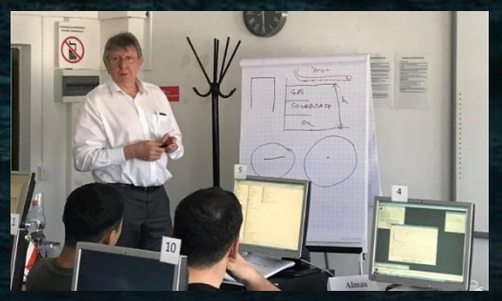
Subsurface Engineering, Geosciences and Production Engineering Experts

OPC Training Catalogue 2019

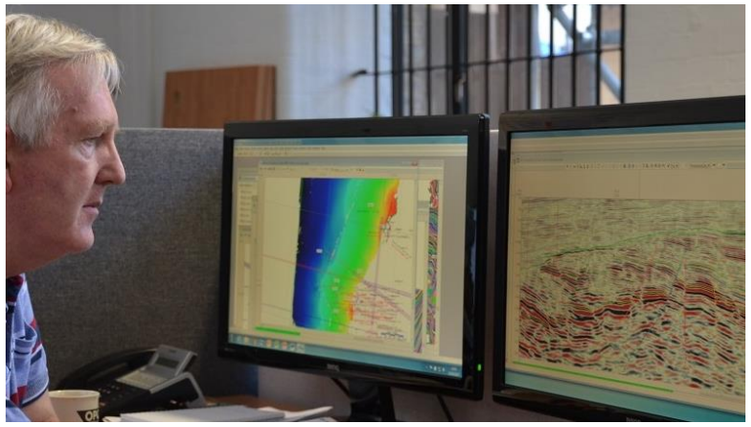


Introduction to OPC

Established in 1988, Oilfield Production Consultants (OPC) is a global technical services consultancy providing fully integrated geosciences, subsurface engineering, production technology, reservoir surveillance and management expertise to NOCs, IOCs and Independents in the oil and gas exploration and production industry.

We have offices in London, Aberdeen, Stavanger, Atyrau, Astana, Doha, Dubai, Lagos and Houston with representative offices in Kuwait, Iraq, Abu Dhabi, Malaysia and Egypt. We have staff, consultants and technology deployed in-house at OPC and externally at our clients' offices and well sites

OPC is ISO 9001:2008 certified, guaranteeing a quality product. OPC is certified by the London and New York Stock Exchanges as a "competent entity" under their Listing Rules.



OPC Training Services

OPC Technical Training Services (TTS) has been developed to support company's gain the highest return from their human capital. We have taken a specific focus on regions in which there is an appetite to train and develop the national workforce.

OPC provide high quality training and educational courses on a wide range of topics within the oil and gas industry.

All of our training programmes are hosted and delivered by experienced and industry-recognised tutors, many of whom regularly lecture in collaboration with leading institutions such as the SPE, Imperial College, London and the Institut Français du Petrole

The majority of our training is delivered through bespoke courses developed to meet the specific requirements of an individual client and the specific training needs of their personnel. Training is delivered at the client's location or at a suitable off-site training centre. It is frequently supported by additional mentoring and ongoing support for the client's staff.

OPC is delivering training in countries where nationalisation programmes require companies to employ a high ratio of local nationals to expatriates to enable sustainable economic growth. Our specialist expertise is deployed in support of national employee development programmes to enable employers to meet Government targets.

We have an ever expanding range of training courses covering the following general topics:

- General Management
- Geology, Geophysics and Petrophysics
- Drilling Operations
- Reservoir and Production Engineering
- Field Development Planning
- Economics and Commercial

Training course summary

General Management

"Petroleum Explored" - An Introduction to E&P

Introduction to Data Management

The Digital Oilfield

E&PD Contracts (Policy, Process, Monitoring & Assessment)

Geology, Geophysics and Petrophysics

Introduction to Petroleum Geology

Fundamentals of Applied Petrophysics

Cased Hole Logging & Production Log Evaluation

Seismic Interpretation

AVO and Seismic Inversion

Rock Physics & Petrophysics for Seismic Interpretation

SCAL: Programming, Design, Implementation, QC & Evaluation

Integration of Core & Log Data

Core Analysis and Reservoir Characterisation

Play Assessment and Prospect Evaluation

Exploration & Development Geology Workshop

Geophysics Workshop

Drilling Operations

Introduction to Drilling & Completions Operations

Drilling Operations Workshop

Stuck Pipe

Fundamentals of Well Control

Casing Cementing - Current Leading Practice & New Techniques

Advanced Well Cementing

Drilling Practices

Advanced Drilling Practices

Advanced Drilling & Completion Technique

Completion and Workovers

Advanced Coiled Tubing Intervention Design

Drill Bit Technology

Economics & Commercial

Introduction to International Petroleum Economics

Petroleum Economics & Risk Analysis

Front End Loading for E&P Projects (FID)

Reservoir and Production Engineering

Practical Well Test Interpretation

Advanced Well Test Interpretation

Reservoir Characterisation

Reservoir Surveillance – Effective Use of Permanent Downhole Pressure Data

Integrated Reservoir Management

Basic Reservoir Engineering for Production Operations Staff

Advanced Hydraulic Fracturing

Fractured Reservoirs

Evaluation and Developing Heavy Oil Resources

Reservoir Engineering Workshop

Dynamic Reservoir Simulation

Fluid Properties & Phase Behaviour (PVT)

Advanced EOR/IOR

Chemical EOR Fundamental's

Enhanced Oil Recovery Fundamentals

Evaluation and Management of Fractured Reservoirs

Artificial Lift Systems

Field Development Planning (FDP)

Introduction to Field Development Panning

Field Development Planning (FDP) - Subsurface

Field Development Planning (FDP) – Subsurface & Facilities

"Petroleum Explored" An Introduction to E&P

Duration 1 day
Code GM/PE/01

Course Objectives

To give newcomers to the industry an appreciation of how the E&P business operates.

This course will describe:

- How the industry has reached where it is today
- What the jargon means
- How the different technical and commercial experts combine to efficiently exploit oil and gas reservoirs
- What can we expect in the future

Who Should Attend?

The course will be suitable for all staff who have just joined the industry and to existing employees who would like to better understand how their specialist role contributes to the company's development and growth.

Course Outline

Welcome to the Oil & Gas Industry

- What's so special about oil & gas?
- In basic terms, what does it do?
- What are you talking about? Here's some basic jargon
- How has it got to where it is now?
- What's coming up for the rest of the day?

How Do we Find Oil & Gas?

- Where do O&G come from?
- How do they end up in reservoirs?
- So how do we know where it is?
- How much is there?
- Are you sure?

We've Found it, so What Can we Do with it Now?

- How can we get it out of the ground?
- How can we prove it's all there?
- What can we do to recover as much as possible?

What Shall we Build?

- What processing facilities do we need?
- What's different about offshore?
- What factors control the design?
- How do you manage the construction project?

So Who Gets to Make all the Money?

- Whose oil is it?
- What's it worth – supply & demand?
- Can we afford to develop our fields?
- How do we choose the best projects?
- Did somebody mention risk?

How Do we Go about Selling our Oil & Gas?

- When will we run out of oil?
- How much more have we found?
- So how can we get some more?
- Can't we use something else?
- What about global warming?
- Let's go for renewables then, shall we?

Introduction to Data Management

Duration 5 days
Code GM/IDM/02

Course Objectives

To identify the core data types used in the E&P industry and how to maximise the value of the available information within an effective data management

Who Should Attend?

Any asset team members from junior to management level gaining an in-depth understanding to workflow optimization and data management

Course Outline

Introductions and Ice Breaker

- What is data and why is it an asset?
- Data types in the E&P industry
- Group exercise on data types
- Use of data standards in E&P
- WITSML demonstration
- Data management best practices
- Data models and databases

Data management

- Understanding business value
- Group exercise on business value
- Common data management issues and challenges
- Working group discussions and presentations on data management challenges

The Value of Data Management

- Group exercise "What is data management?" with feedback presentations
- Why is data management important?
- Video on data management importance
- Understanding data as an asset and treating it appropriately

Data Management Framework

- Defining a data management framework
- Working group discussions on the important elements to support the data management framework with feedback presentations
- An example high level data management framework

Data Management Challenges

- Data management challenges: governance, quality, security and system of record
- Working group discussions on orchestrating the data management challenges with feedback presentations
- Data management – putting it all together

The Digital Oilfield

Duration 2 days
Code GM/DO/03

Course Objectives

To review the current use of IT applications in the oil & gas industry and how they can be extended & combined into an integrated management system.

Who Should Attend?

Any asset team members from junior to management level gaining an in-depth understanding to workflow optimization and data management

Course Outline

Day One

- What is a digital oilfield?
- The upstream digital oilfield
- Current applications in the subsurface
- Well production – drilling & completions
- Production operations
- Pipelines & export
- Digital oilfield data

Day Two

- Engaging the workforce
- Workflow design
- The IT foundation of the digital oilfield
- Getting into action
- Hopes for the future

E&PD Contracts (Policy, Process, Monitoring & Assessment)

Duration 5 days
Code GM/EPD/04

Course Objectives

To learn the philosophy, evolution, and fundamentals of international petroleum contracts and have an opportunity to see how each of these actually works

Who Should Attend?

For senior staff who are involved in E&PD contracts to gain an in-depth understanding of the workflow optimization of international petroleum contracts. Contract Policy, Process, Initiating, Planning, Tendering and Bid Evaluation, Negotiation, Execution, Monitoring and closing.

Course Outline

Day One

- Introduction
- Ownership of Oil & Gas in situ
- Contracts in general
- Petroleum E&PD contracts
- Review of day's lessons

Day Two

- Contracting Objectives
- Tendering for E&PD contracts
- Concessions
- Production sharing contracts
- Review of days lessons

Day Three

- Analysis of an E&PD contract (1)
- Review of day's lessons

Day Four

- Analysis of an E&PD contract (2)
- Review of day's lessons

Day Five

- Negotiating Skills
- Ethics and E&PD contracting
- Simulation exercise
- Closing review

Introduction to Petroleum Geology

Duration 5 days
Code GGP/IPG/01

Course Objectives

To provide participants with an understanding of how oil and gas reservoirs have been formed and how, with limited sub-surface information, reservoir size can be estimated.

Who Should Attend?

