Bachelor of Engineering (Mechanical) (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?
Mechanical Engineering at QUT has a well-established and highly regarded reputation for teaching and produces graduates who are highly sought after by industry.

Career outcomes
When you graduate from this degree you will have the opportunity to work in a number of fields, such as a process engineer, consulting engineer or a project engineer with an average starting salary of around $42,500.

Practical teaching
You will be exposed to ideas and experience of guest lecturers from the real world, industry professionals and academic staff with relevant industry experience.

Industry links
The course has close links with relevant local and overseas industries.
Many of the teaching staff are involved in research with government and industry sectors, ensuring the program is relevant to industry and giving you the opportunity to work on real projects during your studies.

Course structure
You will receive a thorough grounding in the engineering sciences and hands-on practical experience in real-world problem solving and application of theory in a program that is strongly orientated towards industry.

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 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 Mechanical Engineering:
- technical and engineering activities.
- mathematics, science and technology.
- working with your hands.

Recommended Study
Chemistry, Maths C and Physics.

Career Outcomes
The Bachelor of Engineering (Mechanical) provides a sound education in the basic engineering sciences, synthesis and design, engineering management functions, and the social, economic and ethical aspects of engineering practice. Graduates from this degree may find employment in a variety of roles: consultant, project manager or technical adviser where they may be involved in the operation of large, integrated energy-based plants such as mining, power stations, sugar factories, oil refineries etc. Others may work under the guidance of more experienced staff selecting equipment, installing and commissioning plants. Some graduates will go into design offices or manufacturing plants where they will be concerned principally with the logistics of production and the efficient management of people and systems.

Overview
This degree offers a balanced mix of theory and practice with the objective of preparing graduates for the work environment. Students will receive a thorough grounding in the engineering sciences and hands-on, practical experience in real world problem solving and application of
theory to suit industry needs.

**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:

**MECHANICAL ENGINEERING Second Major and Minor Options**

**Second Major:**

- Automotive Engineering
- Engineering Management
- Heavy Mechanical Engineering

**Minors:**

- BEE Applications Minor
- A minor from anywhere in QUT that is outside of the course.

**Special Course Requirements**

A candidate for the degree of Bachelor of Engineering (Mechanical) must complete at least 60 days of industrial experience/practice 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

**Deferment**

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

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

Find out more on deferment.

**Full-time Course structure – 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)**

- 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)**

- ENB205 Electrical and Computer Engineering
- ENB215 Fundamentals of Mechanical Design
- ENB221 Fluid Mechanics
- ENB331 Materials and Manufacturing 2

**Please note:**

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

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

- ENB222 Thermodynamics 1
- ENB311 Stress Analysis
- ENB312 Dynamics of Machinery
- ENB316 Design of Machine Elements

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

- ENB313 Automatic Control
- ENB317 Design and Maintenance of Machinery
- ENB321 Fluids Dynamics
- MAB233 Engineering Mathematics 3
- OR
- Selective

**Year 4 - Semester 1 (to be introduced in 2013)**
BEB801  Project 1  
ENB421  Thermodynamics 2  
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

Mechanical Engineering Selectives
ENB314  Industrial Noise and Vibration  
ENB333  Operations Management  
ENB336  Industrial Engineering  
ENB422  Energy Management  
ENB423  Heating, Ventilation and Air-Conditioning  
ENB432  Engineering Asset Management and Maintenance  
ENB433  Plant and Process Design  
ENB434  Tribology  
ENB435  Computer Integrated Manufacturing

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  
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  
ENB205  Electrical and Computer Engineering  
ENB221  Fluid Mechanics

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

Year 3 - Semester 1 (to be introduced in 2012)
ENB222  Thermodynamics 1  
ENB231  Materials and Manufacturing 1  
ENB311  Stress Analysis  
MAB233  Engineering Mathematics 3  
OR  
Selective

Year 3 - Semester 2 (to be introduced in 2012)
ENB215  Fundamentals of Mechanical Design  
ENB321  Fluids Dynamics  
ENB331  Materials and Manufacturing 2  
Second Major/Minor unit

Year 4 - Semester 1 (to be introduced in 2013)
ENB312  Dynamics of Machinery  
ENB316  Design of Machine Elements  
ENB421  Thermodynamics 2  

Year 4 - Semester 2 (to be introduced in 2013)
BEB801  Project 1  
ENB313  Automatic Control  
ENB317  Design and Maintenance of Machinery  
Second Major/Minor unit

Year 5 - Semester 1 (to be introduced in 2014)
BEB701  Work Integrated Learning 1  
BEB802  Project 2  
Second Major/Minor unit  
Second Major/Minor unit

Mechanical Engineering Selectives
ENB314  Industrial Noise and Vibration  
ENB333  Operations Management  
ENB336  Industrial Engineering  
ENB422  Energy Management  
ENB423  Heating, Ventilation and Air-Conditioning  
ENB432  Engineering Asset Management and Maintenance  
ENB433  Plant and Process Design  
ENB434  Tribology  
ENB435  Computer Integrated Manufacturing
Potential Careers:
Engineer, Mechanical Engineer.

