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## N831: Fundamentals of the Oil and Gas Industry

Instructor(s): Nigel Banks

Format and Duration

Classroom - 3 Days

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### Summary

The course provides an overview of the global oil and gas industry including the fundamentals of petroleum geology, how oil and gas are formed, how we explore for, and produce, oil and gas and how we transport it, refine it and sell the products. On completion of this course, participants will have a working understanding of the basic geological, engineering and economic principles of the petroleum industry.

### Learning Outcomes

Participants will learn to:

1. Locate the main oil and gas producing and consuming areas of the world and describe the factors that have controlled oil prices in the past and may influence them in the future.
2. Explain the basics of geology, the ways in which oil and gas are generated and trapped in the subsurface, and the geoscientists' use of contour maps.
3. Describe the main methods used in the exploration and production of hydrocarbons including seismic, drilling, well testing and the processing of produced fluids.
4. Identify the different aspects of the oil and gas industry, the range of skills and technology employed, and the roles of oil companies and contractors.
5. Review how volumes of oil and gas in place are estimated and describe the factors influencing how much of this can be commercially recovered.
6. Discuss the differences between onshore and offshore exploration and production and the particular challenges of deepwater operations.
7. Review the factors that control the economics of oil and gas production and individual companies' decision-making.
8. Recognise the different challenges involved in the transportation of oil and gas.
9. Understand the principles of oil refining and the petrochemical industry, and the range of products they create.
10. Explain the factors influencing the price of oil and gas products.
11. Identify the environmental, health and safety challenges that the industry faces.

### Training Method

A three-day classroom course, comprising a mixture of lectures and practical exercises.

### Who Should Attend

The course is aimed at non-technical staff of any background including those in finance, administration, HR, I.T, data management, and also support staff in technical functions. It is also useful for entry-level graduate technical staff needing a concise overview of the industry.

### Course Content

The course begins by introducing some basic facts and figures of the global petroleum industry. Then, after introducing some basic geological concepts, ideas are presented of how oil and gas are formed and

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trapped in the subsurface (petroleum systems). The course then leads participants through the methodology employed by oil and gas companies in exploration, production, transportation, refining and marketing of petroleum. It provides an understanding of oil companies' operations, the roles of various staff, the costs of operations both onshore and offshore, and the commercial factors that govern companies' decision-making. Lectures are interspersed with exercises designed to make a variety of technical skills understandable to non-specialists. Emphasis is put on learning practical skills such as the contouring of maps, and on clarifying much of the jargon and confusing nomenclature that exists within the industry.

### Day 1

#### Introduction

- World Petroleum Industry

#### Geological fundamentals

- Structure of the Earth
- Plate tectonics
- Types of rocks
- Sedimentary basins
- Geological Time

#### How are oil and gas fields formed?

- The Petroleum System
- Source rocks
- Petroleum generation
- Petroleum migration
- Petroleum traps
- Reservoirs

### Day 2

#### How do we explore for oil and gas?

- Geological mapping and surface geochemical sampling
- Geophysical methods
- Gravity, magnetics, resistivity
- Seismic - 2D and 3D
- Seismic Interpretation
- Drilling an exploration well
- Well Logging: What do the logs tell us?
- Flow Testing (MDT/DST): what does it tell us?
- Fluid samples for PVT analysis. What do they tell us?

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- How successful are we?

### How we know how much is there?

- Measurement units and nomenclature
- Appraising a discovery
- Estimating volumes of oil and gas in place
- Handling uncertainty

### Day 3

#### How do we produce it?

- Concept of reserves - How much can we recover?
- Primary, secondary and tertiary recovery
- Field Development concepts
- What is the best development plan?
- Development Wells and Production Facilities
- Reservoir monitoring and management

#### How do we transport it?

- Transporting oil
- Transporting gas

#### Refining and marketing

- Refining
- The products
- Marketing and sales

#### Exercises

Identifying rocks, working with maps, seismic interpretation, log correlation, appraising a discovery, estimating volumes of oil and gas.