

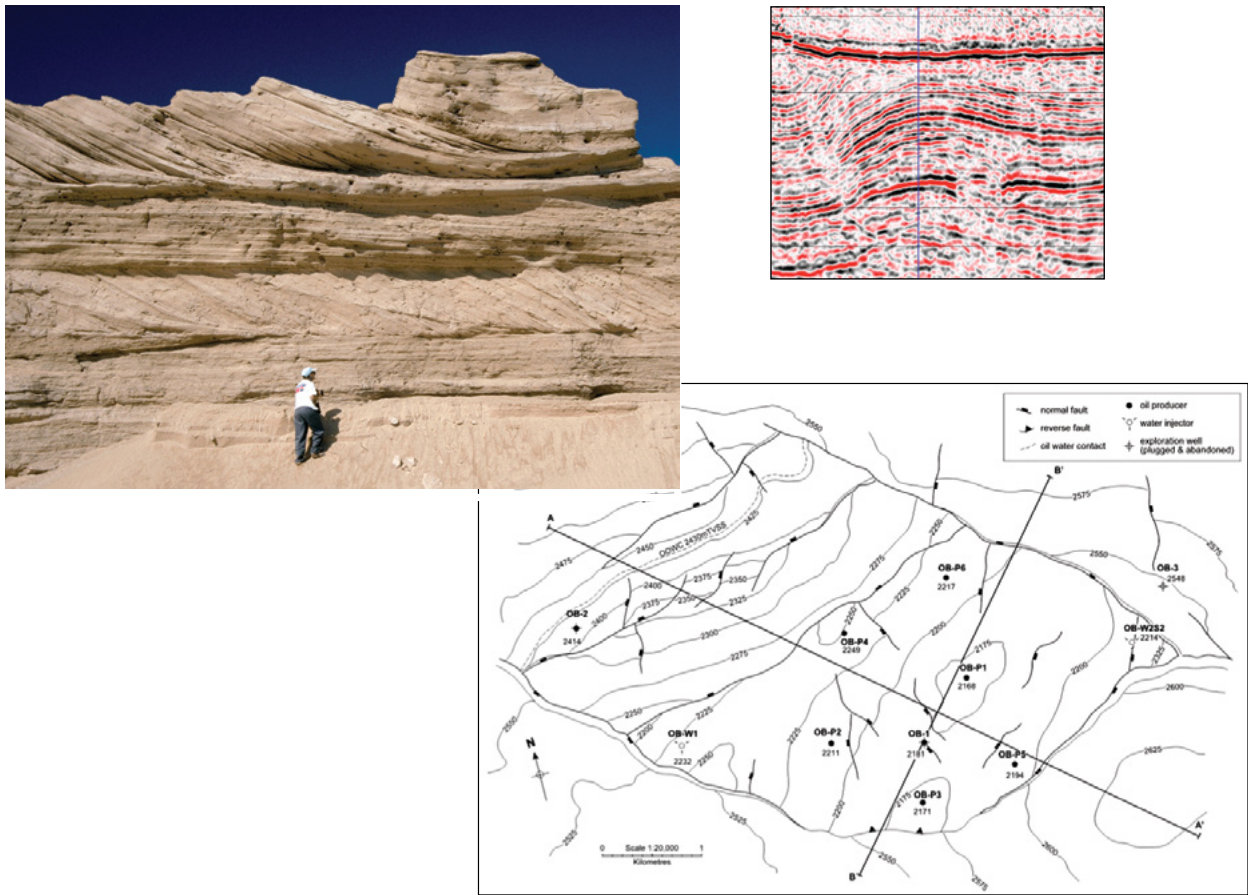
Basic Geoscience

Designed for: The course is aimed at petroleum engineers without an academic background in geoscience but who work with geoscientists on a regular basis. The course is also well suited to geoscientists early in their industry careers.	Duration (days)		Learning Level:		
	1 2 3 4 5 flexible		Skills	■	■
			Knowledge	■	■
			Awareness	■	■

This course gives a hands-on introduction to the practice of reservoir geoscience, covering the core principles of seismic, structure, stratigraphy, sedimentology and diagenesis.

The aim is to illustrate how these principles impact on issues of cross-discipline and commercial importance such as well planning, volumetric determination and development planning.

The course is structured around field case studies for which participants build conceptual geological models, testing and updating them as new data becomes available.





Reservoir Series

Basic Geoscience continued

Course Content:

Establishing purpose

- What do we need to know?
- How do we find out?

Sources of data

- Seismic as a framework
- Lithology from log data
- core

Sedimentology

- the concept of facies'
- depositional environments
- diagenetic overlays

Building the 3D conceptual model

- assessing uncertainties
- determining volumes

Using the model

- designing wells
- interpreting drilling results
- quantifying uncertainty in terms of value
- decision making in the light of that uncertainty

Course Duration:

Duration is 3, 4 or 5 days
depending on whether a field day is
included.

Courses available from this series:

Basic Geoscience
Seismic and its use in the Field Life Cycle
Openhole Petrophysical Interpretation
Core Description
Production Geology
Applied Production Geology
Reservoir Model Design
Geology for Drilling Engineers
Reservoir Engineering
Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Mark Bramwell BSc, PhD

Main Series tutoring: Reservoir, Early Development, E&P Overview, Open Air

Industry experience: over 35 years, geoscience

Career background: Shell, KUFPEC, AGR and TRACS

Personal: Programme manager for the Early Development Series

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8 Rubislaw Terrace, Aberdeen, AB10 1XE
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Contact
training@tracs.com



Reservoir Series

Seismic and its use in the Field Life Cycle continued

Course Content:

Day 1:

Introduction to Case Study

- Seismic refresher - acquisition, processing
- Seismic QC
- Seismic horizon interpretation
- Depth conversion
- Volumetrics

Day 2:

- Incorporate well data
- Seismic AVO
- Attribute mapping
- Bias, uncertainties and risk
- Volumetrics and recommendations for drill locations

Day 3:

- Incorporate well data
- Seismic inversion
- Strategies for development
- Commercial options
- Development recommendations
- What actually happened
- 4D seismic for field monitoring

Course Duration:

Duration is a 3 day course geoscientists throughout their industry careers. As a workstation-based course, it can be delivered in the software of choice.

Courses available from this series:

Basic Geoscience
Seismic and its use in the Field Life Cycle
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Reservoir Model Design
Geology for Drilling Engineers
Reservoir Engineering
Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Peter Rowbotham PhD

Main series Tutoring: Reservoir, Open Air, Master Class
Industry Experience: 30 years, Geophysicist (QI, Interpretation, Acquisition, Processing), Subsurface Team Lead
Career background: Universities of Durham/Imperial, Elf, Shell, Apache and TRACS
Personal: Technical author, EAGE Board – Publications Officer and First Break Editor

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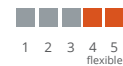
Contact
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Openhole Petrophysical Interpretation

Designed for:

The course is designed for petrophysicists and staff working in reservoir engineering, geology and geophysics and other disciplines which interface with petrophysicists in their daily work.

Duration (days)



Learning Level:

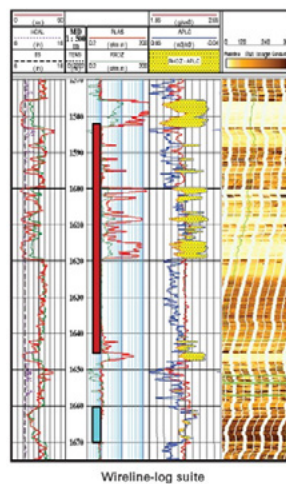
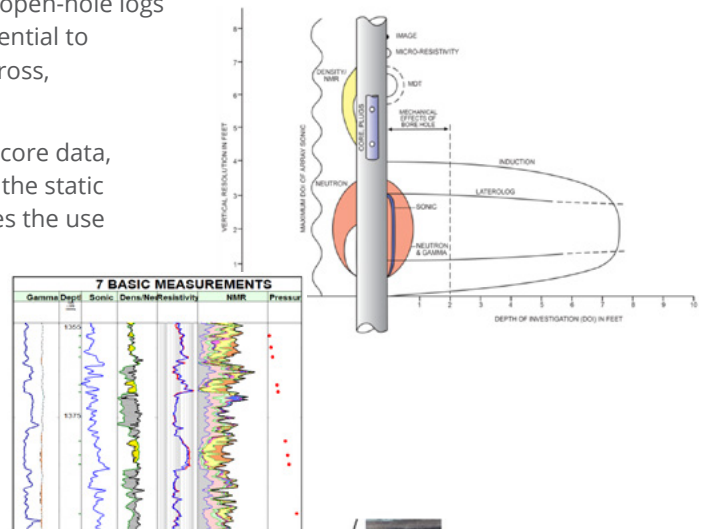


The course deals with the evaluation and reconciliation of core and log data, and the integration of that data into static and dynamic reservoir models.

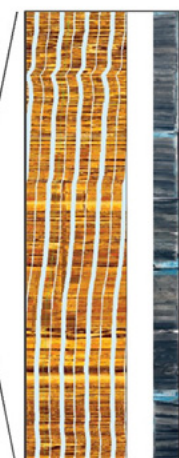
There are seven basic measurements made with open-hole logs and a fundamental understanding of these is essential to derive realistic reservoir properties such as net/gross, porosity and water saturation in reservoirs.

