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## MODULE DESCRIPTOR

### Module Title

Subsurface

Reference	ENM200	Version	11
Created	March 2020	SCQF Level	SCQF 11
Approved	April 2006	SCQF Points	15
Amended	June 2020	ECTS Points	7.5

### Aims of Module

The module integrates knowledge of petroleum geology and the properties of petroleum fluids to develop an understanding of reservoir engineering and formation evaluation and demonstrate how the value of a hydrocarbon accumulation is created.

### Learning Outcomes for Module

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

- 1 Identify and apply geological concepts that will allow students to critically understand how hydrocarbon accumulations occur, how different reservoirs are formed, what considerations must be taken into account in the development and production from specific types of reservoirs encountered.
- 2 Critically apply the essential tools available for finding and characterising hydrocarbon accumulations and evaluate reservoir's economics' potential valuation parameters and conditions.
- 3 Critically relate field observations to geological structure and petroleum production potential and have acquired the fundamental vocabulary and understanding that will allow students to successfully communicate these concepts with industry participants.
- 4 Master the essentials of reservoir and fluid properties from surface and down-hole measurements and analysis and estimation of initial and remaining reserves.
- 5 Appraise and justify the importance of Formation Evaluation as part of accessing and producing hydrocarbons; apply the principles of formation evaluation to oilfield development.

### Indicative Module Content

Principles of geology and their application to the origin, entrapment, exploration and extraction of hydrocarbons. Concepts of reservoir engineering; properties of reservoir rock, fluid distribution and properties, porosity systems and permeability and production chemistry. Dynamics of fluid flow in reservoirs, static pressure and well-test analysis and PVT analysis. Determination of hydrocarbon volumes, estimation/classification of reserves and essentials of recovery methods. Concepts of formation evaluation and geophysical prospecting methods.

**Module Delivery**

The module will be delivered by means of lectures, tutorials, and guided self-study.

**Indicative Student Workload**

	Full Time	Part Time
Contact Hours	57	38
Non-Contact Hours	93	112
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:	Coursework	Weighting:	30%	Outcomes Assessed:	1, 4
Description:	This component will assess typical situations encountered in the exploration and development of oil and gas resources.				

**Component 2**

Type:	Examination	Weighting:	70%	Outcomes Assessed:	2, 3, 5
Description:	Closed book examination, which will assess the knowledge and understanding of the basic principles.				

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

In order to pass, students should achieve a mark of at least 40% in each component (which has a weighting of 30% or more) and an overall grade D or greater.

Module Grade	Minimum Requirements to achieve Module Grade:
<b>A</b>	Greater than or equal to 70%
<b>B</b>	In the range 60% to 69%
<b>C</b>	In the range 55% to 59%
<b>D</b>	In the range 50% to 54%
<b>E</b>	In the range 40% to 49%
<b>F</b>	Less than 40%
<b>NS</b>	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.
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.

**INDICATIVE BIBLIOGRAPHY**

- |   |   |
|---|---|
| 1 | STONELEY, R., Introduction to Petroleum Exploration for Non-Geologists (OUP,1995,ISBN 0198548567); 1995                         |
| 2 | ARCHER, J.S., WALL, C.G., Petroleum Engineering: Principles and Practice (Graham & Trotman,1986,ISBN 0860106659); 1986          |
| 3 | JAHN, F., COOK, M., GRAHAM, M., Hydrocarbon Exploration and Production (Elsevier,1998,ISBN 0444829210) (2nd Edition); 2008      |
| 4 | DAKE, L.P.,The Practice of Reservoir Engineering (Revised Edition); Elsevier,2013   |
| 5 | LI, Yaoguo., KRAHENBUHL, Richard., Gravity and Magnetic Methods in Mineral and Oil & Gas Exploration and Production (EAGE,2015) |
| 6 | SIMM, R., BACON, M., Seismic Amplitude: An Interpreter's Handbook (Cambridge University Press,2014)                             |
| 7 | ASQUITH, George B., KRYGOWSKI, Daniel., Basic Well Log Analysis (American Association of Petroleum Geologists,2004)             |
| 8 | SKINNER, Brian J., PORTER, Stephen C., PARK, Jeffrey., The Dynamic Earth: An Introduction to Physical Geology (Wiley,2004)      |