The course is designed for explorationists and managers with limited experience and operations staff who have not had significant geological training

Course Outline

Reservoir Geology

Fundamentals of petroleum geology

Classification of reservoirs; Geology, Geophysics & Petrophysics

- Controls on reservoir development Depositional
- Structural

Introduction to the acquisition, processing and interpretation of seismic data

Influences of geological characteristics on appraisal and development

Reservoir Fluids

Rock properties

- Porosity
- Permeability
- Pore size distribution
- Wettability

Physical properties of liquids and gases

PVT and phase behaviour

Flow in porous media

Multi-phase flow

Estimating Hydrocarbon Volumes

Basic principles of reserves & resources classification

Deterministic and probabilistic approaches to calculating volumetrics

Addressing the problems of uncertainty

Fundamentals of Applied Petrophysics

Duration 5 days
Code GGP/FAP/02

Course Objectives

To give participants a good understanding of logging operations, the fundamentals of petrophysical relationships and how their work interacts with that of petroleum engineers.

Who Should Attend?

The course will be suitable for geoscientists and engineers responsible for the day-to-day management of reservoirs.

Course Outline

Logging Operations
- Surface & downhole equipment
- Tool principles
- Log headers

Lithology Determination
- Mud logs
- Gamma ray
- Spontaneous potential

Quick-look Approach
- Pay calculation
- Cross-plots
- Archie equations
- Pickett plot

Porosity
- Density, neutron, sonic
- Quality control
- Lithology & porosity
- Uncertainty

Saturation
- Laterologs & induction logs
- Saturation determination & uncertainty

Data Integration
- Zonation
- Contacts
- Uncertainty

Pressure Data
- Tool physics
- Plotting & interpretation
- Gradients & FWL

Cased Hole Logging & Production Log Evaluation

Duration 5 days
Code GGP/CHL/03

Course Objectives

To give participants a good understanding of the fundamentals of cased hole production logging.

Who Should Attend?

The course is aimed at Persons who may be involved in the planning or supervision of Cased Hole logging operations or use the finished interpretation.

Course Outline

Introduction to Production Logging
- Reservoir monitoring
- Production logging measurement
- Application of production logging

Fluid Dynamics & Properties
- Fluid flow fundamentals
- Fluid conversions

Single Phase Measurements and Interpretation
- Single phase flow - overview
- Basic measurements
- Single phase flow – interpretation

Two Phase Measurement and Interpretation
- Multiphase flow – overview
- Two-phase fluid mechanics
- Multiphase flow measurement tools
- Two-phase interpretation - main PL formulae

Reservoir Monitoring Tools
- Saturation related problems
- Introduction to nuclear interactions
- Pulse neutron tools
- Pulse neutron interpretation

Cement Evaluation
- Introduction
- Cement evaluation tools
- Cement evaluation interpretation

Pipe Integrity
- Introduction
- Corrosion types
- Corrosion evaluation tools

Seismic Interpretation

Duration 10 days
Code GGP/SI/04

Course Objectives

The objective of this training course is to give participants an understanding of seismic methods and the underlying geological concepts.

The course members will learn:

- To integrate seismic data with other forms of exploration data
- Recognize structural and stratigraphic styles
- Interpret 2D and 3D seismic data-sets on paper and workstation
- To create seismic travel time maps from interpretation
- Create depth maps from velocity mapping and modelling

Who Should Attend?

The course will be suitable for young geoscientists who have had only limited opportunities to develop their formal training. They will gain practical experience of seismic interpretation using real-life data-sets.

Course Outline

Day 1
- Course introduction
- Geology, Geophysics & Petrophysics
- Methods & concepts in seismic acquisition and processing

Day 2
- Basic geological concepts
- Tying wells and exploration data to seismic data/ synthetics

Day 3
- Field excursion – seismic scale related to geological scale
- Interpretation of extensional and compressional features on 2D seismic data

Day 4
- Continue Interpretation of extensional and compressional features on 2D seismic data
- Interpretation of stratigraphic features on 2D seismic data

Day 5
- Summary of 2D interpretation lessons
- Interpretation of complete 2D & 3D datasets on workstation

Days 6 & 7
- Continue Interpretation of complete 2D & 3D datasets on workstation

Day 8
- Mapping in the time domain
- Velocity model determination and mapping

Day 9
- Depth mapping
- Description of "advanced methods" – seismic attributes, AVO, 4D

Day 10
- Interpretation pitfalls
- Review of course topics
- Discussion

AVO and Seismic Inversion

Duration 5 days
Code GGP/AVO/05

Course Objectives

OPC offers a 5 day training course in AVO and Seismic inversion to build a thorough understanding of the techniques used transforming seismic reflection data into a quantitative rock-property description of a reservoir. The course will cover seismic inversion from post-stack, deterministic, random or geostatistical perspective.

Who should attend?

The course is aimed at geoscientists who aim to gain a better understanding and practical application of AVO and Seismic inversion

Course Outline

Day 1
- Different disciplines in reservoir characterisation
- Structural and stratigraphic interpretation
- Vertical Seismic Profiling (VSP)
- Seismic signal and data processing

Day 2
- Sequence stratigraphic interpretation
- Introduction to AVO and inversion methods
- Seismic attributes
- Case study and exercise

Day 3
- AVO and inversion
- Introduction to rock physics theory and applications
- Reservoir characterisation by seismic modelling

Day 4
- Introduction to log interpretation and seismic petrophysics
- Noise in seismic data interpretation
- Hydrocarbon indicators
- Case study and exercise

Day 5
- Time lapse seismic, monitoring and passive seismics
- Geo-statistical and neural network techniques
- Case studies and exercise

Rock Physics & Petrophysics for Seismic Interpretation

Duration 5 days
Code GGP/RRP/06

Course Topics

- Rock Physics vs Petrophysics, anisotropy, elastic properties, heterogeneous media
- Modulus e.g. Permeability-porosity relationship, critical porosity, dual porosity, Gassmann's equation
- Velocity-porosity relation for shales, shaly sand & carbonates, Vp & Vs, rock compressibility, elastic impedance, Reflection coefficient, AVO
- Pore pressure and effective stress, Biot theory, poroelasticity, Fracture gradient, stress modeling, stress sensitivity of shales & sands, sediment compaction
- Shale Anisotropy, Fractured reservoir, rock physics models for fractures, seismic characterisation of fractured reservoir, mapping of fracture corridors
- Borehole stability, Reservoir Geomechanics, 4D seismic monitoring and prediction of pressure and saturation through seismic data

Course Outline

Day 1
- Introduction to Rock Physics and Petrophysics
- Geology, Geophysics & Petrophysics
- Pore pressure, in situ stress and geomechanical properties Porosity and permeability
- Sediment compaction and microstructure
- Estimation of min and max stress and tectonic strains

Day 2
- Fractured reservoirs
- Seismic (AVO) attributes
- Borehole and seismic methods, including VSP
- Mapping of fracture corridors in naturally fractured reservoirs
- Case story Kuwait fracture corridors

Day 3
- Seismic inversion fundamentals
- Lithology and fluid prediction
- Exercise fluid prediction from seismic
- Petrophysics and log interpretation
- Introduction to modern massive pre-stack data applications

Day 4
- Further on lithology and pore-fluid prediction from well and seismic data
- Exercises MATLAB with real input data
- Hybrid AVO/elastic inversion
- Case story integrated reservoir study
- 4D seismic monitoring

Day 5
- Statistical rock physics
- Exercise with MATLAB, estimate pdf
- Case stories of modern massive prestack data application
- Finding a balance between theory and the geoscientist´s toolbox

SCAL: Programing, Design, Implementation, QC & Evaluation

Duration 5 days
Code GGP/SCAL/07

Course Objectives

- Design SCAL programs as per specific objectives
- QC data and eliminate non representative ones
- Understand the wettability and capillary pressure concepts and evaluate reported relative permeability curves
- Relate permeability results to rock types and make necessary adjustments and refinements
- Capillary Pressure Analysis and Rock Typing
- Determination of Residual Oil Saturation out of relative permeability curves
- Carry out a systematic review of a laboratory report and differentiate results that are clearly invalid from those that may be reliable

Course Outline

Introduction & Steady-State Technique

- Introduction
- Steady-State Technique, Basics
- Steady-State Technique, Analytical interpretation with exercises in Excel
- Steady-State Technique, Best Practice: interpretation-by-simulation, hands-on through exercises with the SCORES/DuMux simulator

Core Plug Preparation & UnSteady-State Technique

- Core plug preparation
- UnSteady-State (Welge) Technique, Basics
- UnSteady-State (Welge) Technique, Analytical interpretation with exercises in Excel
- UnSteady-State (Welge) Technique, Best Practice: interpretation-by-simulation, hands-on through exercises with the SCORES/DuMux simulator

Centrifuge Technique & SCAL Data Quality Assessment

- Centrifuge Technique, Basics
- Centrifuge Technique, Analytical interpretation with exercises in Excel
- Centrifuge Technique, Best Practice: interpretation-by-simulation, hands-on through exercises with the SCORES/DuMux simulator
- SCAL quality assessment

Porous Plate Technique, SCAL for Gas Flooding Experiments, Strengths and Weaknesses of each SCAL Technique

- Porous Plate Technique, Basics
- Porous Plate Technique, Analytical interpretation with exercises in Excel
- Porous Plate Technique, Best Practice: interpretation-by-simulation, hands-on through exercises with the SCORES/DuMux simulator
- SCAL for gas flooding experiments, Understand limitations of UnSteady-State and Steady-State techniques through exercises in Excel
- SCAL for gas flooding experiments, 3-phase relative permeabilities, spreading condition, centrifuge experiments for GOGD
- SCAL for gas flooding experiments, Best Practice: interpretation-by-simulation, hands-on through exercises with the SCORES/DuMux simulator
- Plenary discussion of strength and weaknesses of each SCAL measurement technique

SCAL for EOR, Implementation of SCAL Data into Reservoir Model, and SCAL Master Measurement Program

- SCAL for EOR
- Implementation of SCAL data into Reservoir Model
- Plenary discussion on the design of a Master measurement program

Integration of Core & Log Data

Duration 5 days
Code GGP/ICLD/08

Course Objectives

- Understand Lab Core measurements- RCAL and SCAL
- Determine reservoir properties from Log interpretation and compare it with core measurements and define rock types
- Determine Electrofacies and derive Poro-Perm Relation, well Test Analysis
- Integrate Core, Log and Test data for Reservoir Modeling

Course Outline

Day 1

- Logging tools available to predict or measure reservoir properties Core analysis methods to measure reservoir properties (porosity, permeability, grain density and saturation)
- Electrical properties
- Log analysis

Day 2 & 3

- Log analysis, determine PHI, SW, lithology using deterministic and probabilistic methods
- Summaries
- Examples

Day 3 & 4

- Rock typing and hydraulic units
- Electrofacies and Lithofacies
- Permeability prediction
- Reservoir Rock properties from SCAL-Relative Permeability, Capillary Pressure, Wettability, Electrical properties
- Well Test Analysis, Integration with Petrophysical Analysis
- Examples

Day 5

- Uncertainty
- Monte Carlos sensitivity
- Conclusion

Core Analysis and Reservoir Characterisation

Duration 5 days
Code GGP/CARC/09

Course Objectives

- Understanding Core Porosity, Permeability, Wettability- their measurement and quality control.
- Understanding Rock Properties Required for Reservoir Simulation.
- Understand and Validate SCAL Report and Design SCAL Programme.
- Measurement of SCAL Properties.
- Two Phase Flow Properties and Averaging Petrophysical Properties.
- The course will be a combination of short lectures, practical workshops and plenary discussions to consolidate learning.
- Sessions will be structured carefully to ensure optimisation of learning expectations verbally and on PowerPoint, followed by practical exercises to embed understanding.
- Discussions and question and answer sessions are encouraged to ensure understanding.
- Each session will contain a practical exercise which will be either on paper or in Excel. Attendees should be familiar with basic calculation and charting functions in Excel.

