# N412: A Critical Guide to Reservoir Appraisal and Development

## Format and Duration

Classroom - 5 Days Virtual - 10 Sessions

Instructor(s): Philip Hirst and Pete Smith

## Summary

This course is designed to introduce the decision-based technical workflow that is key to appraisal and development projects. Participants will learn the background theory behind all aspects of reservoirs, from the micro- to seismic-scale, integrating the static and dynamic domains and how to model them. The course covers a range of disciplines and topics, using an integrated subsurface approach with reference to a robust business and commercial framework.

Business Impact: Participants will be empowered to collaborate between disciplines and add value in the appraisal and development of oil & gas assets.

## Learning Outcomes

Participants will learn to:

- 1. Critically evaluate the sources of subsurface data that contribute to the understanding and development of hydrocarbon reservoirs.
- 2. Evaluate how to combine uncertainties and select key variables in a probabilistic evaluation to manage uncertainty.
- 3. Assess fluid properties and PVT for reservoir description, material balance, and flow assurance.
- 4. Understand the controls on the pore scale properties of both clastic and carbonate reservoirs and the principle of flow zones.
- 5. Evaluate sedimentary reservoir architecture and understand its impact on connectivity and fluid flow.
- 6. Asses the possible impact of faults and fractures on reservoir productivity.
- 7. Evaluate the use of both static and dynamic reservoir models as part of the decision-making process.
- 8. Evaluate how reservoir energy, fluid responses, drive mechanisms, and EOR processes are assessed and managed to maximise planned recovery.
- 9. Apply the technical aspects of well testing to appraisal and development decisions.
- 10. Assess the Reserves and resources booking philosophy.

## Training Method

This is a classroom or virtual classroom course comprising a mixture of lectures, discussion, case studies, and practical exercises.

# Who Should Attend

The course is designed for geoscientists, petrophysicists, and reservoir engineers who are involved in field appraisal and development.

Team leaders and asset managers will also benefit.



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Multi-disciplinary asset teams would find particular value in attending as a group.

# **Course Content**

#### Introduction

• Business framework

#### Data and uncertainty

- Data positioning
- Petrophysics and wireline data
- Pressure and contacts

## Heuristics, biases, risk and uncertainty

- Range estimation
- Heuristics
- Risk and uncertainty
- Decisions with uncertainty

#### Reservoirs at a pore-scale

- Clastic reservoirs
- Carbonate reservoirs
- Clays and production issues

#### Reservoir Architecture

- Reservoir architecture and connectivity
- Faults and naturally fractured reservoirs
- Flow zones
- Waterflood and heterogeneity
- Unconventional reservoirs or analogues\*

#### Fluids and reservoir mechanisms

- Fluids and PVT data
- Multi-phase flow
- Reservoir mechanisms
- Secondary and tertiary recovery
- Gas and aquifers



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• Well productivity

#### Value of Information, well productivity and testing

- Parametric Combining
- Value of information (appraisal)
- Value of information (intervention)

#### Static reservoir modelling

- Framing
- Model construction
- Scale and variance
- Facies and property models
- Modelling for comfort
- Upscaling

## Probability estimation, dynamic modelling, and resources

- Well productivity
- Well testing
- Reservoir simulation
- Reserves and resources

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