This involves the evaluation and reconciliation of core data, log data and geological interpretation as input to the static characterisation of the reservoir. This also involves the use of log data to gain an understanding of dynamic reservoir performance.

The course concentrates on the principles behind the various logging tools, their limitations and calibration against mudlogs and cores with a combination lectures, individual and group exercises, open discussion and debrief sessions.



Detailed Image log over part of the cored interval



$$V_{shale} = \frac{GR - GR_{sand}}{GR_{shale} - GR_{sand}}$$

$$Porosity = \frac{\rho_{ma} - \rho_b}{\rho_{ma} - \rho_f}$$

$$S_w = \sqrt{\frac{aR_w}{\phi R_t}}$$



Reservoir Series

Openhole Petrophysical Interpretation continued

Course Content:

Logging Systems and Define the Reservoir

- Introduction to Petrophysics
- Logging Systems and Environment
- Gamma Ray and SP

Pore Systems and Acoustics

- Theory of Pore Systems
- Density and Neutron Logs
- Core Acquisition and Routine Analysis
- Sonic/Acoustic Tools

Saturation and Fluid Distribution

- Resistivity Logging
- Saturation from Logs
- Special Core Analysis
- Fluid Distribution and Saturation Height
- Pressures and Sampling NMR/CMR Tools

Log Interpretation

- The seven basic log measurements and their principles - recap
- The three basic equations - converting logs to reservoir properties
- Distinguishing between rock and fluid effects
- Data resolution - logs always simplify the geology
- Calibration with core - overcoming resolution limitations
- Core Analysis overview
- Geological interpretation from logs
- Interpreting production performance from logs

Course Duration:

Duration is 3 -5 days.

Courses available from this series:

Basic Geoscience
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Openhole Petrophysical Interpretation
Core Description
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Applied Production Geology
Reservoir Model Design
Geology for Drilling Engineers
Reservoir Engineering
Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Mark Bramwell BSc, PhD

Main Series tutoring: Reservoir, Early Development, E&P Overview, Open Air

Industry experience: over 35 years, geoscience

Career background: Shell, KUFPEC, AGR and TRACS

Personal: Programme manager for the Early Development Series

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Core Description

Designed for:

This course is for personnel up to 10 years experience, working as technical professionals in the exploration and production business from the geosciences, reservoir engineering, drilling engineering, petrophysics and petroleum engineering disciplines.

Duration
(days)



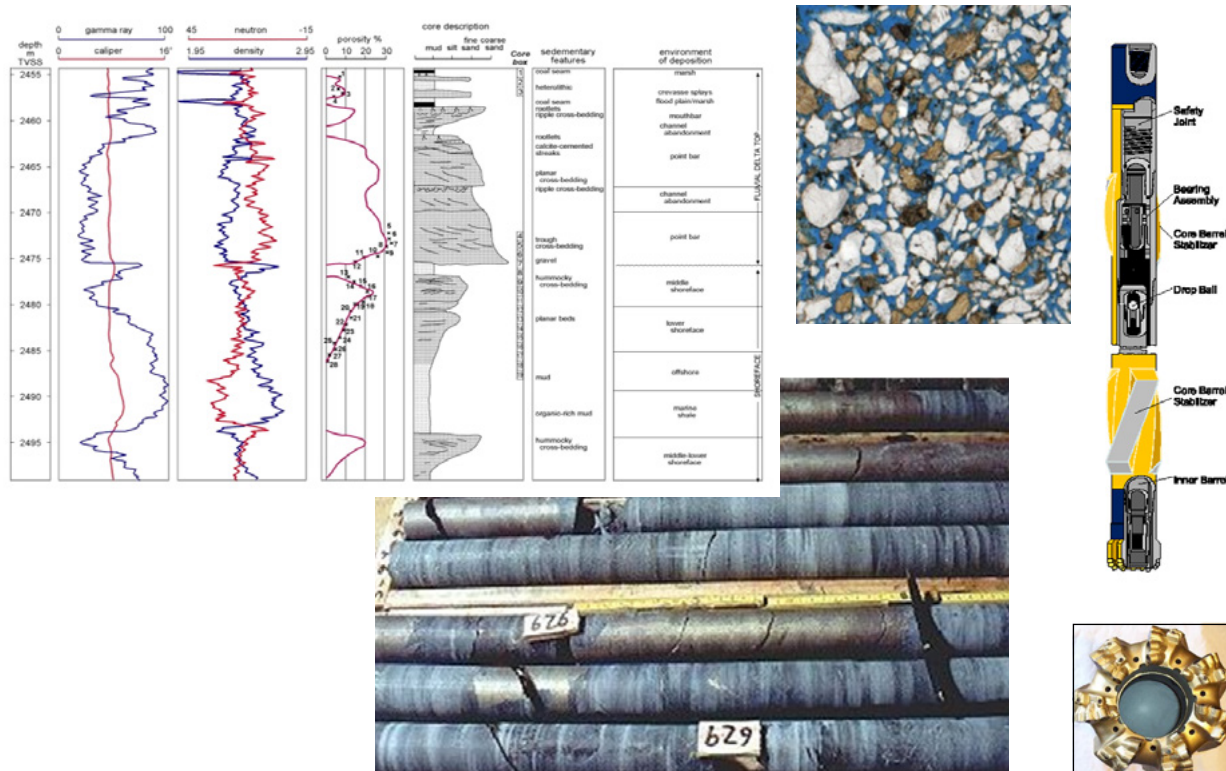
Learning Level:

Skills ■ ■ ■
Knowledge ■ ■ ■
Awareness ■ ■ ■

The course teaches participants how and why core material is acquired in wells, presented in a logical order from interval selection, through well-site acquisition, to core description, analysis and interpretation.

Emphasis is placed on the need for an integrated multidisciplinary approach at all stages of the process if maximum value is to be gained from this expensive, but vital technical data.

There is also optional provision for direct viewing of core material, as well as visiting core laboratories.



Core Description continued

Course Content:

- Selecting intervals for coring
- Cutting core at the wellsite
- Core handling and depth matching
- Calibrating log data with core
- Core description - how to do it what to look for
- Interpreting sedimentary features and depositional environments from core
- Measuring properties from core: I. Conventional Core Analysis (CCA)
- Measuring properties from core: II. Special Core Analysis (SCAL)
- Thin sections and SEM
- Special coring procedures (oriented, preserved cores, pressurised cores)
- Making the most of core to assess and reduce uncertainty
- Value of coring

Course Duration:

Duration is 3 days.

Courses available from this series:

Basic Geoscience
Seismic and its use in the Field Life Cycle
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Course Tutors



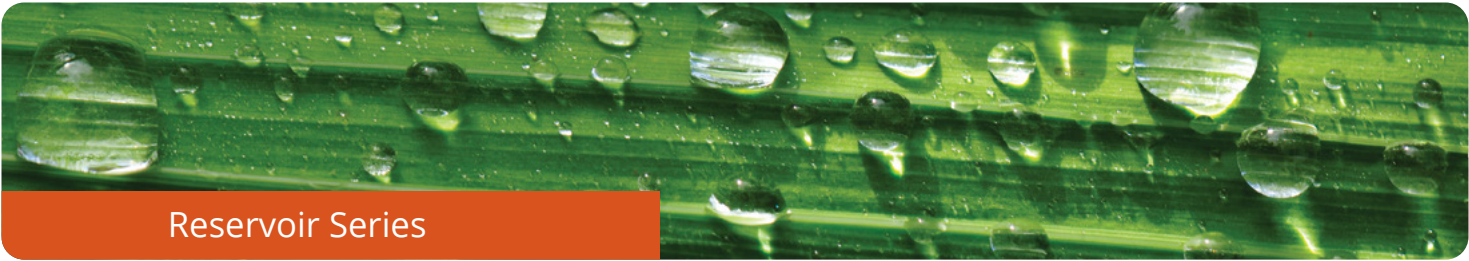
Mark Bramwell BSc, PhD

Main Series tutoring: Reservoir, Early Development, E&P Overview, Open Air

Industry experience: over 35 years, geoscience

Career background: Shell, KUFPEC, AGR and TRACS

Personal: Programme manager for the Early Development Series



Production Geology

Designed for:

The course is aimed at geoscientists early in their industry careers and is also well suited to petroleum engineers without an academic background in geology but who work with geoscientists on a regular basis.