Course Outline

Day 1

- Introduction to the Course
- Data Requirements for Reservoir Characterisation & Reservoir Simulation
- Overview of Coring & Core Recovery
- The Effect of Core Handling on Data Quality
- The Impact of Core Quality on Core Analysis Data
- The Impact of Heterogeneity on Core Analysis and SCAL Programme

Day 2

- Core Porosity – Understanding Different Measurements and Factors Effecting Data Quality
- Permeability – Controlling Factors, Measurement Choices and Quality Control
- Pore Volume Compressibility and its effects on
- Porosity and Permeability

Day 3

- Water Saturation from Core – Dean-Stark Measurements – Theory, Best Practice and Integration with Log and Other Core Data
- Electrical Properties – Theory, Measurements and Integration with Common Resistivity-Saturation Models
- Nuclear Magnetic Resonance (NMR) – Theory, Measurements and Calibration for Bound Fluid and Permeability Models
- Capillary Pressure - Theory & Understanding the Controls on Fluid Distribution

Day 4

- Capillary Pressure – Laboratory Measurements
- Capillary Pressure – Conversion to Reservoir Conditions
- Integration of Capillary Pressure into Saturation Height Function Models
- Integration of Saturation Height Functions with Log Data and Reservoir Models

Day 5

- Relative Permeability – Theory and Controls on Two Phase Fluid Flow
- Relative Permeability – Laboratory Measurement
- Quality Checking Relative Permeability Data
- Integration of Relative Permeability Data into Reservoir Models
- Upscaling and Averaging Core Analysis and Petrophysical Data
- Integration of Reservoir Geology and Core Analysis Data
- Integrating all Data and Quality Checking Legacy Data & Reports
- Course Conclusion and Review Declaration of a discovery

Play Assessment and Prospect Evaluation

Duration 5 days
Code GGP/PAPE/10

Course Objectives

- Provide a basic understanding of petroleum systems play fairway analysis, with a focus upon making playmaps and understand what is meant by "Play-Based Exploration (PBE)"
- Provide a basic underpinning of the statistical concepts needed for prospect and play analysis and contrast the differences between the two
- Provide procedures and math for quickly and consistently estimating the value generated by exploiting a family of prospects - plays and concessions: Play Risk Analysis

Course Outline

Day 1
- Sedimentary basins - setting, formation and sediment fill
- Components of a HC accumulation
- Examine the various types of data that are used in exploration

Day 2
- Petroleum systems
- Petroleum plays
- Leads
- Prospects

Day 3
- The volumetric equation: GRV, N/G, porosity, saturation, shrinkage
- Petroleum resource
- Recovery factor
- Petroleum reserves

Day 4
- Risk, uncertainty and probability
- Monte Carlo analysis
- Field size distributions
- Basic economics: NPV, ROR, EMV
- Decision trees

Day 5
- Declaration of a discovery
- Designing an appraisal programme. 3D seismic and wells. Core and test programmes
- Static and dynamic modelling, history matching
- Predicting production profiles
- Designing a Field Development Programme

Exploration and Development Geology - Fundamentals

Duration 5 days
Code GGP/EDGW/12

Course Objectives

- Provide a basic understanding of formation pressures.
- Learn why understanding formation pressure is so important.
- Learn what geopressure is and how it is generated.
- Learn what pore pressure is and how it is generated, including normal pressure, overpressure and under pressure.
- Learn about hydrodynamics and its consequences.
- Learn how pore pressure is detected and measured by mud logging, DST and wireline testing.
- Learn what fracture pressure is and how it combines with pore pressure to define the "pressure window".
- Learn how pore pressure and fracture pressure can be predicted ahead of drilling.

Course Outline

Day 1
- The importance of understanding pressure during the exploration, appraisal, development and production phases of the petroleum project life cycle.

Day 2
- Terzaghi's Principle.
- Pore overpressure and under pressure.
- Hydrodynamics.

Day 3
- Pore pressure detection by mud logging.
- Pore pressure measurement by DST, PWD and wireline measurement.

Day 4
- Fracture pressure and fracture pressure gradient.
- LOTs, FITs.
- ECD, swab and surge.

Day 5
- The pressure window.
- Well design – hole size and casing programme's.
- Pore pressure and fracture pressure prediction.
- Two case histories.

Exploration and Development Geology Workshop

Duration 15 days
Code GGP/EDGW/12

Course Objectives

The workshop is conceptualised as a teamwork approach to Delineation stage.

At the end of the workshop, participants are expected to;

- Understand petroleum systems and plays
- Understand clastic and carbonate reservoirs
- Be able to evaluate source rock potential
- Understand the use of wireline logging techniques
- Understand evaluating basins, leads and prospects, STOIIP and risk analysis
- Understand wellsite geological operations, coring and testing

Course Outline

Day 1 & 2

- Sedimentary basins, types and plate tectonic settings, basin fill
- Source rocks: oil and gas chemistry
- How source rocks are deposited

Day 3

- Evaluating source rock potential: richness, maturity, proneness, typing oils to source rocks

Day 4 & 5

- Clastic reservoirs
- Carbonate reservoirs

Day 6 & 7

- Seal rocks
- Traps
- Regional geology of the Arabian Plate and of Kuwait

Day 8

- Evaluating sedimentary basins
- Geological field work
- Grav-mag surveying, including FTG
- Seismic surveying

Day 9

- Wellsite Geology
- Mud logging

Day 10

- Petrophysical logging. Using logs to determine lithology, porosity and fluid saturation

Day 11

- Coring, sidewall coring, conventional coring Conventional core analysis. Special core analysis
- Well testing. Wireline testing, drill stem testing, test analysis

Day 12

- The geological model
- Petroleum systems

Day 13

- Leads
- Prospects, the volumetric equation
- Deterministic HCIIP and EUR

Day 14

- Probability and uncertainty
- Prospect specific risk, prospect chance of success
- Monte Carlo analysis, probabilistic HCIIP and EURR

Day 15

Declaration of a discovery

- The appraisal programme: 3D seismic, appraisal wells
- The static model
- The Field Development Plan

Geophysics Workshop

Duration 5 days
Code GGP/GW/13

Course Objectives

The participants will be exposed to the role and value of geophysical technology in prospect exploration and field development.

Participants will also learn about wave phenomena, reflection seismology, borehole geophysics, seismic acquisition and processing sequence.

Participants will gain a basic understanding and introduction to seismic interpretation.

They will work with a sample dataset using standard work flows to integrate and interpret seismic data. The value of seismic data both during exploration and field development scenarios will be considered.

Participants shall interpret two key horizons defining the reservoir, use attributes for fault identification, produce simple depth maps, and workflow to extract attributes for estimating rock properties.

Course Outline

Day 1
- Introduction to the Geology and Geophysics of the Area of the Exercise
- Overview of Geophysics Technology

Day 2
- Geology: Basic Structural Elements
- Seismic Interpretation Exercise
- Geophysics Fundamentals

Day 3
- Geology: Carbonate Depositional Settings
- Seismic Interpretation Exercise
- Seismic Interpretation
- Basics of Seismic Data Acquisition

Day 4
- Geology: Mapping & Correlation
- Seismic Interpretation Exercise
- Basics of Seismic Data Acquisition Marine Acquisition Technology

Day 5
- Geology: Clastics Depositional Settings
- Seismic Interpretation
- Geology: Introduction to Sequence Stratigraphy
- Seismic Interpretation Exercise

Day 6
- Geology: Sequence Stratigraphy
- Seismic Interpretation Exercise
- Seismic Interpretation: Time/Depth conversion methods
- Basics of Seismic Data Processing

Day 7
- Geology: Stratigraphy of Kuwait
- Seismic Interpretation: Time/Depth conversion methods:
- Seismic Interpretation Exercise
- Basics of Seismic Data Processing

Day 8
- Overview of Geophysics Technology
- Seismic Interpretation Exercise
- Quantitative Reservoir Characterization

Day 9
- Overview of Geophysics Technology
- Seismic Interpretation Exercise
- Geophysics Topic as per Participants selection, Q & A on Geophysics in Industry and Research

Day 10
- Geology: Geological Modeling
- Overview of Geophysics Technology
- Course Feedback
- Overview of Geophysics Technology

Introduction to Drilling & Completions Operations

Duration 5 days
Code DO/IDCO/01

Course Objectives

The course covers the concepts under-pinning well control capability.

It is important for those relatively new to drilling planning and operations to fully understand how wells are planned and put in place safely, in order to avoid well control incidents.

The course combines theoretical and practical learning to cover topics including well design, well breakdown and well kill operations

Who Should Attend?

The course is designed for less experienced engineers and managers who are becoming increasingly responsible for well planning and design and drilling and also for relevant operations managers and technical support professionals.

