

Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: Physics for Engineers 2

Unit ID: ENGRG1004

Credit Points: 15.00

Prerequisite(s): Nil

Co-requisite(s): Nil

Exclusion(s): (ENGIN1002 and ENGIN1003)

ASCED: 039999

Description of the Unit:

For all engineering disciplines, a fundamental understanding of not only materials and material structure, but also electricity, electronics, and electromagnetism is the core of being able to effectively find solutions to the challenges that are faced by the world. This unit will introduce you to the basic properties of the most commonly used materials in engineering, the principles of electric fields, electronics components, and electromagnetism in power generation and transmission. The unit will help students develop a comprehensive understanding of these three main topics and how the principles are applied. The key understanding of material properties will help engineers carry out engineering projects by performing material tests to determine the strength of materials and undertake a material selection process. The understanding of electricity, electronic, and electromagnetic will enable the incorporation of electrical drive and control and power generation to be integrated into the multidisciplinary engineering environment.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes:

Knowledge:

- K1.** Identify and explain how material properties and behaviour are dependent on crystallinity, microstructure, and phase composition and how material processing can control these.
- K2.** Outline the interface between the design process, materials selection and manufacturing.
- K3.** Explain the techniques for the analysis of electrical and electronic systems, and and electromagnetic systems.
- K4.** Recognise the laws governing the behaviour of electrical and electronic systems.

Skills:

- S1.** Demonstrate problem solving in a clear, logical and concise way.
- S2.** Perform tensile testing in accordance with AS standards to determine key material properties.
- S3.** Develop appropriate mathematical models for the analysis of electrical and electronic systems.

Application of knowledge and skills:

- A1.** Apply the material selection process to choose materials for a given application using the merit index or decision matrix method.
- A2.** Analyse material properties.
- A3.** Analyse simple electrical and electronic systems.
- A4.** Apply mechanics principles in the analysis of experimental outcomes and in simple design situations.

Unit Content:

Topics may include:

- Material Properties, including atomic number, atomic mass, stoichiometry, crystal structure, mass and density.
- Introduction to stress and strain and their measurement, modulus of elasticity, ductility, brittleness and hardness, electrical and magnetic properties, fracture, fatigue and creep, corrosion mechanisms.
- Electric charge and field.
- Conductors and insulators.
- Electric potential.
- Capacitance, resistance, electric circuits.
- Power generation and transmission.
- Magnetic field.
- Maxwell's equations.
- Electromagnetic waves.

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
S1-S3, A1-A4	Experimental work and / or projects to verify students ability to apply knowledge and skills acquired in the unit.	Reports, demonstrations, presentations	10% - 30%
K1-K4, S1-S3	Relevant tasks and problems to enforce understanding of the students and help in gradual development of knowledge and skills throughout the unit.	Assignments, quizzes	10% - 30%
K1-K4, S1-S3	Questions and problems related to the materials covered in the unit.	Tests	40% - 60%

Adopted Reference Style:

IEEE

Refer to the [library website](#) for more information

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