ENGR C1607: Engineering Science

Module Title:	Engineering Science
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	(a) Lectures: A series of lectures, using touchscreen and video, will initiate and broaden the students' knowledge of the scientific principles on which electronics is based. (b) Projects: A series of mini-projects designed to motivate the students and increase the level of interest in learning the scientific principles.

Module Aim:	To give the students an understanding of the scientific principles underlying engineering systems and components.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Distinguish basic electrical units such as charge, current, voltage, resistance, power and energy.
LO2	Discuss the basic concepts of force, motion, heat, sound, light, magnetism and electricity.
LO3	Perform algebraic manipulations and substitutions of physical formulae to solve problems using appropriate units.
LO4	Solve work, energy, power and friction problems involving simple physical laws.
LO5	Measure and record experimental data and make appropriate analyses using graphs and/or calculations.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

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Module Content & Assessment

Indicative Content
Units State the seven base S.I. Units. Calculate S.I. derived units and unit conversions.
Atomic Structure Describe the simple model of the structure of the atom. Explain the different states of matter. Distinguish between electrical conductors, insulators and semiconductors.
Electrical and Electronic Concepts Explain the nature and cause of static electricity. Relate charge and current. Define potential difference. Use Coulomb's Law to calculate the force between two charges. Describe electric field patterns. Define electric field strength. Describe the concept of capacitance. Distinguish between pure and doped semiconductors. Describe the operation of the p-n junction. Compare energy storage devices such as batteries and supercapacitors.
Force and Motion Define a force. Distinguish between linear and angular forces. Describe Newton's laws of motion. Differentiate between mass, weight and pressure. Define momentum. Describe the principle of conservation of momentum. Resolve a force into orthogonal components. Define harmonic motion. Describe the link between torque and circular motion. Discuss the mechanical concepts used in robots. Describe friction and inertia.
Heat Describe conduction, convection and radiation. Relate heat and temperature. Explain the operation of a thermocouple and resistance thermometer. Describe thermoelectric effects in materials.
Sound Describe the different types of waves and their uses. Explain amplitude, wavelength, frequency, velocity, periodic time and phase. Describe the nature of sound waves. State the frequency range of audible sound. Describe the main properties of sound including absorption and reflection. Describe applications of ultrasonic waves.
Magnetic Concepts Describe a magnetic field. Distinguish between a permanent magnet and electromagnet. Use Faraday's Law to relate change of flux to induced voltage. Describe Lenz's Law. Compare electric motor types and applications.
Light Describe light reflection, refraction and absorption. Describe applications of opto-electronics such as phototransistors, LCD, fibre optic cables.
Energy & Power Describe different forms of energy and energy transformation. Calculate kinetic and potential energy. Describe the principle of conservation of energy. Define power. Calculate the power consumption of various electronic devices.

Assessment Breakdown	%
Continuous Assessment	20.00%
Project	20.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Other	A number of continuous assessments, for which a maximum mark of 20% will be awarded, will be evenly spaced throughout the semester to allow timely feedback to be provided.	1,2,3,4	20.00	n/a

Project

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Project	Practical sessions will be held incorporating demonstrations and individual exercises for each student. The student will be expected to write a report for each demonstration / exercise. Some of these reports may be research–based only.	2,3,4,5	20.00	n/a

No Practical

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	Each student will sit a formal written examination at the end of the module for which a maximum of 60% will be awarded.	1,2,3,4	60.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Every Week	3.00
Practicals	Every Week	1.00
Independent Learning	Every Week	2.00
	Total Hours	6.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EESYS_B	Bachelor of Engineering (Honours) in Electronic Engineering	1	Mandatory