Course Outline

Accessing Optimum Field in-fill Targets using Pilot Holes (aka Ratholing)

- Methods of identifying & defining optimum reservoir paths
- Planning of well paths to enable reaching these targets
- Designing the well casing configurations
- Considerations regarding vertical, deviated, step-out & horizontal wells
- Issues of new wells v re-use of existing wells with regard to defining objectives and making decisions on the options offered

Multilaterals – Equipment and Methods of Casing

- Equipment options available to create multilateral wells
- Alternative casings that can be used as a mother bore and as laterals
- Applying the techniques in constructing a new well
- Issues of well integrity assurance

Secondary Opening up of Producing Horizons

- Sidetracks and multilaterals
- Re-using an existing well options for using multi-lateral techniques
- Special equipment for creating openings & sidetracks from the existing well

Well Completion

- The variety of well completion equipment available
- Selecting the right equipment
- Pros and cons of specific equipment use

Completion Fluids (also known as Flush Fluids)

- Specification of well completion fluids
- Developing their precise purpose and duty
- Description of typical completion fluids

Drilling Operations Workshop

Duration 10 days
Code DO/

Course Objectives

- Fundamentals of Rig Equipment & Operations & Completions, Drilling team
- Fundamentals of Geology Pore Pressure, Primary Well Control, well control operations
- Basic Casing Design, PPFG, drilling fluids & Cementing, completions & well planning
- Well Evaluation, monitoring overburden, wireline, drilling parameters

Course Outline

Day 1
- Introduction to Petroleum Geology
- Well Planning Considerations
- Rig Types & Equipment
- Drilling team & Interfaces

Day 2
- Fundamentals of Pore Pressure
- Drilling & Completion Process
- Drilling Terminology
- Primary Well Control

Day 3
- Kick Tolerance
- Primary Cementing
- Introduction to Mud Logging

Day 4
- Introduction to Well Evaluation
- Logging While Drilling
- Wireline Logging Equipment

Day 5
- Directional Drilling
- Best Practices
- Stuck Pipe & Fishing
- Risk Management & Assessments
- Practical RA Exercise

Day 6
- Drilling Fluids
- Formation Damage
- Prevention of Losses
- Mud Chemistry & Attributes

Day 7
- Well Completions
- BOP Equipment
- Well Servicing & Workover
- Wireline, Coiled Tubing & Snubbing

Day 8
- Casing Design
- Casing Properties
- Axial Load in Submerged Tubulars

Day 9
- Drilling Problems & Solutions
- Rock Mechanics
- Wellbore Instability
- Equipment QA/QC

Day 10
- Well Control Basics
- Maintenance of the BHP
- Well Control Equipment
- Kick Tolerance

Stuck Pipe

Duration 5 days
Code DO/

Course Objectives

- Root Causes of Stuck Pipe
- Avoidance of Stuck Pipe
- Recovery of Stuck Pipe
- Best Operational and Planning Practices

Course Outline

Day 1
- Introduction to Stuck Pipe
- Definition of Stuck Pipe
- Types of Stuck Pipe Conditions
- Unfavourable Well Conditions

Day 2
- Mechanical Events (Settled Solids)
- Hole Cleaning Basics
- BHA Design for Hole Cleaning
- Drag and Torque Exercise
- Submerged Tubulars & Buoyancy

Day 3
- Jar Placement and Operation
- Practical Exercise Jars
- Type of Jars
- BHA Design - Components
- Pipe Severing and Recovery

Day 4
- Introduction to Fishing Tools
- Fishing Economics Exercise
- Other Types of Stuck Pipe
- Differential Sticking and Recovery
- Differential Sticking Exercise

Day 5
- Well Planning for Stuck Pipe
- Best Practices
- Stuck Casing
- Stuck Wireline
- Risk Management & Assessments
- Practical RA Exercise

Fundamentals of Well Control

Duration 5 days
Code DO/FWC/02

Course Objectives

The course covers the concepts under-pinning well control capability.

It is important for those relatively new to drilling planning and operations to fully understand how wells are planned and put in place safely, in order to avoid well control incidents.

The course combines theoretical and practical learning to cover topics including well design; well breakdown and well kill operations.

Who Should Attend?

- The course is designed for less experienced engineers and managers who are becoming increasingly responsible for well planning and design and drilling and also for relevant operations managers and technical support professionals.

Course Outline

Overview of Well Control

- Primary mechanism - adequate hydrostatic balance
- Requiring a secondary means – using BOP equipment
- Killing a well to correct matters and return to normal drilling operations
- Introduce well killing methods - drillers' method, wait and weight method, volumetric method, bullheading

Well Formation Fracturing

- How and why it occurs
- Definition of fracture pressure Typical fracture pressures – globally and variation with depth
- Gas migration during shut-in (with & without influx expansion)
- What happens in an underground blow-out?
- Demonstration and analysis of why this has occurred
- Link to formation fracture gradient, mud weight and surface applied pressure
- How to avoid it happening during well control operations
- More on the well killing process

Well Design – It's Objectives for Well Control

- Design method and criteria with regard to formation fracture
- Outline of casing design principles
- Staying with mud weights inside the pore pressure-fracture pressure envelope with depth Nominating safe limits for kick tolerance
- How leak-off test are carried out to properly determine formation fracture gradients
- How their results translate into limits of kick size for given mud weights to be used
- What are safe limits on most well hole sizes?

Well Kill Operations

- Taking care to avoid down-hole formation fracture at casing shoe formation
- Good drilling practices
- Planning to ensure formation fracture does not occur
- Choice of kill method
- Proposed pressure schedule
- Operations and monitoring to avoid break-down during kill

Casing Cementing
Current Leading Practice & New Techniques

Duration 5 days
Code DO/CC/03

Course Objectives

The course covers the fundamental concepts and calculations required to design cementing jobs and provide practical guidelines for understanding and controlling the operations to ensure that the work proceeds safely and efficiently.

There will also be a discussion of the latest technological developments

Who Should Attend?

- The course is designed for less experienced drilling engineers and managers who are becoming increasingly responsible for cementing operations and also safety and technical support staff.

Course Outline

The course will cover all of the topics shown below:

- Designing a cement job for casing
- Collecting the base input data
- Wellbore geometry for casing Jobs
- Determining hole size
- Cement volume calculations
- Methods of cement placement
- Types of cement
- Chemicals used in cementing – names, purposes
- Selecting cement weights
- Drilling Operations
- Pump ability of cement Thickening times
- Cement chemicals calculations
- Advanced simulation of cementing Jobs
- Testing cement products beforehand
- Running the cement job
- Preparations
- Records whilst running
- Interpretation of pressures during the cement job
- Bumping the plug & pressure testing
- The differences in cementing a liner versus cementing casing
- To summarise techniques - the entire calculations for cement jobs for a well
- Recent innovations in cementing
- Specialist cementing equipment
- Cementing in wells using new technology such as expandable tubulars & swellable elastomers

Advanced Well Cementing

Duration 5 days
Code DO/AWC/04

Course Objectives

The course covers the advanced practices in the latest cementing techniques.

This course delves into the chemistry to address special cases as well as design a full cementing program for a real typical case.

Who Should Attend?

- Operational and Engineering personnel requiring practical and theoretical knowledge and the latest cementing techniques.

Course Outline

The course will cover all of the topics shown below:

- Basic vs. advanced cementing
- Well Performance considerations and well cementing
- Chemistry and characterization of cements
- Cement additives and their functions
- Rheology of cement slurries
- Mud removal
- Cement/ formation interaction
- Speciality cements and systems Annular gas migration
- Cements for high temperature applications
- Cementing equipment and casing hardware
- Cement job design
- Primary cementing methods
- Secondary cementing methods
- Foamed cement
- Horizontal well cementing
- Cement job evaluation
- Laboratory testing of well cements
- Cementing calculations
- Casing and squeeze tool hydraulics
- Tuned light cementing system
- Rheology tuned cementing
- Right angle set cement

Drilling Practices

Duration 5 days
Code DO/

Course Objectives

Course Outline

Who Should Attend?

Advanced Drilling Practices

Duration 5 days
Code DO/ADP/05

Course Objectives

- Drill a well cost effectively and maximize penetration rate
- Evaluate stuck pipe problems and avoid potential problems by optimizing hole cleaning and ROP
- Design, drill string and BOP/wellheads
- Design and implement bit and hydraulics programs
- Recognize and evaluate well control problems by effectively using Mud Logging principles and techniques

Course Outline

Day 1
- Well Planning Basics
- Probabilistic Well Cost Estimation
- Risk Management Basics
- Risk Management Tools
- Overburden Drilling v Reservoir Drilling
- Getting the most from Service Co.

Day 2
- Stuck Pipe - Settled Solids Stuck Pipe - Differential
- Stuck Pipe - Others
- Fishing Tool & Methods
- Fishing Strategy
- Sidetracking & Casing Exits

Day 3
- Surface Wellheads
- Sub Sea Wellheads
- BOP & API 53C
- Drill String Design Basics
- Axial Force in Submerged Tubulars
- Drill String Inspection – DS-1
- Basic Casing Design

Day 4
- Bit Technology
- Drive Mechanisms, PDM, RSS
- Hydraulic Well Planning
- Hole Cleaning Basics
- Best Drilling and Tripping Practices

Day 5
- Classical Well Control (basic)
- Actual Well Control
- Considerations for Deepwater WC
- Consideration for HP/HT WC
- Deepwater Horizon and API 53C
- Advanced Kick Detection Systems
- Review and Q&A

Advanced Drilling & Completion Technique

Duration 3 days
Code DO/ADC/06

Course Objectives

Use of the Tools in the Tool Box to get wells "planned" correctly and then executed in the field

Floating Drill String and employing new technologies to avoid getting stuck + Operations Handbook

Investigating the success of the > 19,000 wells drilled UBD and the new way of drilling MMPD

Utilizing the Service Companies to provide Slick Strings and getting the right drill bit for the job

Surface Set Up to drill UBD/MMPD

From planning right through to Execution = PERI (Planning Equipment Review and Implementation)

Planning and working closely together with the Mud Logging Companies (Actually in the same Office 24/7) garners proven superior results and actually where working as a Performance Engineer for Offshore Operations, Shallow Water and Deep Water Development and Exploration wells

Getting the Service Company involved in all Safety aspects of our ongoing operations and each engineer in the Operating Company becomes the Sponsor for that particular Service Company and again raises the Bar on Safety

Course Outline

Drilling the Well
Drill a well cost effectively
Evaluate Flat Time and Fix
Look at all the Technologies and Methodologies available: Tools in the Toolbox including MMPD

Avoiding Stuck Pipe
Stuck Pipe Avoidance
Lost Circulation challenges
Lifting Capacity and using Pulsing Technologies
Drilling Methods = MMUBD, MMPD and CTD

Detailed Drill String Design
Drill string design and surface components
Slick strings – HWT and no DC's
Drill Bit Selection
Surface Set up for advanced Drilling Technologies

BHA Design – Deviated, Horizontal, ML
Design and implement bit and hydraulic programs
Deviated Wells
Horizontal Wells
Multilateral Wells
How to Complete?

