material properties and manufacturing, material selection, failure, graphical communication.

**Assumed knowledge:** ENB104 or ENB110 is assumed knowledge.  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 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:** 2011 SEM-1

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

**Prerequisites:** ENB120 and MAB126  **Assumed knowledge:** ENB240 is assumed knowledge.  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-2

**ENB244 MICROPROCESSORS AND DIGITAL SYSTEMS**
This unit covers the basics 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

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

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

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 measurement 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

ENB331 MATERIALS AND MANUFACTURING 2
ENB331 is a third year unit which extends the formative body of knowledge gained in ENB231 and introduces the shear deformation mechanisms of engineering material and how these properties can be used to understand the mechanics of metal cutting. Descriptive and analytical information about different material removal processes is provided to the student through lectures, tutorials and case studies. The unit also provides the student with an excellent opportunity to apply the knowledge in the design and manufacture of a component.  
Prerequisites: ENB231  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-2

ENB333 OPERATIONS MANAGEMENT
This unit develops students’ ability in applying quantitative techniques in solving different types of industrial problems. Topics include: product mix, assignment and transportation models; location and layout decisions, job design analysis; project planning; quality control and the use of simulation in operations management.  
Equivalents: MMB476  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

ENB334 DESIGN FOR MANUFACTURING
Topics covered in this unit include: basic concepts in the analysis of a mechanical engineering design, relating the design requirements to a range of manufacturing processes; an understanding of the complete manufacturing specifications for mechanical designs based on functional requirements, manufacturing processes, interchangeability and standardisation; introduction to the basic principles in the design of jigs and fixtures in manufacturing.  
Assumed knowledge: ENB231 is assumed knowledge.  
Equivalents: MMB374  
Credit points: 12  
Contact hours: 5 per week  
Campus: Gardens Point  
Teaching period: 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 and programmable control 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

ENB457 CONTROLS, SYSTEMS AND APPLICATIONS
Control systems are playing an increasingly important role in process control, energy management and utility management. This unit is concerned with the application of advanced control systems with an emphasis on physical architectures and implementations. Topics covered include control system actuators, sensors and controllers, control system architectures, human machine interfacing, adaptive control strategies and intelligent control.  
Prerequisites: ENB301  
Assumed knowledge: This unit is limited to 30 enrolments  
Credit points: 12  
Contact
INB104 BUILDING IT SYSTEMS
Today's modern integrated technology is built on IT systems which run in a range of contexts (e.g. mobile computing, robotics, and web-based systems) using a range of technological solutions such as programming and scripting, databases, web development and network programming. This 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.

Equivalent: ITB001 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2011 SEM-1 and 2011 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: INN270 Equivalent: ITB003 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2011 SEM-1 and 2011 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 tool set 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 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.
Equivalent: ITB847 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2011 SEM-1

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 Equivalent: 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

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