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MODULE DESCRIPTOR

Module Title

Drilling Technology

Reference	ENM210	Version	7
Created	March 2019	SCQF Level	SCQF 11
Approved	April 2006	SCQF Points	15
Amended	May 2019	ECTS Points	7.5

Aims of Module

This module focuses on the Engineering practices of Well Construction. To be able to adapt these practices to a range of well types, and encouraging a strategic approach to well planning.

Learning Outcomes for Module

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

1	Design a directional well, select appropriate kick-off points,build rates, required hole angles and bottom hole assemblies
2	Develop a casing and cement program with regard to production flow rates and basic design principles. Determine appropriate casing setting depths required to protect fresh-water sands, referencing pore pressure and fracture gradient plots in the light of regulatory requirements (e.g. fresh-water protection, zonal isolation etc.)
3	Explain 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
4	Appraise and discuss the principles and theory of survey programming; geodetics, positional uncertainty, tools and calculations. Create a valid survey programme to meet given design objectives
5	Create a coherent functional well design incorporating Well integrity, casing programme, completion and production requirements. Comprehensive functionality of such a design requires alignment with pre-requisite earlier module, Wells-ENM201

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Indicative Module Content

1. Stress Analysis / Torque & Drag Bi-axial and tri-axial stress analysis Piston, buckling, ballooning, temperature, compression & tension equations 2.Directional Drilling Positioning and Co-ordinate Systems Survey calculation methods Basic well planning Anticollision and advanced well planning Drilling tools BHA design 3.Casing and Tubing Design Mechanical Properties of Steel Yield Strengths Buoyancy effects Shoe depth determination Design Criteria Burst and collapse loads Connections and material grades Wellheads 4.Cementing Operations Composition Testing Slurry Properties Placement techniques 5.Bit Technology Bit Hydraulics Bit Types Bit Selection 6.Surveying Magnetic tools: theory and considerations Non-Magnetic tools: theory and considerations Measurements while Drilling Survey programming 7.Drillstring design Tool-joints and handling Operating limits Drillstring corrosion Inspection and classification 8.Well design process

Module Delivery

The module will be delivered by means of direct and online lectures, tutorials, self guided study and fieldwork.

Indicative Student Workload	Full Time	Part Time
Contact Hours	70	30
Non-Contact Hours	80	120
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:	40%	Outcomes Assessed:	5
Description:	Component 1 is a coursework based on a given case study.				

Component 2

Type:	Examination	Weighting:	60%	Outcomes Assessed:	1, 2, 3, 4
Description:	Component 2 is a closed book examination.				

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MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

In order to pass the module, students should achieve a mark of at least 40% in each component (which has a weighting of 30% or more) and an overall grade of D or greater. Non Submission for any assessment component will result in an overall grade of NS for the module. Note: For a module with a single assessment component the Overall Mark in percent is percentage mark for that component. For a module with multiple assessment components the Weighted Overall Mark in percent is the weighted sum of the percentage marks for each component, the weightings being described in the Module Descriptor. If a candidate attains a mark of less than 40% in any component (which has a weighting of 30% or more) the candidate is deemed to have failed that component. If a candidate attains an E, F or NS Overall Grade, the candidate is deemed to have failed the module.

Module Grade	Minimum Requirements to achieve Module Grade:
A	Greater than or equal to 70%
B	In the range 60% to 69%
C	In the range 55% to 59%
D	In the range 50% to 54%
E	In the range 40% to 49%
F	Less than 40%
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. Qualification through previous relevant industry experience may be considered. ENM201 Wells
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	ISLAM, M. RAFIQUL and HOSSAIN, M. ENAMUL. 2020. Drilling Engineering: Towards Achieving Total Sustainability. San Diego: Elsevier Science & Technology.
2	JAMIESON, A. 2012. Introduction to Wellbore Positioning. University of Highland and Islands Research Office
3	AADNOY, B.S. 2010. Modern Well Design. 2nd Edition. CRC Press
4	GEFEI, L. 2021. Applied Well Cementing Engineering. Gulf Professional Publishing.
5	BOURGOYNE et al. 1984. Applied Drilling Engineering. SPE Publications
6	ROBINSON, H. and GARCIA, J. 2015. Drillers knowledge book: creative solutions for today's drilling challenges. Houston, Texas: International Association of Drilling Contractors.
7	RABIA, H. 1985. Oilwell Drilling Engineering. Graham & Trotman
8	Journal articles, conference proceedings, and appropriate websites. Example OnePetro, Knovel, ASME.