Different Completion Options
Open Hole Completions
Cased Hole Completions
Slotted Liners
Gravel Packs
Stimulating
HPHT Ops?

Well Control and Mud Logging
Recognize and evaluate WC problems by effectively using Mud Logging Co's
GEOLOG and GEOSERVICES products
Mud Logs and Wireline Logs
Getting Pressures recorded properly

Health Safety and Environment
HSE
Service Company Safety Meetings
Documenting and Implementing
All-important Follow Up

Drilling Fluids Technology

Duration 5 days
Code DO/DFT/07

Course Objectives

The course covers all aspects of drilling fluids technology, emphasizing both theory and practical application. Delegates are provided with the fundamentals necessary to drill a well.

Who Should Attend?

Engineers and field personnel involved in the planning and implementation of drilling programs.

Course Outline

Day 1

Introduction to Drilling Fluids
- Drilling fluids functions
- Drilling fluids composition; WBM/NADF
- Drilling fluids cost vs. value

Drilling Fluids Specialists and API Testing Protocols
- API mud report form
- API test equipment
- Non-API test equipment

Day 2

Water-based Fluids Chemistry
- Systems and additives
- Clay chemistry
- Polymer chemistry
- Filtrate analysis
- Contaminants

Nonaqueous Fluids Chemistry
- Systems and additives
- Emulsions
- Viscosifiers
- Internal phase activity
- Contaminants

Day 3

Viscosity, Fluid Rheology and Annular Hydraulics
- Mathematical rheological models and calculations
- Pressure drop and equivalent circulating density calculations
- Hole cleaning
- Suspension and Barite SAG

Day 4

Drilled Solids
- Solids testing and analysis
- Solids control equipment

Health, Safety and Environment
- Toxic and hazardous chemicals
- Personal protection
- Waste management

Day 5

Drilling Fluids Engineering
- Fracture gradient and pore pressures
- Lost circulation and wellbore strengthening
- Wellbore stability
- Differential sticking
- Formation damage
- Lubricity

Completion and Workovers

Duration 5 days
Code DO/

Course Objectives

- Reservoir Geology, Productivity & Flow Assurance
- Completion Equipment, tubing & metallurgy
- Artificial Lift and Pressure Support
- Workover, pipe recovery, intervention and completion operations

Course Outline

Day 1
- Introduction to Reservoir Geology
- Well Productivity
- Zonal Isolation and Barriers
- Basic Completions & Completion fluids

Day 2
- Metallurgy and Material Selection
- Flow Assurance, Scales, Asphaltenes
- Lifecycle design

Day 3
- Advanced completions, multi-zone, co-mingled
- Well Integrity, SSSVs
- Wellheads & Trees
- Packers
- Artificial Lift/Pressure Support, gas lift, ESP

Day 4
- Corrosion Monitoring
- Bull heading and well control
- Basic fishing and pipe recovery
- Rigless Workover and interventions

Day 5
- Procurement & Equipment ordering
- Commercial Tenders, Evaluation and Scoring
- Workover Operations
- Well test & PVT
- Suspension & Abandonment

Advanced Coiled Tubing Intervention Design

Duration 5 days
Code DO/

Course Objectives

- Wellbore Completions
- Learn about Coiled Tubing equipment and Applications of Coiled Tubing
- Coiled Tubing interventions
- Evaluation of Coiled Tubing Fatigue and Life of Coiled Tubing
- Programming for Coiled Tubing Operations

Course Outline

Day 1
- Preliminary Information of Reservoir
- Type of Wellbore Completions
- Wellbore Definitions and types of completions

Day 2
- History of Coiled Tubing
- Definition of Pressure
- Type of Coiled tubing Equipment
- Components of Coiled Tubing Equipment

Day 3
- Blow out Preventers
- Manufacture of Coiled Tubing
- Types of interventions
- Workovers, cement squeezes, fracturing, acidizing etc.

Day 4
- Coiled tubing life
- Limitations of Coiled Tubing
- Fatigue Life of Coiled Tubing

Day 5
- Programs and programming
- Programming and Sample Problems
- Industry Recommended Practices

Drill bit technology

Duration 2 days
Code DO/

Course Objectives

The objective of the course will be to enable all participants to gain understanding of different drill bit technology and their field application. Participants will learn the fundamental concepts involved and their application during the practical workshop sessions.

OPC is envisaged to deliver the following:

- Pre-reading (presentations and concise technical references)
- Technical presentations followed by Q & A sessions
- Examples & Case Studies
- Feedback & Follow-up
- Certificate of completion

Course Outline

Day 1

- Basic Bit Types and Design
- Rock Strength and In Situ Stresses
- API Bit Classification
- API Dull Grading
- Economics and Commercial Issues

Day 2

- Bit Hydraulics and Models
- Drill String Dynamics
- Bit design and Hole Cleaning
- Monitoring Bit Performance in real time and offline

Practical Well Test Interpretation

Duration 2 days
Code RPE/PWTI/01

Course Objectives

The course provides an understanding of the theory and practice of pressure transient analysis using analytical methods.

Participants will gain:

- An understanding of the geological and fluid parameters which affect the results of pressure transient analysis.
- Skills to interpret pressure transient analysis data for permeability and the various components of skin
- Skills to evaluate reservoir geometry and connected volume using boundaries and mobility/storativity models
- Experience in analysing real sets of test data

Who Should Attend?

Engineers and Geoscientists who wish to obtain a basic understanding of well test interpretation and the skills required to use PIE.

The individuals attending the course should be able to develop their skills to a level where they will be able to do the analysis themselves and contribute knowledgeably to a department or asset that has some involvement in this area.

It would be useful to have had some previous exposure to well testing, well operations, or theory of reservoir engineering; but this is not vital.

Course Outline

Day 1

- Overview of the development of well testing practice and theory
- The basics - obtaining good data, radius of investigation, the inverse problem, Type Curve models, Superposition
- Introduction to PIE - data loading exercise from a spreadsheet and ASCII file
- Gauge comparison
- The principles and importance of Superposition's and the rate history
- Analysis/diagnostic plots and the manipulation of them: Horner, Superposition and Log Derivative plots - straight line analysis with examples
- Well bore storage and skin - with examples

Day 2

- Flow regimes: radial flow, spherical flow, linear flow and bi-linear flow, pseudo steady state - what this means and why
- Type Curve models
- Examples to reinforce all of the above
- Examples to demonstrate all of the first day's theory in practice
- Boundaries and how this affects the pressure responses, plus how to analyse test data with boundaries
- Reservoir pressure and reservoir surveillance with examples
- Gas well testing with examples

Day 3

- Horizontal wells with examples
- Factors complicating well testing
- Test design
- Interpretation guidelines
- Recognising derivative shapes

Advanced Well Test Interpretation

Duration 3 days
Code RPE/AWTI/02

Course Objectives

This course is more advanced and has thus incorporated more reservoir models for practical application. The aim is to equip attendees with an understanding of the theory and practice of pressure transient analysis using analytical methods and an understanding of the geological and fluid parameters which affect the results of pressure transient analysis.

The course will give you skills to interpret pressure transient analysis data for permeability and the various components of skin as well as evaluating reservoir geometry and connected volume using boundaries and mobility/storativity models. The practical element will give participants experience in analysing real sets of test data.

The course materials and example datasets are not software specific thus can be used with any commercial software package. Use of the PIE well test software from Well Test Solutions (the software used by BP and Total among others worldwide) will be available for the course.

Who Should Attend?

The course will be suitable for junior to senior engineers aiming at getting an advanced perspective on well testing and its applications.

Course Outline

Day 1

- Overview of the development of well testing practice and theory
- Introduction to PIE - data loading exercise from a spreadsheet and ASCII file and gauge comparison
- The principles of Superposition's and the rate history
- Analysis/diagnostic plots and the manipulation of them: Horner, Superposition and Log Derivative plots - straight line analysis with examples
- Well bore storage and skin - with examples, flow regimes: radial flow, spherical flow, linear flow and bi-linear flow, pseudo steady state - what this means and why
- Type Curve models and examples
- Boundary theory and practice with examples using PIE

Day 2

- Reservoir pressure and reservoir surveillance with examples
- Gas well testing with examples
- Horizontal wells with examples
- Factors complicating well testing and how this affects the pressure responses
- Managing anomalous data and analyses

Day 3

- Composite reservoirs: linear and radial
- Multi-well analysis set up and practice in PIE
- Double porosity with examples
- Double permeability with examples
- The principles and application of deconvolution with examples
- Managing the Inverse problem with what is known: testing hypotheses

Reservoir Characterisation

Duration 5 days
Code RPE/RC/03

Course Objectives

To give participants an understanding of reservoir characterization as one of the core skills of their discipline, whereas the engineers will be able to build their cross-disciplinary awareness.

This course adopts a multi-disciplinary approach, which focuses on the importance of and the techniques for the integration of all available geophysical, geological and engineering data (seismic, log, core, test and production data).

The course emphasizes the multi-disciplinary nature of this process and the importance of using both static and dynamic data to help define the reservoir model and thereby optimize the development plan for the reservoir. The course makes extensive use of team exercises to practice data integration and case studies to highlight best practices in reservoir characterization.

Who Should Attend?

This course is specifically designed for a mixed group of senior geoscientists and petroleum and reservoir engineers working in field development groups.

