Bachelor of Engineering (Honours) Mechatronics

Applied Electronics (ENGD 2001)

The Applied Electronics module provides an insight into some practical applications of electronics. It takes a number of electronic and electrical systems and breaks them into constituent parts. In doing this, emphasis is placed on system analysis and therefore provides an approach to studying electronic and electrical engineering that is complementary to the design led modules. Practical examples will be presented in order to develop the skills of analysis, examples may come inter alia from the broadcast, automotive RF (radio frequencies) and biomedical fields. Students will be then able to apply these skills to case studies in order to analyse a given system and break it down to fundamental circuit blocks which are governed by the fundamental principles and laws already covered in the analogue and digital modules.

Embedded Systems (ENGD 2003)

The module covers the use of microprocessor-based systems to control home appliances or industrial equipment that may or may not include electrical motors in their structure. The issues discussed in this module include description of embedded systems, basic aspects of C programming for embedded systems, interrupts, shared-data problems, the use of sub-routines/co-routines/semaphores and real-time operating systems (RTOS). Basic aspects of control systems are also discussed, including the use of artificial intelligence techniques. Main types of electrical motors, their associated power converters, control strategies and the role of electrical motors in typical equipment and appliances are presented.

Electromagnetics (ENGD 2009)

Electromagnetics is one of the fundamental topics uniting electronics with physics and mathematics. Without a knowledge of electromagnetics, devices ranging from high frequency integrated circuits and antennas to electric motors cannot be properly understood and therefore efficiently designed. This module develops an understanding of theory, numerical modelling and experimental practices relevant to this most central of electronics disciplines. The theoretical aspects of the course are mathematical, however, the delivery of the material will develop the mathematics simply as a 'short-hand' way of describing physical phenomena. Many practical examples will be given throughout the delivery.

Project Management (ENGD 2010)

Projects require planning to meet often stringent budget limitations and competitive delivery dates. Therefore, all projects need to be planned, scheduled, costed and completed within given projections. They require also the management of stakeholder expectations, which include an agreed level of quality and an accepted level of risk. Project management is the control of this disparate and often multidisciplinary subject. The project management module presents some of the background, theory and practice to enable students to appreciate the importance and practice of professional project management in their professional and academic development.

Advanced Engineering Mathematics (ENGD 2014)

This module acts as an advanced modern engineering mathematics course for engineering students. The module teaches the key aspects of transform theory and vector calculus. It provides an accessible introduction to advanced modern engineering mathematics with an emphasis on the skill of problem solving. This module is primarily aimed at students studying in the fields of electronic, and communications.

Theory of Machines and Thermodynamics (ENGD 2005)

The module provides two important components of engineering science, i.e. theory of machines and fundamental principles of thermodynamics. The first part further develops understanding and practical skills in kinematical and dynamical analysis of basic mechanisms. Different types of mechanical transmission systems such as four bar linkage, slider crank, fixed axis and epicyclical gear trains, belt systems and clutches are used as illustrative case studies.
The second part of the module delivers fundamental thermodynamic principles starting with the definition of thermodynamics systems and the first law of thermodynamics and its applications. A range of reversible and irreversible processes and the use and application of steam and other fluid tables are also covered. The module also covers the second law of thermodynamics and its applications and thermodynamic cycles such as Carnot cycle and refrigeration and heat pump cycles.

Individual Project (ENGD 3000)
The 'individual project module' will allow students to engage in a substantial piece of individual research and or product development work focused on a topic relevant to their specific discipline. The topic may be drawn from a variety of sources including; their placement experience, research groups, the company in which they are employed or a subject of personal interest (provide a suitable supervision is available). The chosen topic has to provide a suitable challenge to the student.
The chosen topic will require the student to formulate problems, conduct literature reviews, determine solutions, evaluate information, develop hardware & software as appropriate, process data, critically appraise and present their finding using a variety of media. To help prepare students for this, seminars will run at the start of the course, including an important session run by the Kimberlin Library which will build on the research and reporting skills developed in the earlier years of the student's program of study, to provide them with a more advanced tool-kit for information searching.

Power Electronics and Generation (ENGD 3025)
This module introduces and gives the student an understanding of the field of Power Electronics from basic switching power supply principles to modern vector-controlled motor drives. Renewable energy power conversion is also covered. The module reflects the very wide knowledge base associated with the field of power electronics drawing on knowledge of power semiconductors, control, signal processing, DSP and embedded systems. Synchronous machine generation is also covered providing a basic insight into conventional electromagnetic AC power generation.
The module will be delivered using formal lectures and tutorials, with the students working on laboratory experiments which form the basis for the coursework component of the assessment.

System Integration (ENGD 3037)
The objective of this module is to provide level 6 students studying an engineering degree with an insight and understanding into the approach and philosophy of mechatronics. Furthermore the module demonstrates the essential features of mechatronics and its application in realising innovative modern engineering design.
The role of mechatronics and its relevance to modern engineering will feature in terms of product design, machine design, and process design. 'Systems' approach to engineering design via a number of case studies will be covered as part of the module

Dynamics and Control (ENGD 3038)

The module builds on the material developed in the engineering sciences in earlier modules of the course. In particular, it further develops understanding of the fundamentals of vibrations and rigid body dynamics and their application to the analysis and solution of problems in engineering and engineering design. The control part will focus on applying control principles to mechanical systems. This will cover theoretical aspects and practical implementation using computer control and PLC control. The module will also consider basic mechanical sensors and actuators. Delivery of the taught material is illustrated with case study examples and applications where appropriate.

The material is delivered via a structured programme of lectures, tutorials and practical laboratory exercises. Practice exercises are provided for self-directed study which is supported in tutorial sessions. The laboratory exercises are practical investigations aimed at supporting and reinforcing the understanding of principles and concepts as well as developing measurement, experimental and reporting skills. The module is assessed by an end examination together with a coursework component consisting of written laboratory reports and an assignment.