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|--|-----------------------|
| <b>Module Title</b>                                  | Reference ENM233      |
| <b>Materials and Corrosion Science</b>               | SCQF SCQF             |
|  | Level 11              |
|  | SCQF Points 15        |
|  | ECTS Points 7.5       |
| <b>Keywords</b>                                      | Created November 2005 |
| Materials, properties, design limitations, corrosion | Approved April 2006   |
|  | Amended August 2014   |
|  | Version No. 3         |

## This Version is No Longer Current

The latest version of this module is available [here](#)

### 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.

Corrosion control ? by design and management, Material selection, surfactants and inhibitors, coatings.  
Porbaix and Evans diagrams

Failure Analysis. Fatigue life prediction.  
Safe life and fail safe design.

### Corequisite Modules

None.

### Indicative Student Workload

|                        | Full Time | Distance Learning | Blended Learning |
|------------------------|-----------|-------------------|------------------|
| <i>Contact Hours</i>   |           |                   |                  |
| Laboratories           | 5         | 0                 | 0                |
| Lectures               | 36        | 0                 | 36               |
| Tutorials and Seminars | 5         | 0                 | 4                |

### Precluded Modules

This module is not suitable for students following an MSc in Professional Studies programme unless they meet the entry qualifications stipulated in

#### *Directed Study*

|                        |    |    |    |
|------------------------|----|----|----|
| Coursework             | 20 | 25 | 20 |
| Preparation and Review | 44 | 80 | 40 |

#### *Private Study*

|          |    |    |    |
|----------|----|----|----|
| Revision | 40 | 45 | 50 |
|----------|----|----|----|

the University Regulations on admission and the prerequisites above.

### **Aims of Module**

To develop an understanding of the properties of materials used within the oil and gas industries, their uses, limitations and design constraints.

To develop an understanding of corrosion science and mechanisms, with particular reference to the oil and gas industry.

### **Learning Outcomes for Module**

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

1. Analyse and discuss the properties, design constraints and limitations of the principal materials used within the oil and gas industry.
2. Critically evaluate the properties and characteristics of steels, its phases and its principal alloys.
3. Appraise the principal corrosion mechanisms

### **Mode of Delivery**

This is a lecture and tutorial based full time course, with case study work, plus private study and discussion. The course is available as an online distance learning module with online tutor support. A blend of distance learning and direct attendance is also possible.

### **Assessment Plan**

|             | Learning Outcomes Assessed |
|-------------|----------------------------|
| Component 1 | 1,2,3,4                    |
| Component 2 | 1,2,3,4                    |

Component 2 is a closed book examination. (50%)

Learning outcomes covered in this module represent interrelated elements of the module topic. Coursework and examinations may emphasise some learning outcomes above others without totally divorcing one from the other and while retaining a balanced assessment in total.

Component 1 is a piece of coursework. (50%)

### **Indicative Bibliography**

1. CALLISTER, W., Rethwisch, David G. 2015. Materials Science and Engineering. Wiley

relevant to oil and gas industry equipments 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.

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