Course Outline

Objectives of Reservoir Characterization

- Identification of a reservoir model, which behaves as similar as possible to that of the actual reservoir
- Use of static and dynamic data interpretation models, and the integration of the models into a reservoir model
- Verification of the resulting reservoir model
- Need for consistency with all interpretation models
- Reservoir characterization - dynamic & iterative process
- Understand the non-uniqueness of the inverse problem in identifying a reservoir model and ways to reduce it
- Understand that reservoirs are more complex and uncertain than previously modelled

Use all Available Data to:

- Describe and model each reservoir unit
- Understand past & predict future reservoir performance
- Controls on fluid flow and hydrocarbon recovery

Static Data that Describe the Reservoir

- 2D vs. 3D modelling
- Concepts of 3D stochastic modelling
- Principles & use of geostatistics in uncertainty modelling ‘best practice’ approach to integration of reservoir data
- The link to reservoir simulation

Use of Seismic and Log Data, Seismic and Sequence Stratigraphy, etc., to Determine

- Structural configuration and hydrocarbon distribution
- Reservoir architecture and reservoir continuity
- Determine lithofacies and permeability distributions
- Interpretation of facies assemblages, flow units visualization
- Structural modelling & property modelling
- Honouring heterogeneity & complexity

The Cross-Discipline Dimensions

- Use of engineering data (test, production data) to confirm geological correlations/models
- Dynamic data that describes reservoir behaviour
- Team exercises in reservoir characterization
- Case histories & best practices

Reservoir Surveillance:
Effective Use of Permanent Downhole Pressure Data

Duration 2 days
Code RPE/RS/04

Course Objectives

To give participants a good understanding of the concepts and value of reservoir surveillance and to provide:

- Skills to interpret pressure transient analysis data using well test interpretation software
- An understanding of the theory & practice of pressure transient testing sufficient to differentiate between well and reservoir performance
- Techniques for monitoring average reservoir pressure in multi-well reservoirs
- Experience in working with and extracting useful information from real sets of permanent downhole pressure data and permanent downhole flowmeter data

Who Should Attend?

The course will be suitable for any member of a technical or commercial team, from TA to Manager, where large quantities of downhole pressure data are being provided to the team on a regular basis.

Course Outline

Fundamentals of Well Testing and Pressure Transient Analysis

- Well & reservoir terminology and definitions
- Data required and information gained from well testing
- Well test interpretation methodology
- Pressure Transient Analysis theory

Relevance of Input Data for Reservoir Surveillance

- Pressure data - where, when and how?
- Rate data - what should we use and how accurate is it?
- Fluid and rock data
- Interference testing and rate allocation using PTA models

Superposition Theory

- Importance in analysing long production history data
- What production history should be used?
- Does it matter?

The Plots (graphs) Used for Analysis and Why we don't Use Horner Plots

- Data plots
- Superposition
- Log-log plots

What are we looking for in Reservoir Surveillance?

- What can we do with the data we get?
- Monitoring permeability and skin changes
- Average reservoir pressure and time to pseudo-steady state
- Techniques for determining average reservoir pressure

Material Balance and Reservoir Modelling with Permanent Down-hole Gauges

- Validity of material balance in PTA modelling
- Use of material balance models to determine Volume of Investigation and Minimum Connected Volume
- Use of PTA material balance for reservoir models: GIIP/STOOIP and reserves
- Use of mobility and storativity differences for reservoir modelling

So How Does this Add Value?

- Practical case studies based on real data sets

Integrated Reservoir Management

Duration 5 days
Code ` RPE/IRM/05

Course Objectives

To give participants a good understanding of the concepts and the tools which can contribute to the reservoir management by making it a multi-disciplinary process?

Who Should Attend?

The course will be suitable for petroleum and reservoir engineers and some experienced geoscientists responsible for day-to-day management of reservoirs.

Course Outline

Introduction to "Reservoir Management"

- What do we mean by reservoir management?
- The sources and acquisition of reservoir data
- The "old" sequential approach
- The "new" integrated/iterative way of reservoir management
- The primary importance of reservoir characterisation

The Reservoir Management Process

- The objective - increasing the value of a hydrocarbon asset
- Possible targets - decreased risk, greater and earlier production, reduced costs, added flexibility
- Planning field developments
- Monitoring reservoir performance
- Evaluating results by comparisons of actual performance with predictions

Understanding the Reservoir - the Technology Toolkit

- Review of popular systems for static and dynamic reservoir modelling
- The importance of applying the technology competently
- Integration of geological, geophysical and engineering data
- Reservoir characterization, describing the reservoir - the static model with static data
- Reservoir simulation, describing the reservoir's behaviour - the dynamic model with dynamic data
- Reservoir surveillance - monitoring performance and analysing the data

Adding Economic Value

- Techniques to maximize economic recovery
- Minimising capital investment, operating costs and risk
- Economic impact of changes to operating plans
- How timing affects value

Basic Reservoir Engineering: For Production Operations Staff

Duration 5 days
Code RPE/BRE/06

Course Objectives

To give participants an understanding of the practices and limitations of the methods and procedures employed by reservoir engineers. In addition to covering the subjects at a basic conceptual level, gas well testing, sampling and reservoir surveillance will be covered in considerable detail and with practical examples.

Who Should Attend?

The course will be suitable for all technical and professional field operations staff and their managers.

Course Outline

Basic Petroleum Geology & Petrophysics

- Deposition, formation and trapping mechanisms
- Reservoir properties
- Production mechanisms & recovery methods
- Recovery factors and sweep efficiency
- Fluid flow - Darcy's Law, absolute and relative permeability
- Linear and radial flow
- Transient, pseudo-steady and steady state flow regimes
- Rock & fluid properties, phase behaviour
- Viscosity, compressibility, z factor, p2 and m (p) methods

Evaluation and Recovery of Gas Reserves

- Determination of original gas-in-place - material balance, decline curve analysis, volumetrics
- Overview of dynamic reservoir analysis
- Gas reservoir drive mechanisms, gas recovery estimates

Gas Flow in Well Bores and Pipelines

- Gas well bore and pipeline flow correlations
- Transient and pseudo-steady state IPR
- Nodal analysis applied to gas wells/reservoirs

Predicting Future Performance & Ultimate Recovery

- Forecasting methods & use and abuse of decline curves
- Well spacing in gas reservoirs
- Infill well drilling for reserves or offtake enhancement
- Comparison of reservoir simulation & analytical methods

Gas Well Testing and Pressure Transient Analysis

- Basics of gas well testing
- The concepts of radius of investigation, flow after flow testing, Isochronal and modified isochronal testing
- Build-up testing
- Determination of - permeability, mechanical, geometrical and rate dependent skin
- Boundary and heterogeneity identification
- IPR determination with C/N and LIT methods
- Problems with liquid dropout in the wellbore during testing
- Build-up analysis of gas condensate reservoirs

Importance of Taking Representative Fluid Samples

- Use of fluid samples in reservoir characterization
- Surface and subsurface sampling methods
- Importance of quality control in sampling
- Reservoir surveillance

Advanced Hydraulic Fracturing

Duration 5 days
Code RPE/AHF/07

Course Objectives

The course is designed for engineers, supervisors, geoscientists, technologists and operations personnel. It will enable participants to gain a thorough insight into all practical aspects of Advanced Propped Hydrofrac Stimulation Technologies, which have proven successful in field applications worldwide.

A quick review of hydrofrac stimulation fundamentals will be presented at the very beginning; however, the trainees must have an understanding of the basic engineering principles and concepts.

Who Should Attend?

The course is designed for engineers, supervisors, geoscientists, technologists and operations personnel.

Course Outline

Day 1
Data Gathering and Candidate Selection
- Data sources
- Input data required for 3D models
- Determine critical parameters
- Types of treatments
- Results of treatments
- Optimisation methodology

Day 2
Fundamental & Critical Fracturing Concepts
- Fluid mechanics
- Rock mechanics
- Critical fracturing issues

Day 3
Frac Design & Analysis
- Fluid selection considerations
- Proppant selection consideration
- Frac design with 3D model
- Benefits of real-time frac analysis
- Result of 3D models

Day 4
Treatment Execution and Analysis
- MiniFrac design and execution
- MiniFrac analysis
- Rate Step-down test
- MiniFrac design and execution
- Post-treatment QAAC

Day 5
Treatment Execution and Analysis
- Pre-job materials testing
- Pre-job QAAC
- Real-time QA/QC
- Real-time design methodology
- Post-job procedures

Fractured Reservoirs

Duration 5 days
Code RPE/FR/08

Course Objectives

This course provides concepts, skills and understanding required for analysing fractured reservoirs. Geological concepts, fracture development process, behaviour of fractured reservoirs, engineering concepts and methods for evaluation and management of heterogeneous naturally-fractured reservoirs are presented.

Issues impacting fractured reservoir performance, including drive mechanisms, capillary forces, gravity, viscous effects and flow characteristics in matrix and fracture, well test analysis, integrated fractured reservoir study and reservoir simulation are discussed. Case studies and class exercises will be discussed.

Who Should Attend?

Reservoir engineers, geologists, petrophysicists, geophysicists involved in multi-disciplinary subsurface projects related to evaluation, characterization and analysis of fractured reservoirs.

Course Outline

- Introduction to fractured reservoirs
- Fractured reservoir geology
- Geological conditions of fracturing
- Quantitative evaluation of fracturing
- Characterization of natural fractures and fracture systems
- Basic parameters of fractures
- Statistical representations
- Physical properties of fractured rocks
- Porosities
- Permeabilities
- Compressibility
- Relative permeability
- Capillary pressure
- Logging in fractured reservoirs
- Fluid flow in fractured reservoir with double porosity
- Basic equations of flow
- Warren and Root model
- Other models
- Well flow and productivity
- Liquid flow
- Gas flow
- Analysis and interpretation of pressure transient tests in naturally-fractured reservoirs
- Drawdown test
- Build-up test
- Interference effects
- Type-curve analysis
- Fluid displacement in fractured reservoirs
- Displacement of oil by water
- Displacement of oil by gas
- Imbibition and drainage
- Production mechanisms
- Effects of natural fractures on reservoir permeability, drainage area and water flood
- Simulation of fractured reservoirs

Evaluation and Developing Heavy Oil Resources

Duration 5 days
Code RPE/EDHO/09

Course Objectives

This course is largely designed for geoscientists or engineers with a need to advance their understanding of heavy oil – situ oil sands resources

- Evaluate and develop heave oil/oil sands resources.
- Understand the importance of heavy oil/oil sands resources in today's word energy market.
- Contrast heavy oil/oil sands resources as compared to conventional and other unconventional resources with aspect of.
- Understand the geology, critical attributes, and commerciality of the Canadian heavy oil/oil sands.
- Collect the appropriate data and evaluate the critical geologic and reservoir parameters of various types of heavy oil/oil sands.
- Recognize and evaluate the environmental challenges required to develop and produce heavy oil/oil sands resources.
- Understand the process and methodology to evaluate, select, plan, design, and implement a heavy oil/oil sands recovery.
- Become knowledgeable of the worldwide distribution and geologic setting of the more significant heavy oil resources.

