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## MODULE DESCRIPTOR

### Module Title

Engineering Materials

Reference	EN1703	Version	3
Created	April 2023	SCQF Level	SCQF 7
Approved	March 2021	SCQF Points	30
Amended	August 2023	ECTS Points	15

### Aims of Module

To provide the student with the fundamental principles of structures and properties of engineering materials as well as metal alloys.

### Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Describe the internal structure of atoms and molecules as well as the different types of crystals.
- 2 Identify the bonding and imperfections in solids and how these effect the properties of materials.
- 3 Summarise the important properties of engineering materials including mechanical, physical, electrical and thermal.
- 4 State the properties and heat treatment of alloy steel, cast iron and non-ferrous metals and alloys.
- 5 Define the mechanical properties of different materials.

### Indicative Module Content

The structure of metals: types of atomic bonds, crystal structure of metals, deformation and strength of single crystals, grain and grain boundaries, recovery and grain growth, cold, warm and hot working. Imperfections in solids: point defect, miscellaneous imperfections, microscopic examination. Material properties: mechanical (tensile strength, toughness, hardness and ductility), physical (density, melting point and specific heat), thermal conductivity and expansion, electrical properties and corrosion resistance. Introduction to engineering materials: metals and their alloys, ceramics, polymers and composites. Metal alloys: phase diagram, main types of ferrous and non-ferrous materials, heat treatment of ferrous and non-ferrous alloys, surface hardening techniques for steels used by industry with reference to engineering applications.

### Module Delivery

The module will be essentially student centred but will be supported by lecture, demonstration, industrial visits and video where these are felt to be appropriate. It will involve the student working to tackle problems relating to real mechanical engineering products. The student will be given set objectives and will in general be expected to follow prescribed procedures

**Indicative Student Workload**

	Full Time	Part Time
Contact Hours	80	N/A
Non-Contact Hours	220	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	300	N/A
<i>Actual Placement hours for professional, statutory or regulatory body</i>		

**ASSESSMENT PLAN**

If a major/minor model is used and box is ticked, % weightings below are indicative only.

**Component 1**

Type: Coursework Weighting: 100% Outcomes Assessed: 1, 2, 3, 4, 5  
 Description: A portfolio of lab activities covering material and mechanical properties of engineering materials.

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

To Pass the module a minimum of D Grade is required.

Module Grade	Minimum Requirements to achieve Module Grade:
<b>A</b>	A
<b>B</b>	B
<b>C</b>	C
<b>D</b>	D
<b>E</b>	E
<b>F</b>	F
<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination

**Module Requirements**

Prerequisites for Module	None.
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

- 1 CALLISTER W.D., RETHWISCH, D. G., 2014. Materials Science and Engineering. 9th Edition SI Version, New York: Wiley
- 2 KALPAKJIAN, S. and SCMID, S., 2014. Manufacturing engineering & technology. 7th ed. Harlow: Pearson.
- 3 GROOVER, M.P., 2016. Principles of modern manufacturing. Global Edition SI Version, New York: Wiley.