

MODULE DESCRIPTOR

Module Title

Drilling Technology

Reference	ENM210	Version	9
Created	August 2021	SCQF Level	SCQF 11
Approved	April 2006	SCQF Points	15
Amended	August 2021	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 Comprehensively design a directional well, demonstrate critical understanding of appropriate kick-off points, build rates, required hole angles and bottom hole assemblies.
- 2 Develop a detailed casing and cement program based on extensive understanding of appropriate casing setting depths, referencing pore pressure and fracture gradient.
- 3 Analyse and justify the functional and loading requirements of various tubular strings in order to make a complete practical design for a wide range of different well conditions.
- 4 Critically appraise and demonstrate understanding of the principles and theory of survey programming; geodetics, positional uncertainty, tools and calculations in order to develop a comprehensive survey programme to efficiently fulfil given design objectives.
- 5 Analytically design a coherent functional well incorporating Well integrity efficiency, casing programme optimization, completion and production requirements.

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
<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: Examination Weighting: 40% Outcomes Assessed: 5
 Description: Report.

Component 2

Type: Examination Weighting: 60% Outcomes Assessed: 1, 2, 3, 4
 Description: 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 40% and C2 is worth 60%.

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

ADDITIONAL NOTES

Part Time refers to Online Learning Part Time.

INDICATIVE BIBLIOGRAPHY

- 1 ISLAM, M. RAFIQU L 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.