Who Should Attend?

The course will be suitable for Geoscience and engineering professionals

Course Outline

Day 1
- Understand the importance of heavy oil/oil sands resources in today's world energy market.
- Oil sands (Bitumen)/heavy oil introduction and definitions

Day 2
- Collect the appropriate data and evaluate the critical geologic and reservoir parameters of various types of heavy oil/oil sands
- Recognize and evaluate the environmental challenges required to develop and produce heavy oil/oil sands resources
- Evaluate and develop heavy oil/oil sands resources

Day 3
- Evaluate and develop heavy oil/oil sands resources
- Heavy oil/in-situ oil sands recovery process overview
- Non thermal field examples and development strategies
- Heavy oil/in-situ oil sands recovery process overview - Thermal
- Heavy oil/in-situ oil sands recovery process overview - Thermal field examples and development strategies

Day 4
- Evaluate and develop heavy oil/oil sands resources
- Heavy oil/in-situ oil sands recovery process overview - steam assisted gravity drainage (SAGD)
- Heavy oil/in-situ oil sands recovery process overview - steam assisted gravity drainage (SAGD) field examples and development strategies

Day 5
- Evaluate and develop heavy oil/oil sands resources
- Other commercial thermal in-situ technologies
- Other piloting recovery processes for heavy oil/oil sands recovery
- Reserves and resources booking practice of heavy oil/oil sands development
- Summary of process selection and methodology to evaluate and develop heavy oil/oil sands resources

Reservoir Engineering Workshop

Duration 10 days
Code RPE/REW/10

Course Objectives

- Extended understanding of reservoir types, complexities and volumes
- Extended understanding of fluid contacts and reservoir pressures
- Extended understanding of reservoir drive mechanisms
- Extended understanding of rock and fluid properties, Test and RFT data
- Understanding well hydraulics and productivity
- Integrated understanding of uncertainties and their likely implications
- Understanding of the surface facilities issues and artificial lift operations
- Understand and apply basic petroleum economics
- Propose a development plan (from appraisal to abandonment)
- Advanced understanding of Fluid flow in reservoirs (drive and recover mechanisms)
- Advanced understanding of fluid properties, phase behaviour (PVT), EOS and core analysis (conventional and special) for reservoir characterization
- Learn volumetric (OIP) and static and dynamic uncertainties and calculate reserves (material balance, decline curves) and uncertainty
- Run dynamic models/reservoir simulation models. Conduct production forecasting as well as developing a good understanding of IOR/EOR methods including the evaluation of their application.

Course Outline

Day 1
- Evaluation of the Physical Properties of a Reservoir
- Reservoir geology, Geophysics and Hydrocarbon Accumulations

Day 2
- Evaluations of the Physical Properties of Reservoir Fluids
- Water Properties
- Gas Properties
- Oil Properties

Day 3
- Well Pressure-Rate-Time Analysis
- Well Pressure-Time (WT) Volumetrics

Day 4
- Static Reservoir Modelling
- Evaluation of Rock-Fluid Characteristic
- Wettability Number and Contact Angle

Day 5
- Dynamic Reservoir Modelling
- Classification of Hydrocarbon Reserves
- Computation of Reservoir Volume

Day 6
- Reservoir Drive Mechanisms and Performance Predictions
- Calculations of Recovery from Gas Reservoir-No Water Drive
- Calculations of Recovery from Gas Reservoir-With Water Drive

Day 7
- Immiscible Displacement Processes
- Recovery Calculations Using Frontal Advance Theory

Day 8
- Improved Hydrocarbon Recovery
- Influence of Recovery Mechanisms on Residual Oil

Day 9
- Field Appraisal Development
- Production Prognoses - Green Fields
- Green Field - Dynamic Reservoir Model Development

Day 10
- History Matching - Brown Fields
- Brown-Filed Model Development
- Examples of History Match

Dynamic Reservoir Simulation

Duration 10 days
Code RPE/DRS/11

Course Objectives

- To know and understand fundamental concepts of Dynamic Reservoir
- To learn about the building of a reservoir simulation model (data gathering, data QC)
- To learn about carrying out a simple reservoir simulation study (data input, history matching and production forecast with a black-oil model)

Course Outline

Day 1
- Reservoir Simulation Overview
- Structural Framework with faults and reservoir tops; Stratigraphy; Fluid contacts

Day 2
- Reservoir Simulation Introduction - Drive Mechanisms and Material Balance
- Reservoir Modelling
- Numerical Model Construction-Finite-Difference Operations

Day 3
- Two Phase Flow: Saturation, Capillary pressure, Gravity, End-point saturation, Relative permeability, Darcy flow, Buckley-Leverett
- Three Phase Flow: Black Oil Model
- Pressure and fluid properties, Three phase relative permeabilities, Finite difference and initialization

Day 4
- Upscaling and Geologic Uncertainty
- Upscaling to the Flow Model; Geologic Uncertainty
- Fluid Properties; Dynamic Data-RFT: MDT data, Well production history data, Tracer data

Day 5
- Modelling of a reservoir aquifer: Modelling water influx, Infinite of Carter-Tracy and Finite aquifer of Fetkovich
- Approximate relations for water influx; Analysis of water drive

Day 6
- Designing the reservoir model: Selecting Reservoir–Rock and Fluid Properties Data; Selecting grid and time step sizes; Selecting the numerical solution method
- Water injection (BO); Lean gas injection (BO); Water Alternating Gas, WAG injection

Day 7
- Forecasting future production profiles
- Preparation of input data and Planning the prediction cases to be run

Day 8
- History matching objectives, strategy and plans
- Choose and match selected performance parameters

Day 9
- Sector modelling
- Structured and unstructured gridding approaches: Cartesian grids.

Day 10
- Coupling Reservoir flow simulation to: Network simulation; Geomechanical flow model

Fluid Properties & Phase Behaviour (PVT)

Duration 5 days
Code RPE/PVT/12

Course Objectives

The course is designed to help engineers evaluate the Critical properties of reservoir fluids and carry out PVT and phase behaviour calculations. The course also explores laboratory PVT analysis.

Course Outline

Day 1
- Volumetric and Phase Behaviour of Oil and Gas Systems
- Oil and Gas Properties and Correlations
- Classification of Reservoir Fluids
- PVT Fluid Sampling, Tests and Empirical Correlations (Black Oil, Natural Gas and Formation Water)
- Selected PVT Exercises

Day 2
- Criteria for Phase Equilibrium
- Cubic Equation of State
- Phase Behaviour Calculations
- Fluid Characterization
- Selected PVT Exercises
- Quiz Sessions

Day 3
- Mechanisms of High Pressure Gas Displacements
- Experimental Studies
- Miscibility Conditions
- Interfacial Tensions
- Selected Exercises
- Sessions with Problems

Day 4
- Fluid Gradients
- Reservoir Compartmentalization
- Fluid Components Grouping
- Comparison of EOS
- Selected PVT Exercises
- Sessions with Problems

Day 5
- Tuning of EOS
- Dynamic Validation of Model
- Evaluation of Reservoir Fluids
- Group Problems Presentations
- Summary of Properties and Phase Behaviour of Fluids

Advanced EOR/IOR

Duration 5 days
Code RPE/AEI/13

Course Objectives

The course is aimed at engineers and geoscientists who want to learn EOR/IOR physical methods of displacement, screening processes, field piloting schemes as well as provide attendees with EOR/IOR practical production techniques.

Course Outline

Day 1

- Fundamentals of displacements
- Water - flood methods
- Gas - flood methods
- Chemical - flood methods
- Thermal flood methods
- Exercises with Questionnaires

Day 2

- Investigate feasibility of a given IOR/EOR scheme
- Screening of selected prospects for a gas/water flood displacements
- Screening of prospects for a thermal flooding
- Problem exercises

Day 3

- Review and learn selected piloting strategies Onshore
- Practical aspects of EOR pilots
- Operating guidelines and monitoring for piloting EOR
- Gas flood pilot case study (onshore)

Day 4

- Review and learn selected piloting strategies (offshore North Sea)
- Challenging aspects of EOR/IOR
- Selected offshore case study project
- Case study guidelines

Day 5

- Field scale reservoir characterization
- Inter well communication
- Flow rate analysis
- Case study presentations

Chemical EOR Fundamentals

Duration 5 days
Code RPE/

Course Objectives

- Understand the different Enhanced Oil Recovery (EOR) techniques and how they work.
- Introduce the different chemical waterflooding techniques – Fundamentals, mechanisms and expected incremental recovery.
- Having an overview of the different technical steps of the Field implementation of chemical waterflooding from lab experiments, simulation, pilot tests to full field implementation
- Estimating the incremental oil recovery due to the application of chemical waterflooding.
- Assessing the economic feasibility of chemical waterflooding.
- Identifying the operational impact of chemical waterflooding methods on production and injection wells and surface facilities.
- Applying the knowledge gained during the course on some examples and case studies

Course Outline

Day 1: Introduction and Setting the Scene

- Why enhanced oil recovery?
- The different EOR techniques and how they work.
- The main reservoir and fluid parameters that impact the selection of the EOR method.
- Current field applications of EOR in the Middle East.
- Introduction to chemical waterflooding techniques and their applications;
- The importance of data acquisition in the selection of EOR;

Day 2: Chemical Waterflooding Techniques

- Alkaline Flooding
- Polymer waterflooding
- Surfactant Waterflooding;
- Alkaline Surfactant waterflooding;
- Alkaline Surfactant Polymer waterflooding;
- Other chemical waterflooding methods;
- Expected incremental oil recovery for different chemical EOR methods

Day 3: The selection and implementation of Chemical EOR techniques

- The workflow for the selection of the chemical EOR;
- The importance of laboratory experiments and how they are planned;
- Laboratory results and interpretation
- History-matching of lab results for better understanding of the chemical EOR waterflooding;
- Pilot field test design and implementation;
- Production data collection, interpretation and history matching;
- Using simulation to conduct feasibility studies on chemical EOR applications on a field scale;
- Sensitivity analysis studies to estimate the range of expected incremental recovery

