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MODULE DESCRIPTOR

Module Title

Materials and Corrosion Science

Reference	ENM233	Version	6
Created	August 2021	SCQF Level	SCQF 11
Approved	April 2006	SCQF Points	15
Amended	August 2021	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	Demonstrate a critical understanding of the properties, design constraints and limitations of the principal materials used within energy production.
2	Critically evaluate the properties and characteristics of steels, its phases and its principal alloys.
3	Apply critical analysis of the principal corrosion mechanisms relevant to energy production equipment and processes.
4	Critically evaluate 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 is a lecture and tutorial based full time course, with case study work, plus private study and discussion. The course is available an online learning module with online tutor support. A blend of distance learning and direct attendance is also possible.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	50	42
Non-Contact Hours	100	108
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

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

Component 1

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	4
Description:	A piece of coursework.				

Component 2

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2, 3
Description:	A closed book examination.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The module has 2 components and an overall grade D is required to pass the module. The component weighting is as follows: C1 is worth 50% and C2 is worth 50%. MEng students must pass each component with a minimum D grade to pass the module. The main grid applies to MSc students.

		Examination:						
		A	**B**	**C**	**D**	**E**	**F**	**NS**
Coursework:	**A**	A	A	B	B	C	E	
	B	A	B	B	C	C	E	
	C	B	B	C	C	D	E	
	D	B	C	C	D	D	E	
	E	C	C	D	D	E	E	
	F	E	E	E	E	E	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

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