Duration
(days)

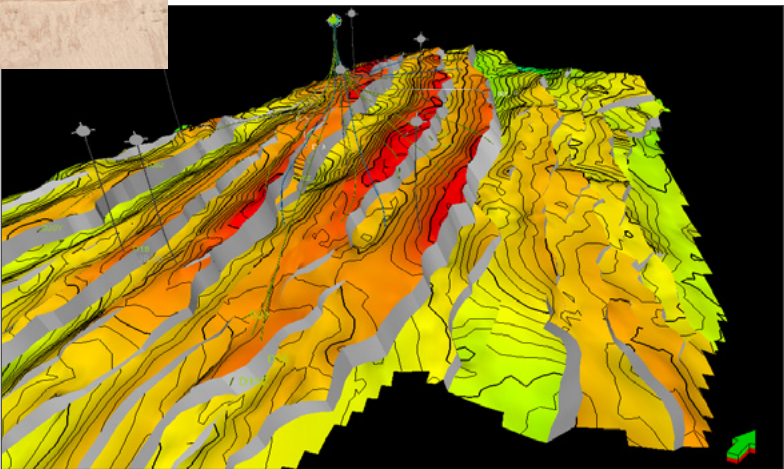
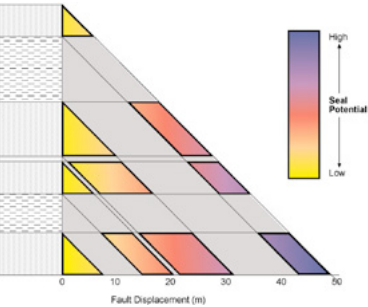
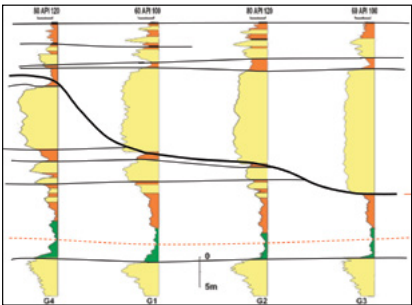
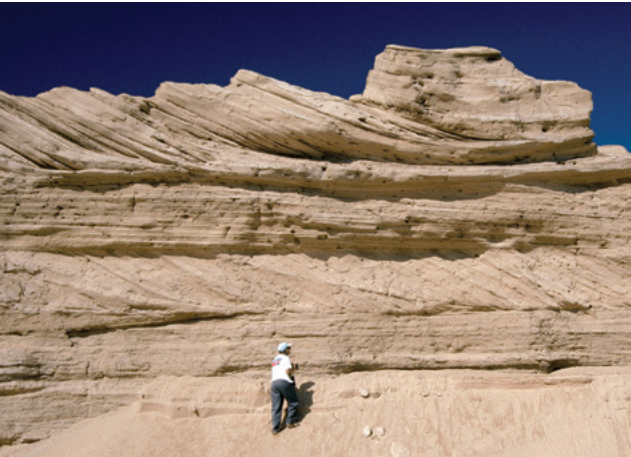


Learning Level:

Skills	
Knowledge	
Awareness	

This course aims to illustrate the linkage between geological interpretations and the petroleum engineering end-product they feed into. Structured around case study material, insight is given into the relationship between the subjective nature of geological uncertainties and the need to quantify the broader subsurface uncertainties of petroleum engineering.

The course covers fundamental principles of structure, stratigraphy, sedimentology and diagenesis, viewed in the context of the tasks of well planning, volumetrics and the geological interpretation of seismic, log and core data. It is offered class based or outcrop based in Wales as part of the 'Open Air' course series.





Reservoir Series

Production Geology continued

Course Content:

Establishing purpose

- What do we need to know?
- How do we find out?

Sources of data

- Seismic as a framework
- Sedimentology
 - rock types from core
 - rock types from log data
 - the concept of 'facies'
 - depositional environments
- Structure
 - interpretation of structures from seismic and log data
 - structural styles
 - the relationship between structure and sedimentation

- Diagenesis
- Building the 3D geological model
 - assessing uncertainties
 - determining volumes
- Using the model
 - designing wells
 - interpreting drilling results
 - quantifying uncertainty in terms of value
 - decision making in the light of that uncertainty

Course Duration:

Duration is 5 days based on one trainer a field day is optional.

Courses available from this series:

Basic Geoscience
 Seismic and its use in the Field Life Cycle
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 Core Description
 Production Geology
 Applied Production Geology
 Reservoir Model Design
 Geology for Drilling Engineers
 Reservoir Engineering
 Applied Reservoir Engineering
 Well Test Design and Analysis
 Geomechanics
 Structural Models in Seismic Data

Course Tutors



Mark Bramwell BSc, PhD

Main Series tutoring: Reservoir, Early Development, E&P Overview, Open Air

Industry experience: over 35 years, geoscience

Career background: Shell, KUFPEC, AGR and TRACS

Personal: Programme manager for the Early Development Series



Mark Bentley PhD

Main Series tutoring: Reservoir, E&P Overview, Open Air and Master Class

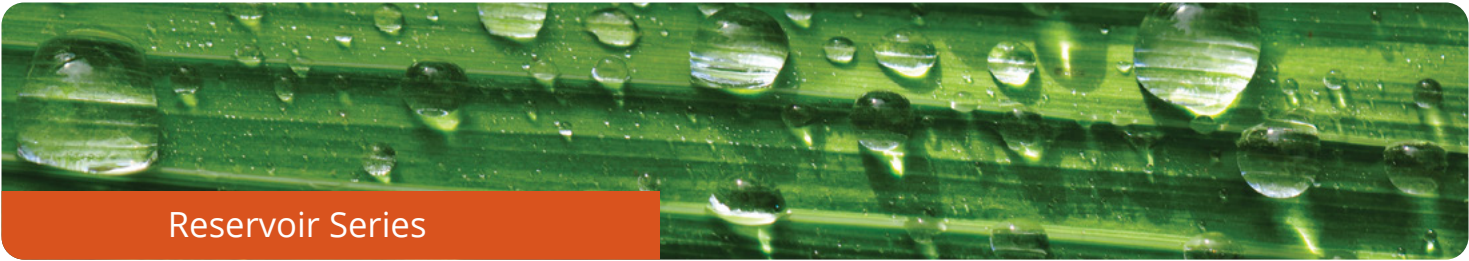
Industry experience: over 30 years, geoscience

Career background: Shell, AGR and TRACS

Personal: Author 'Reservoir Model Design', SPE and EAGE distinguished lecturer, AGR (Training Director), TRACS Training Director, Associate Professor Heriot-Watt University

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 Tel: +44 (0)1224 024074

Contact
training@tracs.com



Applied Production Geology

Designed for:

The course is aimed at petroleum engineers early in their industry careers who require a firm grounding in the technical fundamentals of production geoscience as they apply to operations.

Duration
(days)



Learning Level:

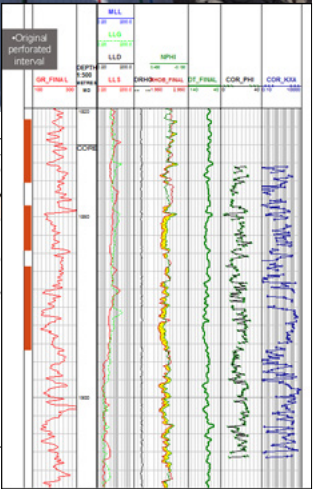
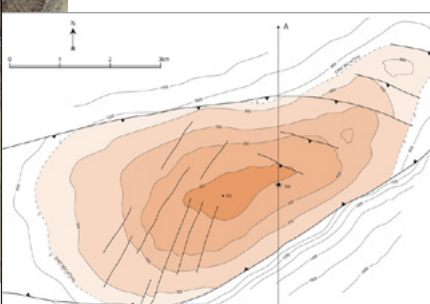


This course has been built specifically for the Middle East and uses field data from Natih and Gharif reservoirs, mapped on to analogue outcrops around Nizwa and core material at Muscat.

The course illustrates the linkage between geological interpretations and the petroleum engineering end-products they feed into. The standard production geological tasks of mapping, reservoir characterisation (both matrix and fractures), correlation, log interpretation, hydrocarbon distribution and volumetrics are combined with an analysis of risk and uncertainty. Running the event partly 'Open Air™' allows the crucial aspect of scale to be incorporated.

The course makes use of the 'Madmar Field' case study as a red thread. Madmar is a synthetic oil and gas field case scaled to the outcrops near Nizwa and populated with data from Natih and Gharif producing reservoirs.

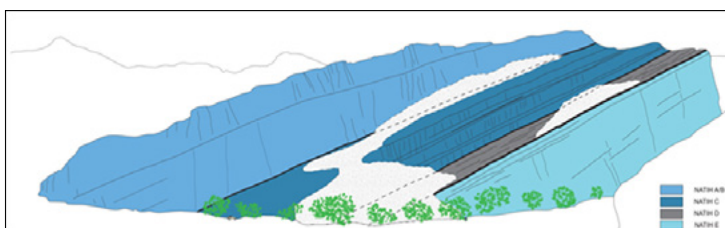
The objective is for petroleum engineers who have had basic training in geoscience to take that knowledge out in to the field, consolidate what they know and build on it. Attendees should come out of the event with a clear view of the component parts of production geoscience work, and first-hand experience of how geoscience work impacts on the other petroleum engineering disciplines.



Applied Production Geology continued

Course Content:

- Carbonate reservoir characterisation
- Clastic reservoir characterisation
- Framework mapping
- Reservoir heterogeneity
- Interpreting core
- Interpreting logs
- Rock properties, data and scale
- Properties of fracture systems
- Understanding saturation-height
- Volumetrics
- Handling uncertainty
- Production geoscience deliverables



Logistics

Golden Tulip Hotel, Nizwa (3 days) and
Intercontinental Hotel, Muscat (2 days)

Course Duration:

Duration is 5 days.