UNIT SYNOPSES

ENB150 INTRODUCING ENGINEERING DESIGN
Assumed knowledge: ENB110 is assumed knowledge.
Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-2

ENB200 INTRODUCING SUSTAINABILITY
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

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

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: 2010 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

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...
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

**ENB314 INDUSTRIAL NOISE AND VIBRATION**  
The unit is about the study of noise and vibration measurement and control which is experienced in industry. It includes a basic understanding of the theories and capable of modelling and predicting noise and vibration in an industrial environment. This unit will provide you with sufficient experience in instrumentation and measurement of noise and vibration and to apply them in industry.

**Prerequisites:** ENB312  
**Assumed knowledge:** MAB127 or MAB132 or MAB182 are assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point

**ENB316 DESIGN OF MACHINE ELEMENTS**  
Analysis of operating conditions and their impact on design solutions, design of fasteners, shafts and other mechanical components, design of springs, Design for manufacturability, fundamentals of lubrication, computer aided design (solid modelling), frames and housings.

**Prerequisites:** ENB215  
**Equivalents:** MMB381  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point

**ENB317 DESIGN AND MAINTENANCE OF MACHINERY**  
Design of equipment for special applications such as pressure vessel, food processing, Design of machine system, Optimisation of design, machinery failure, prediction, analysis and prevention. Design for reliability application of FMEA, Condition monitoring, ethics, Fundamentals of friction, wear related to design, Failure analysis & OH&S.

**Prerequisites:** ENB316  
**Equivalents:** MMB382  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point

**ENB321 FLUIDS DYNAMICS**  
Hydraulic and pneumatic systems; design, analysis and performance of pumps, turbines and fluid couplings; unsteady pipe flow; flow around solid bodies, including potential flow and boundary layers; compressible flow and shock waves.

**Prerequisites:** ENB201 or ENB221  
**Equivalents:**
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: 2010 SEM-1

ENB333 OPERATIONS MANAGEMENT
This unit develops students’ ability in applying quantitative techniques in solving different types of industrial operations 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: 2010 SEM-1

ENB336 INDUSTRIAL ENGINEERING
Aim of this unit is to develop skills and understanding the concepts and techniques of lean manufacturing (methods engineering). These includes identifying wastes using Value Stream Mapping (VSM), SS, SMED, JIT, plant layout, cell design with proper material handling and balance and job design with due consideration to ergonomics.
Assumed knowledge: MAB233 is assumed knowledge.
Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-2

ENB421 THERMODYNAMICS 2
Applications of heat transfer theory in steam power plant, refrigeration and gas turbines; steady state and transient conduction; convection with internal or external flow; free convection in stationary fluids; boiling and condensation; thermal resistance networks; heat exchangers; radiation heat transfer.
Prerequisites: ENB222 and ENB321 Equivalents: MMB351 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

ENB422 ENERGY MANAGEMENT
Topics covered in this unit include: Global energy and climate issues, the systematic process by which energy use is monitored and analysed; individual treatment of electricity, fuels and their properties, compressed air, buildings, cycle requirements, energy recovery equipment; financial analysis of proposals. Environmental aspects will be considered for each topic.
Assumed knowledge: ENB201 or ENB221 and ENB222 are assumed knowledge. Equivalents: MMB451 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

ENB423 HEATING, VENTILATION AND AIR-CONDITIONING
Heating, Ventilation and Air Conditioning (HVAC) is closely related to human habitation, comfort and productivity. It also consumes considerable amount of energy. With increasing global warming, it is becoming one of the most important engineering systems in modern buildings.

This unit will introduce you basic principles of HVAC and refrigeration systems. It will discuss the design factors and practices related to the design and operation of HVAC systems. It will also provide you with other relevant knowledge commonly used in the building services industry. This course should therefore provide you a good basis to undertake further study, research and professional work in this field.
Prerequisites: ENB201 or ENB221 or ENB222 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

ENB432 ENGINEERING ASSET MANAGEMENT AND MAINTENANCE
This unit includes the following: engineering asset management policy statement; overhaul and replacement of engineering assets; organisation for maintenance; maintenance planning and control; failure mode and effect analysis; reliability, maintainability and availability analysis; risk assessment; spare parts inventory management.
Assumed knowledge: MAB233 is assumed knowledge.
Equivalents: MMB470 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

ENB433 PLANT AND PROCESS DESIGN
The unit is of great assistance to graduates who will work in one of the many industry where Mechanical Engineers are concerned with Plant and Process Design. These industries use heat exchangers, piping systems and cooling towers intensively. This would include power stations, mineral processing, sugar/processing and refinery/chemical industries. The unit is taught by university and industry specialists who have considerable experience in their chosen field.
Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-2
ENB434 TRIBOLOGY
Tribology is the study of friction, wear and lubrication. In this unit, the knowledge you acquire is applied to solve problems prevalent in engineering. Topics covered range from the theory of friction, lubricant properties and chemistry, to the control of friction and wear by proper selection of both materials and lubricants.

Prerequisites: ENB201 or ENB221
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2010 SEM-2

ENB435 COMPUTER INTEGRATED MANUFACTURING
Topics covered in this unit include: introduction of the concepts of strategic planning for computer integrated manufacturing; concepts of advanced manufacturing technologies and the various components of computer integrated manufacturing system; the importance of concurrent engineering in the context of CIM; introduction to the principles of modelling and simulation techniques as a design and evaluation tool for manufacturing systems.

Assumed knowledge: ENB231 and MAB233 are assumed knowledge.
Equivalents: MMB471
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2010 SEM-1

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

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