

MODULE DESCRIPTOR

Module Title

Materials and Corrosion Science

Reference	ENM233	Version	7
Created	December 2022	SCQF Level	SCQF 11
Approved	April 2006	SCQF Points	15
Amended	July 2023	ECTS Points	7.5

Aims of Module

To develop an understanding of the properties of materials used within the energy sector, oil and gas industries and renewables, their uses, limitations and design constraints. To develop an understanding of corrosion science and mechanisms, with particular reference to energy production.

Learning Outcomes for Module

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

- 1 Critically evaluate the properties, design constraints and limitations of the principal materials used within energy production.
- 2 Analyse the properties and characteristics of steels, its phases and its principal alloys.
- 3 Make informed judgements on the principal corrosion mechanisms relevant to energy production equipment and processes.
- 4 Appraise corrosion prevention and control strategies.

Indicative Module Content

Properties of materials. Metals and Alloys. Ceramics, polymers and composites. Structure of materials, characterisation and classification of materials. Fundamentals of structures. Steel composition and properties. Phase diagrams. Treatment processes. Alloy compositions. Corrosion principles and mechanisms. Corrosion management. Prevention and mitigation. Cathodic protection. Environmental effects. SSC, SCC. Corrosion control ? by design and management. Material selection, surfactants and inhibitors, coatings. Pourbaix and Evans diagrams. Failure Analysis. Fatigue life prediction. Safe life and fail safe design.

Module Delivery

This module will have blended learning including lecture and tutorials, with case study work, private study and discussion. The module is available as part-time online learning with online tutor support.

Indicative Student Workload	Full Time	Part Time
Contact Hours	35	35
Non-Contact Hours	115	115
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
<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: Examination Weighting: 100% Outcomes Assessed: 1, 2, 3, 4
 Description: A closed book exam worth 100% of the module

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

Component 1 comprises 100% of the module grade. To pass the module, a D grade is required.

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

Module Requirements

Prerequisites for Module	Normally a UK 2.2 honours degree or above, in Engineering or a related discipline. Proficiency in English language for academic purposes, or IELTS score of 6.5 or above.
Corequisites for module	None.
Precluded Modules	This module is not suitable for students following an MSc in Professional Studies programme unless they meet the entry qualifications stipulated in the University Regulations on admission and the prerequisites above.

INDICATIVE BIBLIOGRAPHY

- CALLISTER, W., Rethwisch, David G. 2015. Materials Science and Engineering. Wiley
- FONTANA, M., 1986. Corrosion Engineering. 3rd ed. McGraw Hill.
- Ahmad, Zaki, 2006. Principles of Corrosion Engineering and Corrosion Control, 1st ed. Boston, MA : Butterworth-Heinemann. 2006
- Lazzari, Luciano, 2017. Engineering Tools for Corrosion: Design and Diagnosis San Diego: Elsevier Science