Courses available from this series:

Basic Geoscience
Seismic and its use in the Field Life Cycle
Openhole Petrophysical Interpretation
Core Description
Production Geology
Applied Production Geology
Reservoir Model Design
Geology for Drilling Engineers
Reservoir Engineering
Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Mark Bentley PhD

Main Series tutoring: Reservoir, E&P Overview, Open Air and Master Class

Industry experience: over 30 years, geoscience

Career background: Shell, AGR and TRACS

Personal: Author 'Reservoir Model Design', SPE and EAGE distinguished lecturer, AGR (Training Director), TRACS Training Director, Associate Professor Heriot-Watt University



John Howell PhD

Main Series tutoring: Reservoir, Open Air

Industry experience: +25 years, geoscience

Career background: Gaps, University of Liverpool, University of Bergen, Rocksource ASA, University of Aberdeen

Personal: Published over 120 scientific articles and edited five books



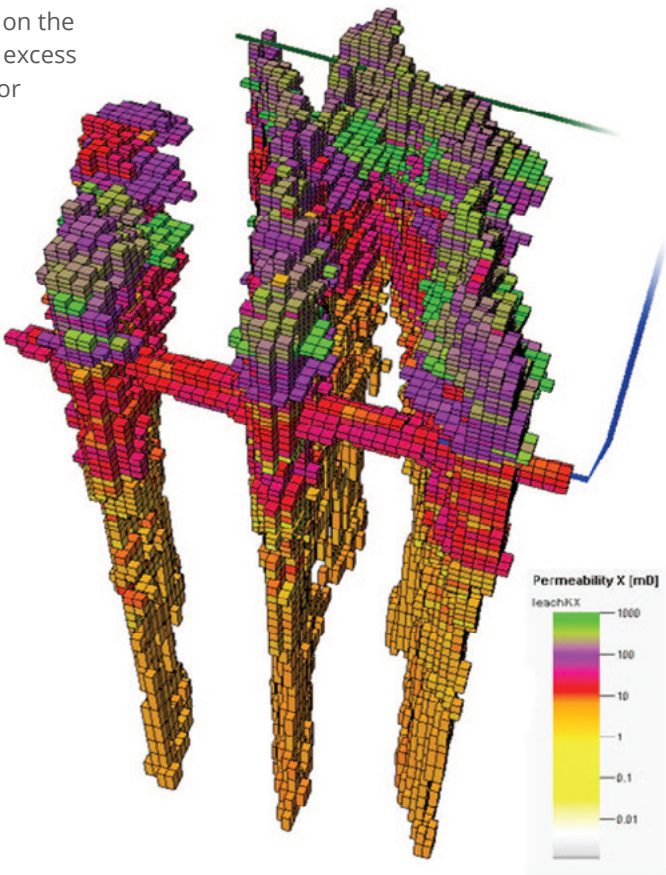
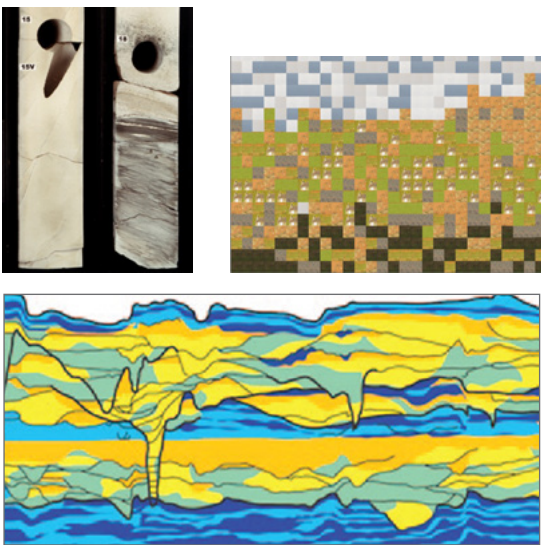
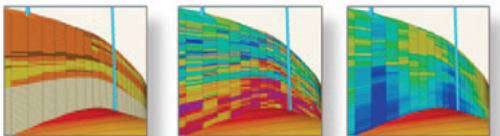
Reservoir Model Design

Designed for: Geoscientists with some knowledge of reservoir modelling software; reservoir engineers and petrophysicists who work with static reservoir models, and team leaders who wish to have a deeper understanding of the principles behind modelling and how to QC models made by others.	Duration (days) 1 2 3 4 5 flexible	Learning Level:	
		Skills	
		Knowledge	
		Awareness	

What differentiates a good reservoir model from a bad one? This course offers a software-independent view on the process of reservoir model design, tackles the underlying reasons why some models disappoint, and offers solutions which support the building of more efficient, fit-for-purpose and successful reservoir models.

Considerable time is dedicated to reservoir modelling exercises in many companies but the results often disappoint: the time taken to build models is often too long, the models too detailed and cumbersome and the model deliverables ultimately not fit-for-purpose. This course tackles the reasons why and offers remedies to fix these problems. The advice is based on the experience of the tutors, who have been involved in excess of 100 reservoir modelling and simulation projects for many companies over the last twenty years.

The central theme of the event is “reservoir model design”, on the premise that it is poor design rather than software handling errors which are typically the cause of poor model outcomes.



Reservoir Model Design - continued



Course Content:

The course content is organised around the following:

- **Model purpose** – why are you logged on in the first place; is the purpose clearly defined?
- **Elements and architecture** – what level of detail do you need to include given the model purpose and the development context? Full-field detail may not be needed.
- **Probability and determinism** – what are our expectations of geostatistics and how do we use them intuitively to represent a reservoir concept?
- **Multi-scale modelling** – static-dynamic upscaling is only part of the story, and not always the main part; the issue is multi-scale and extends from pore-scale behaviour to the full field.
- **Uncertainty-handling** – how to really go wrong.

This is typically a field-based event, combining classroom talks and discussion with access to outcrops on the Moray Firth. The course can equally well be run at other outcrops, currently prepared at locations in England, Wales, France, Spain and the USA (see Open Air™ course summaries). Alternatively, the course can be structured around a company's own field data (log and core), combined with workshop-style reviews of ongoing static modelling work.

Course Duration:

Duration is 3 - 5 days.

Courses available from this series:

Basic Geoscience
Seismic and its use in the Field Life Cycle
Openhole Petrophysical Interpretation
Core Description
Production Geology
Applied Production Geology
Reservoir Model Design
Geology for Drilling Engineers
Reservoir Engineering
Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Mark Bentley PhD

Main Series tutoring: Reservoir, E&P Overview, Open Air and Master Class

Industry experience: over 30 years, geoscience

Career background: Shell, AGR and TRACS

Personal: Author 'Reservoir Model Design', SPE and EAGE distinguished lecturer, AGR (Training Director), TRACS Training Director, Associate Professor Heriot-Watt University



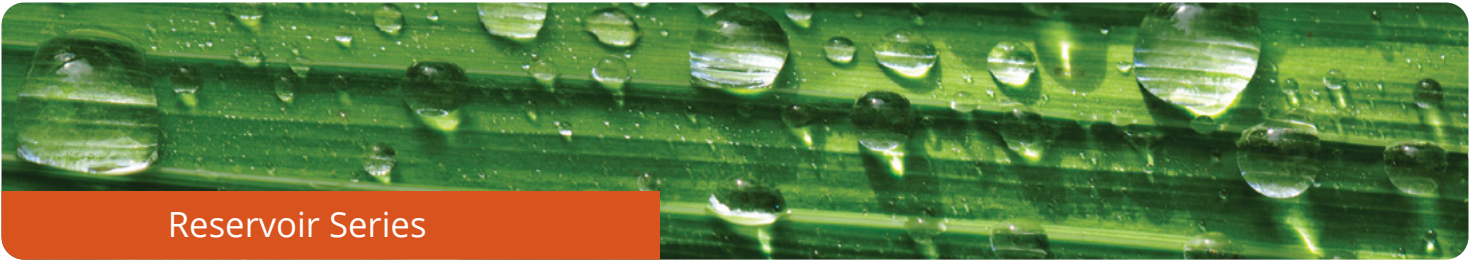
John Howell PhD

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Personal: Published over 120 scientific articles and edited five books



