MODULE DESCRIPTOR

Module Title

Drilling Technology

Reference	ENM210	Version	10
Created	May 2022	SCQF Level	SCQF 11
Approved	April 2006	SCQF Points	15
Amended	August 2022	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 conditions covering CO2 injectors, encouraging a strategic approach to well planning, and increase the safety of drilling operations.

Learning Outcomes for Module

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

1	Design a directional well, selecting appropriate kick-off points, build rates, required hole angles, and bottom hole assemblies.
2	Develop a detailed casing and cement programme based on casing setting depths with reference to pore pressure and fracture gradient.
3	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.
4	Critically appraise and discuss the principles and theory of survey programming; geodetics, positional uncertainty, tools and calculations in order to develop a survey programme to efficiently fulfil given design objectives.
5	Critically evaluate bit types and cutting mechanisms and perform calculations related to bit hydraulics.

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 corrosion Inspection and classification 8.Well design process

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Module Delivery

The module will be delivered by means of face to face and hybrid (full-time) and part-time (online learning part-time) lectures, tutorials, student-centred learning activities, and self-guided study. Emphasis is placed on an integrative approach to communication, engagement and learning, with student involvement fostered through discussion and group work.

Indicative Student Workload	Full Time	Part Time
Contact Hours	43	25
Non-Contact Hours	107	125
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:	Examination	Weighting:	100%	Outcomes Assessed:	1, 2, 3, 4, 5
Description:	Closed book examination.				

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. Qualification through previous relevant industry experience may be considered.
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.

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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.