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## MODULE DESCRIPTOR

### Module Title

Wells

Reference	ENM201	Version	9
Created	March 2020	SCQF Level	SCQF 11
Approved	May 2006	SCQF Points	15
Amended	June 2020	ECTS Points	7.5

### Aims of Module

This module provides a broad understanding of the essential principles of Well Construction, specifically from a perspective of engineering integrity. It presents a systematic approach to improve the safe planning and the design of wells (in particular: Well performance evaluation and control, casing and cementing, borehole stability and fluid rheology among others). It provides a comprehensive introduction to the basic methods, concepts and technology used to deduce potential hole problems before producing a final well plan.

### Learning Outcomes for Module

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

- 1 Analyse and justify the functional and loading requirements of various tubular strings in order to make a complete design selection for a wide range of different well conditions.
- 2 Critically evaluate cement and drilling fluids functions and properties and perform calculations relating to drilling operations.
- 3 Develop and discuss a plan for a new well including information on the mitigation of problems whilst drilling through different formations and the other main critical elements required for a successful outcome.
- 4 Critically evaluate bit types and cutting mechanisms and perform calculations related to bit hydraulics.
- 5 Analyse and apply the concept of flow into the wellbore (Inflow Performance Relationship) and up the production tubing (Vertical Lift Performance) along with the function of the principal completion components from the reservoir interface to surface.

### Indicative Module Content

1. Introduction, History, People, Well Lifecycle, Rig Components. 2. Drilling Process & Design, Drilling Process, Casing String. 3. Well Control, Barriers, Pressures. 4. Fluids (Muds & Cements), Drilling Fluids, Cements & Cementing. 5. Drillstring & Ancillaries, BHA & Toolstring, Introduction to Rock Bits, Rock Stresses & Pressures, Cement Basics & Chemistry. 6. Corrosion, Material Properties & Specifications, Fundamentals of Corrosion, Types of Corrosion. 7. Completion Essentials, Completion Function, Operations & Design Process, Completion Architecture & Equipment Selection, Tubing Specification & Equipment Material Selection, Safety Systems and Life of Well Integrity Management, Perforation and Sand Control, Well production performance & nodal systems analysis, Well Inflow Performance and Skin, Multiphase Flow & Vertical Lift Performance, Artificial Lift Options.

### Module Delivery

This module may be delivered by means of lectures, tutorials and student-centred learning activities.

### Indicative Student Workload

	Full Time	Part Time
Contact Hours	53	40
Non-Contact Hours	97	110
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:	Coursework	Weighting:	50%	Outcomes Assessed:	3
Description:	Component 1 is a coursework which will involve the preparation of a short report.				

#### Component 2

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2, 4, 5
Description:	Component 2 is a closed book examination.				

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

In order to pass, students should achieve a mark of at least 40% in each component (which has a weighting of 30% or more) and an overall grade D or greater.

Module Grade	Minimum Requirements to achieve Module Grade:
<b>A</b>	Greater than or equal to 70%
<b>B</b>	In the range 60% to 69%
<b>C</b>	In the range 55% to 59%
<b>D</b>	In the range 50% to 54%
<b>E</b>	In the range 40% to 49%
<b>F</b>	Less than 40%
<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination

**Module Requirements**

Prerequisites for Module	Normally a 2.2 UK honours degree in Engineering or a related discipline, and proficiency in English language for academic purposes (or IELTS score of 6.5 or equivalent).
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.

**ADDITIONAL NOTES**

Part Time refers to Online Learning Part Time.

**INDICATIVE BIBLIOGRAPHY**

- 1 AADNOY, B.S., 2010. Modern well design. CRC Press
- 2 BOURGOYNE, A.T., MILLHEIM, K.K., CHENEVERT, M.E. and YOUNG, F.S., 1986. Applied drilling engineering. Richardson, Texas: Society of Petroleum Engineers.
- 3 CAENN, R., DARLEY, HCH., and GRAY, GR. 2017. Composition and Properties of Drilling and Completion Fluids. Elsevier, Gulf Professional Publishing.
- 4 GEFEI, L. 2021. Applied Well Cementing Engineering. Gulf Professional Publishing.
- 5 JONATHAN, B. 2009. Well completion design. Elsevier Science & Technology.
- 6 RABIA, H. 1985. Oilwell Drilling Engineering. Graham and Trotman.
- 7 ROBINSON, H. and GARCIA, J. 2015. Drillers knowledge book: creative solutions for today's drilling challenges. Houston, Texas: International Association of Drilling Contractors.
- 8 Journal articles, conference proceedings, and appropriate websites. Example OnePetro, Knovel, ASME.