Geology for Drilling Engineers

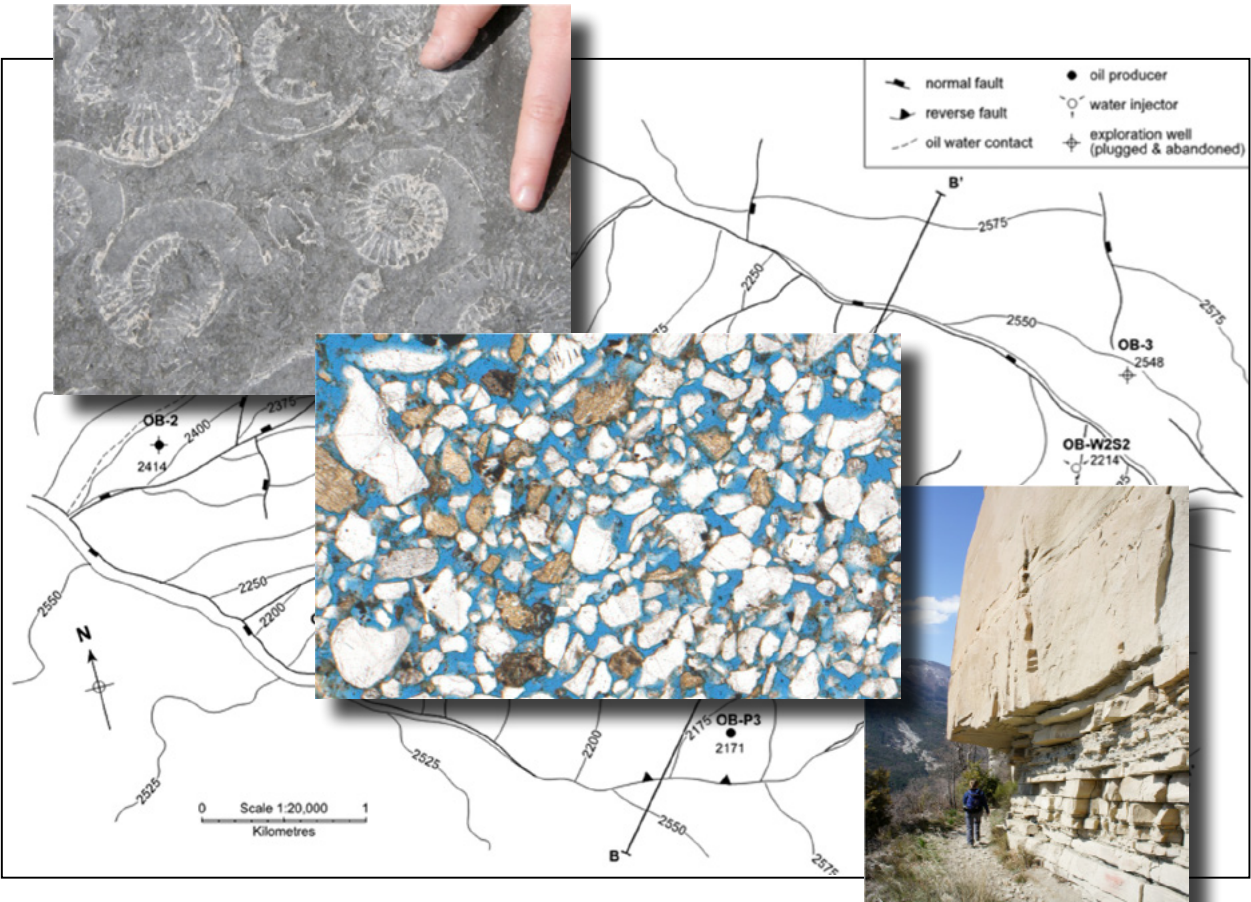
Designed for:
The course is aimed at drilling and completions staff without an academic background in geology but who work with geoscientists.

Duration
(days)
1 2 3 4 5
flexible

Learning Level:
Skills ■ ■ ■
Knowledge ■ ■ ■
Awareness ■ ■ ■

This course runs through the fundamentals of geoscience as they apply to the drilling environment.

Specific themes are the fundamentals of petroleum geology, the description of basic geological features (including geoscience terminology), geological aspects of well planning, the geological interpretation of drilling results and geological issues surrounding completion design. Case study material for the Ganymede Field will be used through the event, including a hands-on session with the reservoir rocks and an exercise on geological well targeting in the field, including geological interpretation of the resulting drilling outcome.



Early Development
E&P Overview
Reservoir
Wells

Business & Risk
Open Air
Coaching
Master Class





Reservoir Series

Geology for Drilling Engineers continued

Course Content:

Petroleum Systems

- Source rocks
- Reservoirs
- Traps
- Exploration wells

Rock types

- lithology from cuttings and core
- lithology from log data
- the concept of 'facies'
- reservoir types

Geological structures

- terminology
- spotting structures from core and log data
- structural styles

Building a geological model

- correlations between wells
- volumetrics
- well targeting

Drilling the model

- geological aspects of well design
- interpreting drilling results
- near-wellbore geology for completion design

Course Duration:

Duration is 3 days.

This can also be run field-based over 5 days.

Courses available from this series:

Basic Geoscience
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Core Description
Production Geology
Applied Production Geology
Reservoir Model Design
Geology for Drilling Engineers
Reservoir Engineering
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Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Mark Bramwell BSc, PhD

Main Series tutoring: Reservoir, Early Development, E&P Overview, Open Air

Industry experience: over 35 years, geoscience

Career background: Shell, KUPPEC, AGR and TRACS

Personal: Programme manager for the Early Development Series

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training@tracs.com

Reservoir Engineering

Designed for:

This course is designed for basic to intermediate reservoir engineers (0-5 years) and is also of benefit to geoscientists and other disciplines which interface with reservoir engineers in their daily work.

Duration (days)



Learning Level:

Skills	■	■	■
Knowledge	■	■	■
Awareness	■	■	■

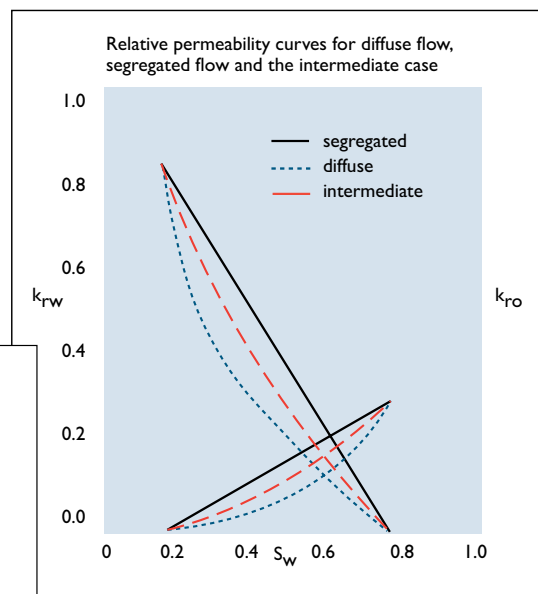
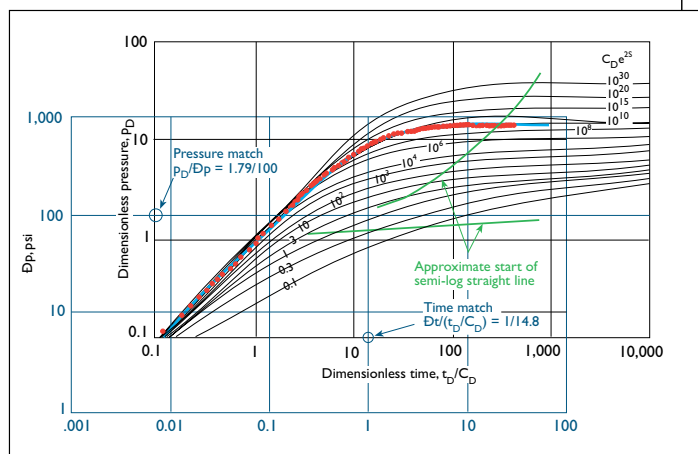
The case study material covered in this course has been chosen to illustrate the application of reservoir engineering tools and techniques in a development planning and reservoir management context.

The course draws out the key interfaces between reservoir engineering and geoscience disciplines. Worked examples show the use of data and techniques employed during the construction and maintenance of a reservoir model. Separate examples are used for gas field reservoir engineering and well testing.

This process will follow specific phases of:

- building a static reservoir model
- fluid characterisation
- developing a dynamic model
- reservoir management during the producing life of a field

The reservoir engineering course makes significant use of an offshore case study with a sizeable oil reservoir.



Reservoir Engineering continued

Course Content:

The Static Reservoir Model

- Reservoir zonation
- Defining fluid contacts
- RFT pressure measurements and Pressure vs Depth relationships
- Capillary pressures and saturation-height relationships

Fluid Properties

- Fluid sampling
- Analysis of fluid samples
- Chemical properties of hydrocarbons
- Physical properties of hydrocarbons
- Making use of the PVT report

Developing the Dynamic Reservoir Model

- Fluid displacement
- Dynamic well performance
- Upscaling from the core scale
- Reservoir simulation

Reservoir Management

- Reservoir monitoring
- Production forecasting
- History matching in reservoir simulation
- Enhanced Oil Recovery techniques

Well Test Analysis

- Uses of well testing
- Planning a well test
- Well testing operations
- Well test analysis
- Analysis principles
- Analysis techniques
- Special test types

Course Duration:

Duration is 3 or 5 days depending on the level of teaching requirement

Courses available from this series:

Basic Geoscience
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Production Geology
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Reservoir Engineering
Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Mark Cook BSc, MBA

Main Series tutoring: Early Development, Business & Risk, Reservoir Engineering

Industry experience: over 40 years, reservoir engineering, economics and risk analysis

Career background: Shell, TRACS (Director) and AGR (VP)

Personal: Author, 'Petroleum Economics and Risk Analysis' (2021) 'Hydrocarbon Exploration and Production' (2008) SPE distinguished lecturer on Risk Analysis, Guest lecturer at Heriot Watt University



Jerry Hadwin BSc, MEng

Main Series tutoring: Reservoir, Early Development, Open Air

Industry experience: over 35 years, reservoir engineering

Career background: Shell, TRACS and AGR

Personal: Co-author 'Adventure Trekking in Oman'



