INTRODUCTION TO RESERVOIR ENGINEERING

INSTITUTE FOR PROFESSIONAL AND EXECUTIVE DEVELOPMENT

United Kingdom

UNIT SPECIFICATION

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Unit Title

Introduction to Reservoir Engineering

Credit value

The credit value for this unit is 30 30 credits equivalent to 300 hours of teaching and learning (10 hours is equivalent to 1 credit) Guided learning hours (GLH) = 50 hours GLH includes lectures, tutorials and supervised study. This may vary to suit the needs and requirements of the learner and/or the approved centre of study. Directed learning = 50 hours: This includes advance reading and preparation, group study, and undertaking research tasks. Self-managed learning = 200 hours: This includes completing assignments and working through the core and additional reading texts. It also includes personal research reading via other physical and/or electronic resources.

Learning outcome Learner will:	**Assessment criteria** Learner can:
1.0 Understand the various reservoir drives or reservoir energy	1.1 Examine the following characteristics of oil reservoirs drives: - Depletion drive or dissolved gas - Free gas cap expansion drive - Waterdrive - Mixed drive reservoirs 1.2 Describe the characteristics of the energy that drives production in a gas reservoir: - Expansion gas or volumetric drive - Waterdrive 1.3 Explain what is meant by Maximum Efficient Rate (MER) and examine its relevance
2.0 Understand the nature of hydrocarbon activity in the reservoir	2.1 Examine the major types of reservoir fluids (black oil, volatile oil, retrograde gas, wet gas and dry gas) 2.2 Explain the following: - Recovery factor - Shrinkage factor - Solution gas oil ratio - Saturated oil and undersaturated oil - Formation volume factor - Relative permeability of a fluid 2.3 Describe the following types of reserves - Proven reserves - Developed reserves - Undeveloped reserves - Unproven reserves

	2.4 Explore the methods used for estimating oil and gas reserves: - Volumetric method - Materials balance method - Decline curve analysis
3.0 Understand the nature of well and reservoir pressures	3.1 Differentiate between tubing pressure and casing pressure 3.2 Examine how bottom-hole pressure is measured 3.3 Explain what is meant by a downdraw and examine its relevance 3.4 Explain what is meant by virgin, initial or original pressure and examine its relevance
4.0 Understand the significance of well testing in petroleum production	4.1 Explain why tests are run on production wells 4.2 Examine the significance of the following tests: potential test, productivity test, pressure transient test, drawdown test, build up test, multirate test, back pressure test 4.3 Explain the following terms: deliverability, maximum potential flow or absolute open flow (AOF), production index (PI), inflow performance relationship (IPR)
5.0 Understand the nature and significance of production logs and maps	5.1 Evaluate the importance of production logs 5.1.1 Examine the purpose of the following production logs; tracer log, noise log, temperature log and collar log 5.2 Describe the functions of continuous flowmeter, packer flowmeter, nanometer, gradiometer and watercutmeter 5.3 Evaluate the significance of decline curves 5.3.1 Explain what is meant by:

	- Economic limit of a well - A stripper well 5.3.2 Analyse the decline curves for solution-gas reservoir, water-drive reservoir and free gas cap drive reservoir 5.3.3 Examine the use of the following production maps: - Well status maps - Cumulative production maps - Bubble maps
6.0 Understand the nature and significance of well stimulation	6.1 Examine the significance of well stimulation 6.2 Describe the following methods of well stimulation - Acidizing - Explosion fracturing - Hydraulic fracturing
7.0 Understand the disposal methods for oilfield brine and solution gas	7.1 Identify when natural gas produced with oil may be considered a disposal problem 7.2 Examine ways in which unwanted natural gas may be utilized where there is no market for it 7.3 Describe disposal methods for oilfield brine
8.0 Understand the problems that can be encountered during petroleum production	8.1 Examine the following problems and evaluate how they can be prevented or controlled: - Bypassing - Coning - Condensates separating in reservoir

	- Compaction and subsidence - Corrosion
9.0 Understand the nature and significance of primary production, improved oil recovery and ultimate oil recovery	9.1 Explain what is meant by primary production 9.1.1 Examine the factors affecting primary production 9.2 Explain what is meant by improved oil recovery 9.2.1 Give an account on the improved oil recovery techniques: - Waterflood (five-spot pattern, seven-spot pattern, inverted seven-spot pattern, line drive) - Enhanced oil recovery (miscible gas drive, chemical flood, thermal recovery) 9.3 Explain the meaning of sweep efficiency, displacement efficiency and mobility ratio

Recommended learning resources

Indicative reading	Hydrocarbon exploration and production by Graham et al (2008). ISBN: 978-0444532367 • For a full list of textbooks and publications relevant to this unit, please contact IPED - UK.
Learning Aid	A learning resource material is provided to guide the learner/tutor and to serve as a quick reference point for contents of the programme. The student is advised not to be over reliant on the study guide but to access the relevant textbooks or other academic materials as much as possible to help him/her with the course.