UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Petroleum Engineering
Module Code:	CPE6006-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Chemical Engineering
Subject Area:	Chemical and Process Engineering
FHEQ Level:	FHEQ Level 6
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	**Hours**
Lectures	48
Tutorials	12
Directed Study	140

Availability	
Occurrence	**Location / Period**
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims

1) To provide students with a detailed understanding of petroleum production processes.
2) To describe the origin of fossil fuels, the location and capacity of known reserves of oil and natural gas, and the physical and chemical characteristics of crude oils. To introduce sustainable and environmentally friendly methods used for exploiting these reserves to produce a flow of crude oil/gas for refinery use.
3) To provide students with a background to the principles of petroleum production technology and relevant unit operations and design calculations.

Outline Syllabus

Oilfield geological strata, tectonic plate theory, seismic prospecting, world reserves and forecast

for oil and natural gas, tar sands, oil shales, bitumen and ultra-heavy crudes, primary and secondary recovery, drilling technology, offshore and onshore oil production, health & safety issues, explosion hazards, characterisation of petroleum fractions, atmospheric multicomponent distillation unit, energy recovery, lubricating oil units, hydro-treating.
Reservoir natural drive mechanisms, well tubular, well completion, perforation, subsurface
Reservoir rock properties: porosity, permeability, permeability correlations, saturation, rock , compressibility, wettability, capillary pressure, relative permeability
Reservoir fluid properties: classification of reservoirs, fluids, gas density, gas compressibility factor, gas formation volume factor, isothermal gas compressibility, gas viscosity, oil gravity, gas-oil ratio, oil formation volume factor, isothermal oil compressibility, oil density, oil viscosity, water formation volume factor, gas solubility in water, brine viscosity, water isothermal compressibility.
Reservoir deliverability: flow regimes, inflow performance, relationship, construction of IPR curves, composite IPR of stratified reservoirs, future IPR
Single-phase and multi-phase flow in wellbores and pipelines: flow in vertical and horizontal pipes, Darcy-Wiesbach friction factor, allowable working pressure for pipes, allowable flow velocity in pipes, general gas pipeline flow equation, pipeline efficiency and transmission factor.

Learning Outcomes	
1	Know scope of Production Engineering including surface production. Understand basics of oil/gas drilling. Describe different offshore platforms and their applications. Understand statistics/fact on oil economics. Know scope of Petroleum Production Engineering. Analyse performance of a production well (steady state, transient and pseudo-steady state). Explain wellhead surface and sub-surface production facilities. Calculate rock and fluid properties. Understand artificial lift methods. Analyse performance of a production well (steady state, transient and pseudo-steady state.
2	Construct simple flow diagram for a process that only involves phase separations by physical means, identify specific issues concerning process safety and environmental pollution; Undertake process design of two and three phase separators used in surface production operations. Analyse well performance for the cases of steady-state, pseudo-steady state and transient flow. Perform pressure drop calculations for multi-phase flow in horizontal and vertical wellhead production pipes. Convert physical quantities into different systems of units.
3	Apply simplifying assumptions to complex problems in order to gain useful design information individually and in a team. Manage time to meet deadlines; be able to communicate effectively (written and verbal). Manage time to meet deadlines; be able to communicate effectively (written and verbal). Analyse oil and gas well deliverability.

Learning, Teaching and Assessment Strategy

1) Concepts, principles & theories of important surface production processes are explored in classroom teaching with the aid of computational software.
2) Lectures designed to give students the ability to use techniques and solve problems of interest to Petroleum Engineers.
3) Tutorials using Aspen Hysys software to help students apply the knowledge to solve problems.
4) Learning outcomes are assessed by formal examination and coursework

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G).
SM1b, EA1b, EA3b, D3b, D4, D6, P2, P4, P8, G2, G3b, SM1m, SM5m, SM6m, EA1m, EA3m, D3m, P2m.
Further details of these learning outcomes can be found at https://www.engc.org.uk/.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Examination - closed book	Examination - closed book	2 hours	50%
Summative	Coursework	1 written report (less than 1500 words + figures)	0 hours	30%
Summative	Classroom test	Mid year test	2 hours	20%

Reading List

To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html.

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.