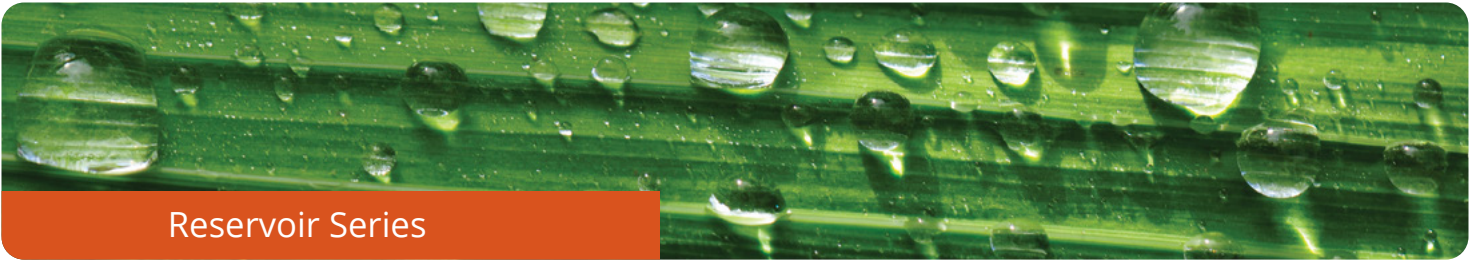
Richard Oxlade MEng, BSc

Main Series tutoring: Reservoir, Early Development, Master Class (business)

Industry experience: over 40 years, commercial, reservoir engineering

Career background: BP, AGR and TRACS

Personal: Global advisor, business planning & economic analysis



Applied Reservoir Engineering

Designed for:
This course aims to give practising reservoir engineers in the early years of their careers a robust understanding of analysis techniques used to determine forecasts and reserves based on fundamental concepts.

Duration
(days)

1 2 3 4 5
flexible

Learning Level:

Skills

Knowledge

Awareness

The course revisits basic reservoir engineering principles and provides the opportunity to practise analysis techniques through desktop exercises. This course will also introduce some of the key concepts and techniques associated with the energy transition.

Early Development
E&P Overview
Reservoir
Wells

Business & Risk
Open Air
Coaching
Master Class

R12a

Applied Reservoir Engineering continued

Course Content:

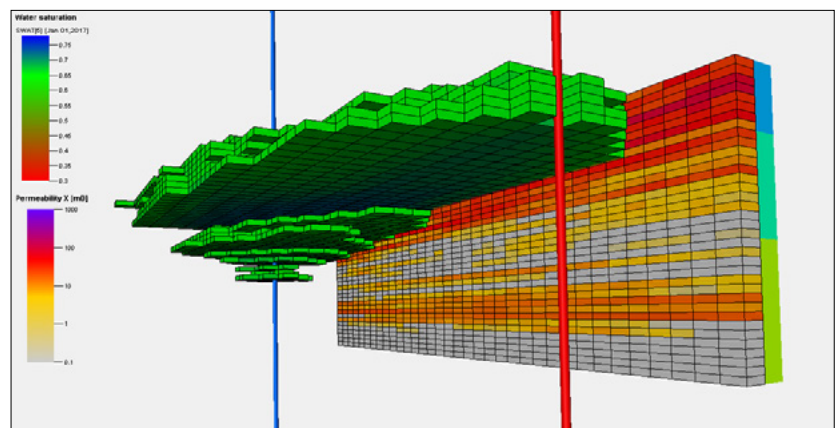
1. Ensure a robust understanding of the fundamental concepts associated with fluid and rock properties and the physics of multiphase flow in porous media.
2. Understand interpretation techniques to convert measured data to reservoir engineering analysis input.
3. Explore a range of analytical techniques to quantify production rates and recoverable volumes from different types of reservoirs and development techniques, which can be used as primary quantification methods or in support for larger studies.
4. Provide practical guidelines for approaching reservoir modelling studies, including upscaling and workflows.
5. Apply the understanding of basic concepts and techniques to explain how enhanced recovery methods work and can be quantified.
6. Understand resource categorisation and the reservoir engineer's role in quantification of resources.
7. Introduce the role of reservoir engineering in the energy transition, focussing on carbon storage and geothermal.

Course Duration:

Duration is 4 to 5 days

Courses available from this series:

Basic Geoscience
Seismic and its use in the Field Life Cycle
Openhole Petrophysical Interpretation
Core Description
Production Geology
Applied Production Geology
Reservoir Model Design
Geology for Drilling Engineers
Reservoir Engineering
Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data



Course Tutors



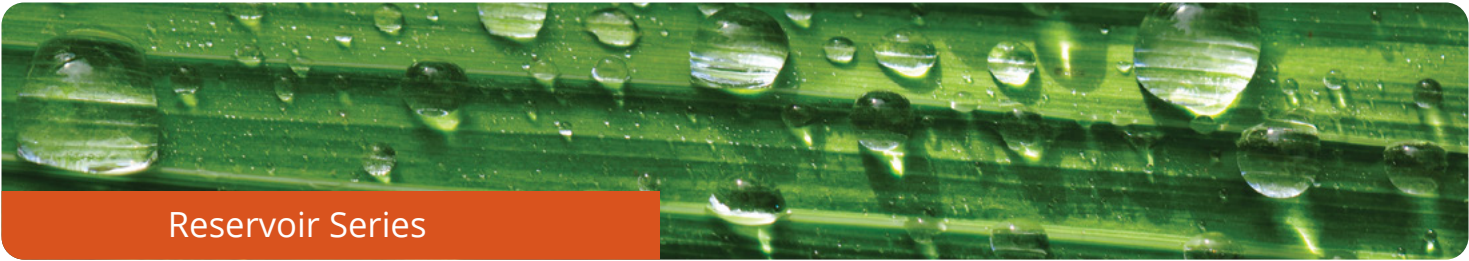
Jerry Hadwin BSc, MEng

Main Series tutoring: Reservoir, Early Development, Open Air

Industry experience: over 35 years, reservoir engineering

Career background: Shell, TRACS and AGR

Personal: Co-author 'Adventure Trekking in Oman'



Applied Reservoir Engineering (PDO Specific)

Designed for:

The course is aimed at PDO petroleum engineers early in their industry careers who require a secure grounding in the technical fundamentals of reservoir engineering as they apply to PDO operations.

Duration
(days)



Learning Level:

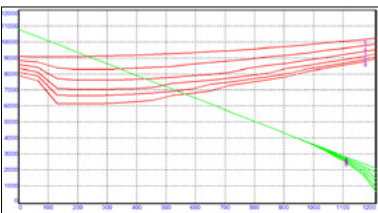
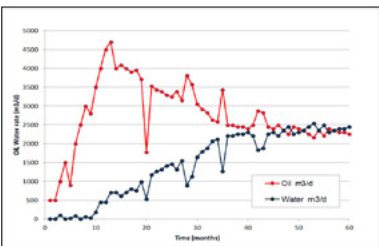
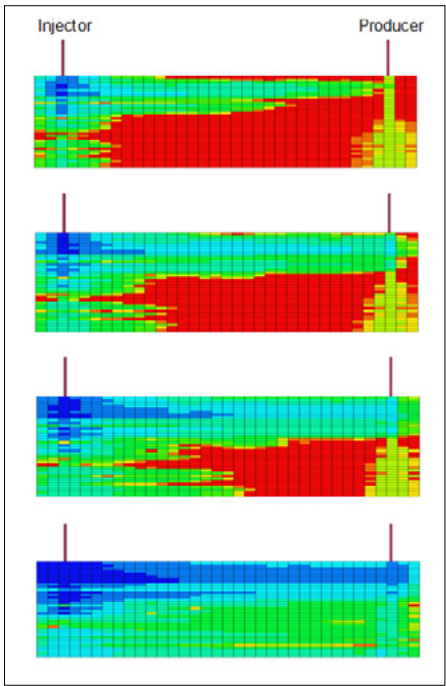
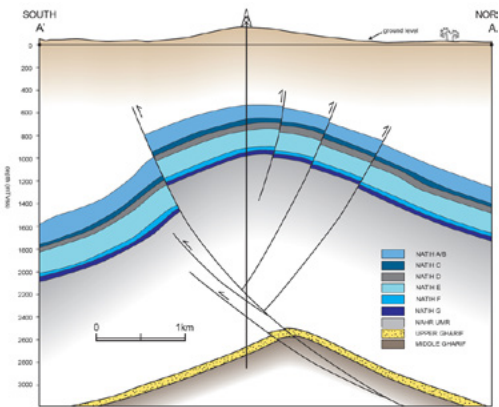
Skills	■	■	■
Knowledge	■	■	■
Awareness	■	■	■

This course has been built specifically for the Middle East and uses dynamic field data from Natih and Gharif reservoirs, mapped on to analogue outcrops around Nizwa.

The course revisits the fundamentals of reservoir engineering which every petroleum engineer should understand fully, and applies these fundamentals to the core tasks of reservoir engineer. The course will cover the standard reservoir engineering principles of heterogeneous flow in matrix and fracture systems, the techniques of material balance, oil and gas PVT analysis and well testing. These will be applied to determine well rates, recovery under depletion and waterflood, culminating in production forecasting with associated uncertainty. Running the event partly 'Open Air™' allows the crucial aspect of scale to be appreciated first-hand.

