

Drilling

SCE-2-321

Faculty of Engineering, Science & the
Built Environment

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1. UNIT DETAILS

Unit Title:	Drilling
Unit Level:	2 year
Unit Reference Number:	SCE-2-321
Credit Value:	15
Student Study Hours:	150
Contact Hours:	48
Private Study Hours:	102
Pre-requisite Learning (If applicable):	Fundamentals of Petroleum Engineering
Co-requisite Units (If applicable):	None
Course(s):	Petroleum Engineering
Year and Semester	Second Year, Semester 1
Unit Coordinator:	Dr Pedro Diaz
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Teaching Team & Contact Details (If applicable):	Dr Pedro Diaz, 020 78157953, diazp2@lsbu.ac.uk, E-238 Professor P. Nolan, 02078157901, E-236 Dr Ali Qubian, 020 78157948, qubiana@lsbu.ac.uk, E-242
Subject Area:	Applied Chemical Sciences
Summary of Assessment Method:	Coursework (30%): 3 laboratory reports and 2 safety assignments Examination (70%): 2 hours

2. SHORT DESCRIPTION

This unit is intended to equip level 2 students with an understanding of the scientific principles underlying the production and processing of petroleum and petroleum products. These principles include chemistry, safety in production and processing, fundamentals of drilling and evaluation of formation. The unit will establish a basic knowledge in these scientific principles to prepare for a career in petroleum engineering, and may be studied in greater details at a postgraduate level.

3. AIMS OF THE UNIT

- To develop an understanding of the scientific principles underlying the production, drilling and processing of petroleum
- To provide students with an awareness of the safety

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

By the end of the unit, you should be able to:

- Understand and explain fundamental principles and mechanisms of drilling
- Explain the techniques of evaluating different petroleum formations
- Employ appropriate measurement methods to assess volume and relative production of hydrocarbon reserves
- Understand and explain concepts of porosity, permeability, wettability, and capillary pressure. Understand how these parameters may affect the oil production
- To identify some interaction between fluid and rock and the effect on the oil production
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- Recognise and explain the hazards present in petroleum production, drilling and processing; and undertake simple hazard operability and hazard analysis studies on a process plant
- Identify and describe environmentally hazardous wastes in oil and gas production, and recommend methods of handling and disposal of these wastes
- Employ established codes of practice and regulations designed to ensure safe operation of plant and safety of environment

4.2 Intellectual Skills

Work with concepts in Engineering and their defining equations.
Use mathematics and science to support the analysis of engineering problems

4.3 Practical Skills

Carry out practical tasks given equipment and instructions, recording data neatly and following up with calculations, graphs, discussion and conclusions.

Time and work organisation

Manipulate, sort and present data, identifying possible errors and inconsistencies.

4.4 Transferable Skills

General:

- Work effectively in a team to achieve an objective, with due respect and recognition to contribution from other members of the team
- Self management, time management and organisation

Engineering:

- Analyse and interpret experimental data and communicate same in an understandable form
- Use information technology in research, analysis and presentation
- Demonstrate problem solving skills, analytical skills and scientific reasoning

5. ASSESSMENT OF THE UNIT

Coursework (30%): 3 laboratory reports and 2 safety assignments.

- The student must prepare three separate laboratory reports, marked for the attention of Dr A. Qubian, and handed in to the Faculty Office T313, no later than 4 pm on Tuesday 15 January 2007

Examination (70%): 2 hours exam paper (50%) + 4 assessments in class (20%)

6. FEEDBACK

Feedback will normally be given to students 15 working days after the submission of an assignment.

7. INTRODUCTION TO STUDYING THE UNIT

7.1 Overview of the Main Content

- Drilling. Fundamental principles of drilling. Introduction to drilling fluids. Drilling Practices
- Formation Evaluation. Measurement techniques. Techniques of log interpretation
- Safety in petroleum production. Hazard identification and remedial actions. Hazard evaluation and assessment techniques. Codes of practice and regulations

7.2 Overview of Types of Classes

Lectures (3 hours/week)

Workshops (3 hours Weeks 10-12)

7.3 Importance of Student Self-Managed Learning Time

There are three workshops where the students will perform experiments related to the topics covered in the lectures. Three laboratory reports have to be prepared and handed on time for their assessment. It is important the students make a good use of the time in the laboratory in order to perform the experiments and collect the relevant results efficiently. It is advisable that the student work on the corresponding report during the same week the workshop takes place, in order to avoid their accumulation, ensuring their handing in on time.

7.4 Employability

Study of the unit should develop the student ability to acquire new theoretical knowledge and to put it into practice in some experiments. The experimental part aims to develop the student abilities in the use of the scientific method.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

The programme of classes below is intended only as a guide and is subject to modification according to rate of progress and unforeseen factors.

Week	Begins Monday	Content
1	24-Sep	Introduction to petrophysics. Porosity, Permeability
2	01-Oct	Introduction to petrophysics. Wettability, Capillary Pressure
3	08-Oct	Fundamental principles of drilling.
4	15-Oct	Drilling Fluids Systems. Composition
5	22-Oct	Drilling Fluids Systems. Separation
6	29-Oct	Drilling Practices
7	05-Nov	Formation Evaluation. Measurement Techniques
8	13-Nov	Techniques of Log Interpretation
9	19-Nov	Techniques of Log Interpretation
10	26-Nov	Workshop: Logging
11	03-Dec	Workshop: Porosity
12	10-Dec	Workshop: Drilling fluids
13	07-Jan-08	Laboratory Reports
14	14-Jan-08	Hand in course work
15	21-Jan-08	End of Semester Examination

9. LEARNING RESOURCES

9.1 Core Materials

- Bourgrove jr., A.T and Millehim, K.K.(2005) *Applied Drilling Engineering. SPE Textbook Series, Vol 2.ISBN 1-55563-001-4*
- Tiab D, and Donaldson E. (2005) *Petrophysics. Gulf Publishing Company. Texas.*

- Lyons, William C. and Plisga, Gary J. (2005)_Standard handbook of petroleum & natural

- gas engineering. Oxford : Gulf Professional ISBN 0750677856
- Jahn F, Cook M & Graham M. (2006) Hydrocarbon Exploration and Production. Elsevier ISBN: 0-4444-82921-0
 - Darling T. (2005) Well logging and Formation Evaluation. Gulf Drilling Guides. Elsevier. ISBN: 0-7506-7883-6
 - ASME Shale Shaker Committee (2005) Drilling Fluids Processing Handbook Gulf Professional. ISBN 0-7506-7775-9
 - B Skelton, (1997). *Process Safety Analysis: an Introduction*; IChemE.
 - T.A Kletz, (1983). *HAZOP and HAZAN*, I.Chem.E, 1983.

9.2 Optional Materials

- Kletz, T.A. (1983) *HAZOP and HAZAN*, IChemE
- Tuhtar, D. (1989) *Fire and Explosion Protection*, Ellis Horwood, Chichester, 1989
- Lees F. P. (1980) *Loss Prevention in the Process Industries*, Butterworths