The course makes extensive use of the 'Madmar Field' case study as a red thread to tie these concepts together. Madmar is a synthetic oil and gas field case sized to fit the scaled to the outcrops near Nizwa and populated with data from Natih and Gharif producing reservoirs. The course culminates in a forecasting exercise for the Madmar Field case.

The objective is for petroleum engineers who have had basic training in reservoir engineering to take that knowledge out in to the field, consolidate what they know and build on it. Attendees should come out of the event with a clear view of the component parts of reservoir engineering work, and a thorough understanding of how the components come together to produce forecasts.



Early Development
E&P Overview
Reservoir
Wells

Business & Risk
Open Air
Coaching
Master Class



Applied Reservoir Engineering continued

Course Content:

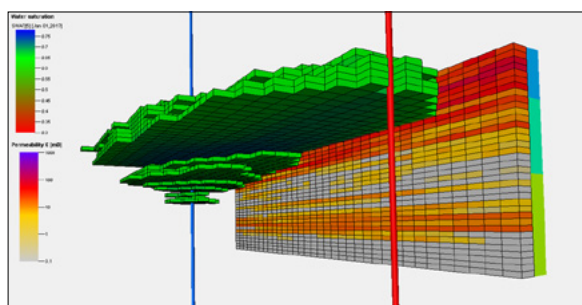
- Fundamentals of flow in porous media
- Flow in fractures
- Application of material balance techniques
- Oil and gas PVT
- Well test interpretation
- Determinants of rate
- Recovery under depletion
- Recovery under waterflood
- Productivity of horizontal vs. vertical wells
- Simulation
- Production forecasting
- Forecast uncertainty and resource definition

Course Duration:

Duration is 5 days

Logistics:

Golden Tulip Hotel, Nizwa (3 days) and
Intercontinental Hotel, Muscat (2 days)



Course Tutors

Courses available from this series:

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Applied Reservoir Engineering
Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data



Mark Cook BSc, MBA

Main Series tutoring: Early Development, Business & Risk, Reservoir Engineering

Industry experience: over 40 years, reservoir engineering, economics and risk analysis

Career background: Shell, TRACS (Director) and AGR (VP)

Personal: Author, 'Petroleum Economics and Risk Analysis' (2021) 'Hydrocarbon Exploration and Production' (2008) SPE distinguished lecturer on Risk Analysis, Guest lecturer at Heriot Watt University



Richard Oxlade MEng, BSc

Main Series tutoring: Reservoir, Early Development, Master Class (business)

Industry experience: over 40 years, commercial, reservoir engineering

Career background: BP, AGR and TRACS

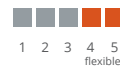
Personal: Global advisor, business planning & economic analysis

Well Test Design and Analysis

Designed for:

The course is written for engineers who will be involved in both planning and interpreting well tests. A reasonable level of reservoir engineering knowledge is required, eg fluid property characterisation. It is suitable for reservoir engineers with 1-5 years experience, or those who have not practised well test design and analysis before.

Duration (days)

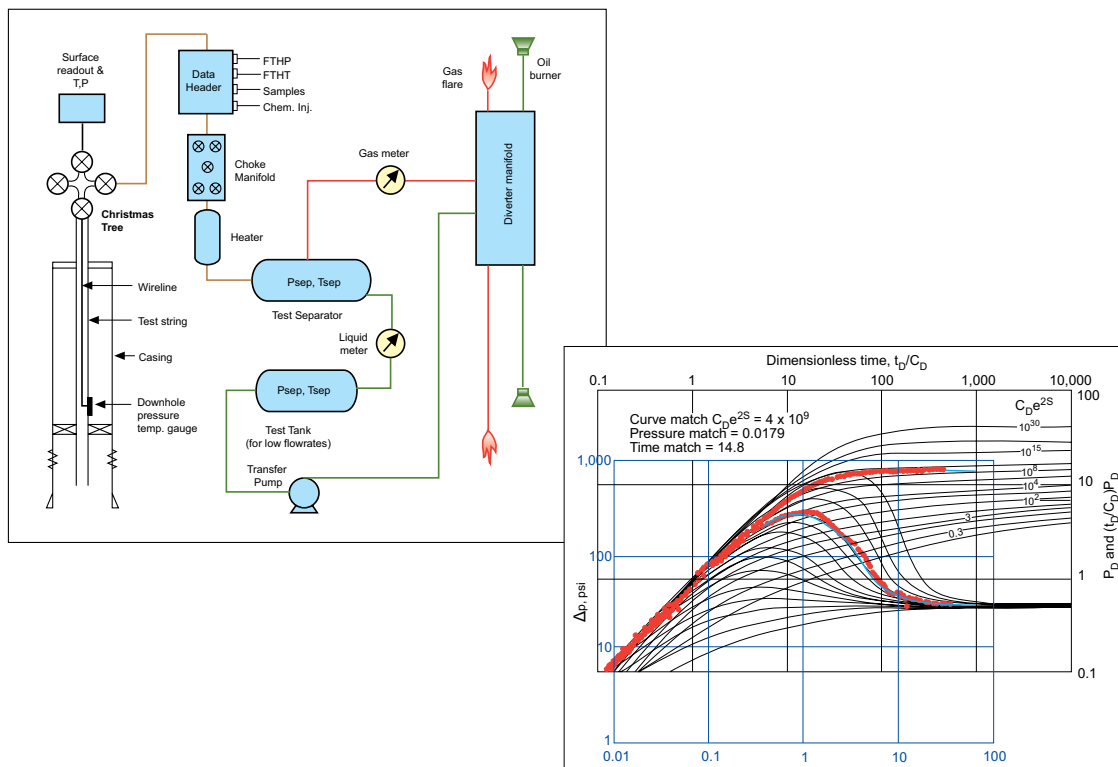


Learning Level:

Skills	■ ■ ■
Knowledge	■ ■ ■
Awareness	■ ■ ■

This course shows you how to approach the planning, witnessing, interpretation and reporting of a well test. An expansive case study is provided which is used as an example of oil well testing. Separate examples are used for gas well testing and other more complex tests.

The mathematical background to transient pressure testing is covered in sufficient detail to allow the theory behind the basic interpretation techniques to be understood.



Well Test Design and Analysis continued

Course Content:

- Introduction to Well Testing
Overview of Well Behavior and Testing,
Objectives of Well Testing,
Plan of this Course Manual
- Fundamentals of Fluid Flow in Porous Media
Diffusivity Equation,
Boundary Conditions,
Superposition
- Flow and Build-Up Test Analysis for Oil Wells
Analysis of Flow Tests,
Analysis of Build-up Tests,
Radius of Investigation,
Wellbore Storage Effects,
Skin - damage and stimulation,
Effect of Partial Penetration and Deviation,
Drainage Area Pressure, Distance to Boundaries
- Flow and Build-Up Test Analysis for Natural Gas Wells
Pseudopressure,
Non-Darcy Flow,
Analysis of Gas Well Flow Tests,
Multirate Tests,
Analysis of Gas Well Build-up Tests
- Type Curve Analysis
Ramey Type Curves,
Gringarten et al Type Curves,
Bourdet et al Derivative Type Curves,
Use of Commercial Well Test Analysis Software
- Drill Stem Testing
Equipment,
Design and Execution,
Analysis - Ramey et al ,
Closed Chamber DST
- Special Applications
Interference and Pulse Testing,
Hydraulically Fractured Wells,
Naturally Fractured Reservoirs,
Horizontal Well Analysis

Course Duration:

Duration is 3 - 5 days

Courses available from this series:

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Well Test Design and Analysis
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Structural Models in Seismic Data

Course Tutor



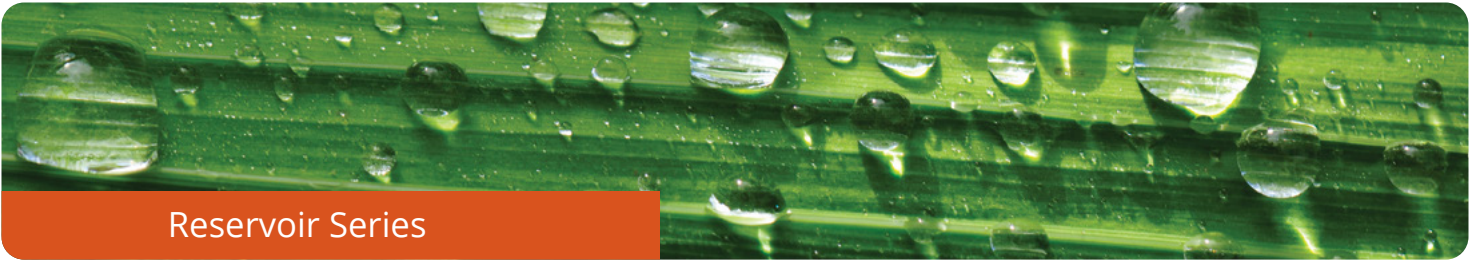
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(2021) 'Hydrocarbon Exploration and Production' (2008) SPE
distinguished lecturer on Risk Analysis, Guest lecturer at
Heriot Watt University



Geomechanics

Designed for:

This course is designed for geophysicists, geologists, petrophysicists petroleum engineers, reservoir engineers, drilling engineers and production engineers.

Duration (days)

1 2 3 4 5 flexible

Learning Level:

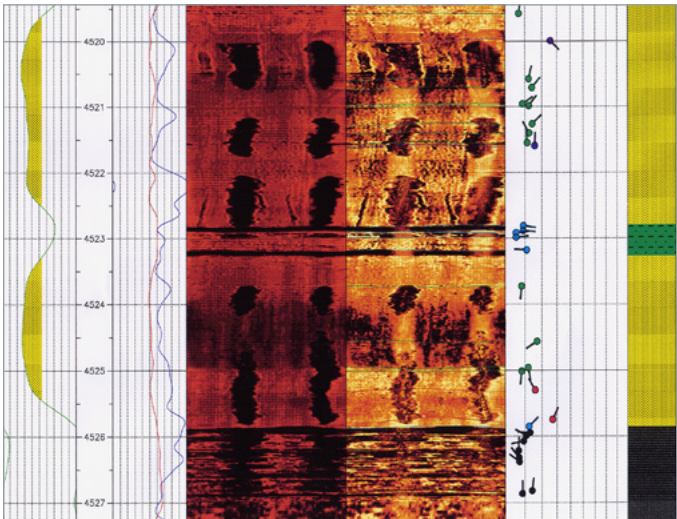
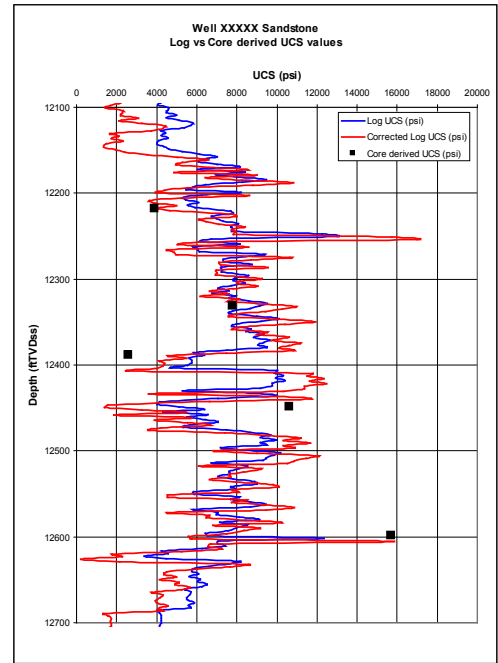
Skills

Knowledge

Awareness

Reservoir geomechanics (or rock mechanics) can mean many things to many people and these different perceptions can lead to gaps in knowledge and misunderstanding between different disciplines.

In this course we introduce basic geomechanics concepts and processes to provide a level playing field. We also provide examples (with exercises) covering how this knowledge can be applied in the hydrocarbons industry for drilling wells, completion and stimulation designs, reservoir modelling and production / injection simulations.





Reservoir Series

Geomechanics continued

Course Content

Theory & Measurement

Basic Theory (with exercises)

- Stress-Strain relationships
- Material Properties
- Mohr circles
- Intact rock failure vs discontinuity reactivation
- Structural geology – natural geomechanics
- Elasticity theory
- Rock physics (acoustic wave propagation)
- Wellbore stress system

Measurement (with exercises)

- Stress tensor
- Pore pressure
- Elastic moduli (from well data and seismic)
- Rock strength (compressive and tensile)
- Friction angle
- Biot factor

Course Duration:

Duration is 4 or 5 days depending on whether it involves one or two trainers and if a field day is included.

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Application & Management

Drilling (with exercises)

- Wellbore stresses (stress tensor rotation)
- Wellbore stability models (e.g. Mohr Coulomb, Modified Lade)
- Calibration from offset wells (drilling report data)
- Wellbore design examples (anisotropic failure, open natural fractures)

Productivity (with exercises)

- Sand production prediction (empirical and numerical)
- Sand control (completion design, drawdown, depletion and rate constraints)
- Introduction to hydraulic fracture design (2D and pseudo 3D models, proppant schedules)
- Introduction to acid fracture design (2D and pseudo 3D models, diversion control)

Reservoir Performance

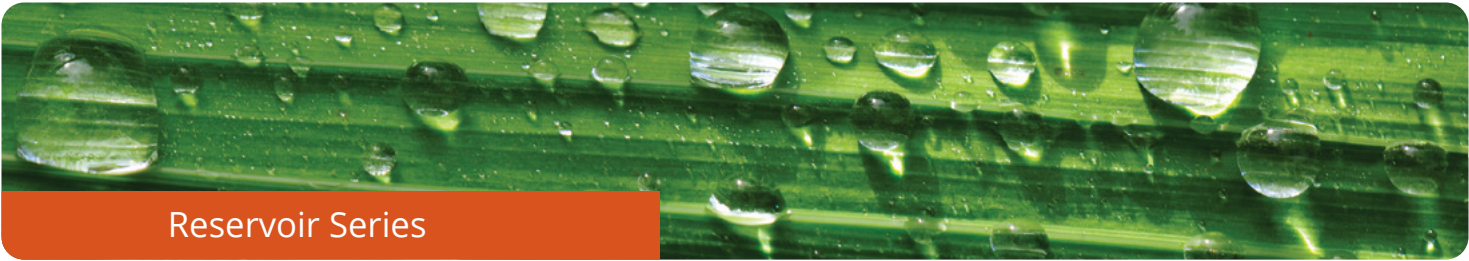
- 3D reservoir geomechanical model construction (well data, seismic inversion data)
- 3D Wellbore stability (trajectory screening & optimisation)
- Production effects (compaction, subsidence, fault reactivation, poroelasticity)
- Injection effects (caprock tensile failure, fault reactivation, poroelasticity)
- Naturally fractured reservoirs (fracture compressibility, permeability changes)

Course Tutors



Tim Wynn PhD

Main Series tutoring: Reservoir, Energy Transition and renewables, Master Class and Open Air
Industry experience: Over 30 years, Geology & Geomechanics
Career background: British Gas, ICE Energy, and TRACS
Personal: An editor and technical paper reviewer on several publications and has published a number of technical articles and papers



Structural Models in Seismic Data

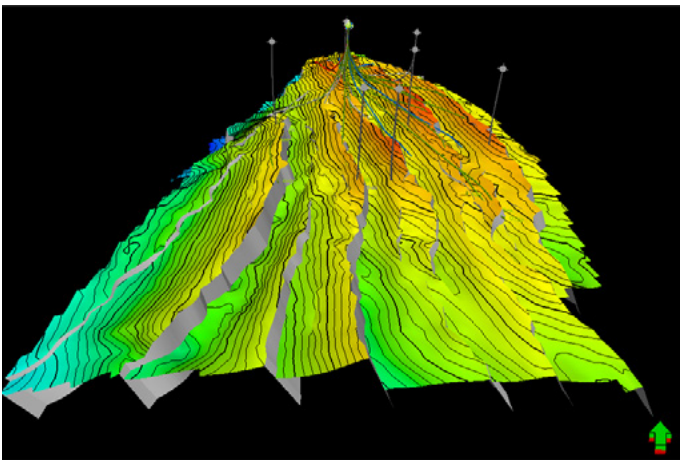
Designed for: The course is as applicable to interpreters, and reservoir modellers as it is asset evaluation manager who need awareness of confidence in the output.	Duration (days) 1 2 3 4 flexible	Learning Level: Skills Knowledge Awareness
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Why the uncertainty in your structural model really does matter.

With the advent of extensive 3D data it is all too easy to determine top reservoir horizon from well picks, autopick and generate a structure map. Once generated this is then used in the first instance to generate a prospect and then subsequently as the input into reservoir modelling. Despite being fundamental in volumetric determination and prediction of fluid migration, the uncertainty, and inaccuracy, in this structure map is often under estimated.

Recent advances of automated fault picking in part reduces the time taken to generate structure maps and corresponding fault networks, which can reduce this uncertainty, but all interpretation still needs to be QC'd and be sensible. Critically, these advances still require the interpreter to understand both fault behaviour and impact on reservoir distribution and integrity.

The central theme of this event is construction of robust structural models and develop an understanding and appreciation of the uncertainties within them and how to evaluate multiple scenarios.





Reservoir Series

Structural Models in Seismic Data continued

Course Content

The course content is organised around the following:

- Data interpretation and conditioning
- Determination of structures controlling reservoir distribution or integrity
- High confidence fault picking and initial fault model
- Application of fault statistics to fault models
- Addressing uncertainty in fault models and consideration of lower confidence, sub-seismic resolution features
- Impact of faulting on fluid migration

Course Duration:

The scope of the course is 4 days, or flexed to suit the client's requirement. The primary course will provide an overview across all tectonic settings and include both 2D and 3D data types with applicability at prospect and reservoir scales. The course can be more specifically tailored for extensional or contractional systems, and prospect generation or reservoir modelling.

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Well Test Design and Analysis
Geomechanics
Structural Models in Seismic Data

Course Tutors



Douglas Paton PhD

Main Series tutoring: Reservoir, Open Air

Industry experience: 20 years, geoscience

Career background: Conoco-Phillips, Chevron, BHP, Saudi Aramco, TectonKnow

Personal: Published over 60 scientific articles and papers. Invited committee member, GCSSPEM Roberts meeting (2021). Invited member for AAPG International Research Committee (2017-present)

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