Day 4: The Chemical EOR Field Implementation Project

- Assessing the different chemical EOR field implementation concepts;
- The operational impact of chemical waterflooding on production and injection wells and surface facilities;
- Cost estimation of different chemical EOR concepts;
- Optimization of the various production and cost profiles of different chemical EOR methods;
- Economic evaluation of chemical EOR projects;
- Ensuring efficient execution of chemical EOR projects;

Day 5: Actual Field Development Plans – Examples & Case Studies

- Alkaline waterflooding case study
- Polymer waterflooding case study
- Surfactant waterflooding case study
- Combination chemical EOR case study;
- Summary, conclusions and recommendations

Enhanced Oil Recovery Fundamentals

Duration 5 days
Code RPE/EORF/14

Course Objectives

- Drive mechanisms and recovery factors for primary depletion and pressure maintenance with waterflood or immiscible gas injection
- Determine reasons and causes why recovery could be lower than expected
- Choose optimal methods for improving recovery for primary depletion, waterflood or immiscible gas injection
- Chose optimal methods of enhancing oil recovery beyond primary depletion, waterflood, or immiscible gas injection
- Understand mechanisms for enhanced oil recovery in various EOR techniques
- Understand the most important variables that control enhanced oil recovery in various EOR methods
- Screening criteria for selecting optimal EOR techniques
- Designing EOR processes - theoretical methods, lab tests, and field pilots
- Planning and implementing EOR processes using the appropriate empirical, analytical, and simulation tools
- Forecasting rate-time and recovery-time performance for various EOR methods and analysing the performance
- Assess risks for EOR performance and ways to mitigate these risks and minimize their impact on project economics

Course Outline

Day 1

Reservoir life cycle and primary and secondary recovery and improved and enhanced oil recovery.

Primary Recovery
- Drive mechanisms
- Typical recovery factors
- Reasons for poor performance
- Methods to improve recovery
- Case Studies

Secondary Recovery
- Waterflood and immiscible gas injection
- Drive mechanisms
- Typical recovery factors
- Reasons for poor performance
- Methods to improve recovery
- Case Studies

Day 2

Improved Oil Recovery
- Recompletions
- Water shutoff
- Infill drilling
- Use of artificial lift
- Identification of bypassed oil
- 4D seismic monitoring
- Field case studies

Day 3

- Enhanced Oil Recovery Methods
- Thermal recovery methods
- Steam flooding
- CHOPS
- SAGD
- Insitu combustion
- Mining
- Chemical flooding methods

Day 4

EOR Screening Criteria
- Examples and exercises

Designing EOR Processes
- Theoretical methods
- Laboratory measurements
- Field pilots

Day 5

Planning and Implementation of EOR Processes
- Key factors for success
- Use of appropriate empirical, analytical and simulation tolls
- Practical considerations
- Forecasting EOR process performance and analysing the performance
- Identify main risks to EOR performance
- Mitigate risks to minimize effect on EOR project economics
- Detailed Field Case Studies

Evaluation and Management of Fractured Reservoirs

Duration 5 days
Code RPE/EMFR/15

Course Objectives

- To introduce and overview the technical issues and the best practice workflow to achieve solutions
- To introduce the principles of structural geology and rock mechanics required for fractured reservoir appraisal
- To describe the range of well-scale data sources available for reservoir appraisal, with their merits, limitations and applications
- To show how outcrop analogs can be used to support reservoir characterisation and modeling ('virtual field trip')
- To describe the methods and workflow for fractured reservoir modeling
- To overview fractured basement reservoir appraisal and development
- To overview in situ stress determination, geomechanics and drilling techniques in fractured reservoirs
- To review, summarise and discuss key learnings from the course

Course Outline

Day 1

Session 1: **Overview of Fractured Reservoirs**

- Definitions, classifications of fractured reservoirs, examples worldwide
- Typical character of fractured reservoirs
- Technical issues in geology, geomechanics, engineering
- Overview of workflow and solutions in fractured reservoir appraisal and management

Session 2: **Structure and Geomechanics Basics**

- Basics of stress, strain and fracture mechanics
- Natural fracture types, geometries, flow character (open, sealed, partial)

Day 2

Session 2: Continued

- Fracture reactivation and critical shear, impact on reservoir quality
- Fracture attributes and impact on reservoir quality, fracture porosity review
- 3D Fracture distribution controls (fracture 'drivers')

Session 3**: Data Sources and Techniques (Well-Scale)**

- Static data sources for fractured reservoir appraisal and their merits, limitations, applications
- Exercises in image log interpretation for fractures

Day 3

Session 3: Continued

Session 4: **Outcrop Analogs**

- Use of outcrop analogs for reservoir characterisation virtual field trip to the fractured carbonate outcrops of Spain

Day 4

Session 5: **Fracture Modeling**

- Preparation of well data
- Fracture prediction methods at reservoir scale
- Static fracture modeling workflow
- Calibration with dynamic data
- Geomechanics models

Session 6: **Basement Reservoirs Introduction**

- Basement charging mechanisms

Day 5

Session 6: Continued

- Basement reservoir examples, fracture and flow properties and reservoir quality
- Reservoir models and case histories

Session 7: **In Situ Stress, Geomechanics and Drilling Issues**

- Principles of in situ stress determination
- Stress models and critical shear appraisal of
- fracture k

Applied Production Logging & Reservoir Monitoring

Duration 5 days
Code RPE/APLR/16

Course Objectives

Encompassing advanced techniques for production logging and reservoir monitoring, this course teaches attendees the design of a data-acquisition program for evaluation of wellbore or reservoir behaviour based on field development objectives. Quick look techniques for log quality control will also be taught.

Who Should Attend?

The course will be suitable for petroleum and reservoir engineers.

Course Outline

Day 1
- Flow Velocity Profile Using a Spinner Flowmeter
- Interpretation of Spinner Logs for Bulk Production Profile
- Phase Identification and Multiphase Flow
- Two and Three Phase Flow in Well

Day 2
- Flow and Drawdown
- How IPR Affects the Well Flow Profile
- High Deviation Angle and Horizontal
- Tools to Measure Horizontal Multiphase Flow

Day 3
- Temperature Logging
- Noise Logs
- Radioactive Tracer Logging

Day 4
- Distributed Temperature Sensing (DTS)
- Pulsed Neutron Capture (PNC) Logs
- Computation of Saturations - Clean and Shaly Zones
- Carbon-Oxygen Measurements

Day 5
- Carbon-Oxygen Measurements (continued)
- Gas-View/Baker Atlas
- Through-Casing Resistivity - (CHFR)
- Formation Testing Through Casing
- Detection of Water Flow by Oxygen Activation using PNC tools

Reserves Estimation and Uncertainty

Duration 5 days
Code RPE/REU/17

Course Objectives

Update G&G and reservoir engineers with the newest and most accurate methods for obtaining the value of a reserve. Following the completion of this course, all delegates should be able to manage deterministic and probabilistic methods, with the aim of gaining a thorough understanding of various reserve levels and their equivalence in both systems.

Who Should Attend?

The course will be suitable for geologists and geophysicists.

Course Outline

Day 1

Reservoir characterization for reserves evaluation

Resources and Reserves - Background and Definitions

Resources and Reserves-Classification
- PRMS, SPE, WPC, AAPG, SERC, etc
- Prospective resources
- Contingent resources
- Reserves

Day 2

Technical Evaluation Methods
- Field analogues
- Volumetric methods
- Material balance
- Decline curve analysis
- Reservoir simulation
- Generation of production profiles

Day 3

Deterministic Reserves Estimation
- Proved
- Probable
- Possible
- Developed
- Undeveloped

Day 4

Risks and Uncertainties in Reserves Estimation
- Risk register

Integration of Risks and Uncertainties in Reserves Estimation
- Sensitivity models
- Scenario models
- Risk analysis models
- Monte Carlo simulation

Day 5

Probabilistic reserves estimation with risks and uncertainties included
- P10, P50, P90 reserves

Effect of economics on reserves

Artificial Lift Systems

Duration 5 days
Code RPE/

Course Objectives

This course covers the principles behind artificial lift systems. Attendees be trained in how to:

- Make basic PVT properties and inflow performance (IPR) calculations related to artificial lift (PROSPER)
- Understand and apply multiphase tubing and pipe flow principles
- Select the appropriate artificial lift system
- Compare various artificial lift systems-determine which one is most economically feasible
- Specify components and auxiliary equipment needed for each system. Design system features that allow for gassy production, production with solids, viscous production, and for other harsh environments
- Know what best practices are available to extend the life of equipment and installed lift systems
- Apply basic design and analysis concepts

Course Outline

Day 1

Introduction to the Course

- Why artificial lift
- General overview of main methods

Day 2

Nodal analysis to assess well performance and the need for artificial lift

PVT properties - their use nodal analysis

IPR – different methods – reservoir delivery evaluations

Multiphase flow correlation and their selection in modeling flow in the tubular (tubing and pipes)

Assess the need for artificial lift support for the well

Day 3

Artificial Lift Methods

- Introduction to the main artificial lift methods
- Compare different artificial lift methods
- Selection of the appropriate artificial lift method

Day 4

- Main components and characteristics of different artificial lift systems
- Best practices to extend the life of AL systems

Day 5

- Design concepts for the main AL methods with examples of each

Introduction to Field Development Planning

Duration 5 days
Code DO/

Course Objectives

The course covers the fundamental approach to working with and writing a field development plan (FDP), which is the output of a sequence of decision and discipline-based tasks to create a development plan.

Who Should Attend?

Petroleum engineers and reservoir engineers.

Course Outline

Day 1

Introduction and Setting the Scene

- The life cycle of upstream oil and gas projects
- The complex, irreversible and multi-dimensional reality of field development
- The risk and uncertainty concepts
- The decision-making process and the analysis of various decision options
- The importance of having a multi-disciplinary team
- The importance of data acquisition in the exploration and appraisal phases
- Data quality check and control

Day 2

The Field Development Plan (FDP) Process & FDP Geoscience Studies

- Summary of the steps of the FDP process
- Exploration & appraisal data collection, evaluation and integration
- The multi-disciplinary work flow
- The integration of geophysical, geological, petrophysical and engineering data for reservoir characterization
- The reservoir (static) model construction
- Uncertainties and the importance of creating different reservoir realisations
- Hydrocarbon-in-place estimation

Day 3

The FDP Concepts Matrix

- The workflow for constructing the reservoir (dynamic) simulator
- Reservoir fluids characterization
- History-matching of test data from exploration and appraisal wells and the importance of integrated team approach to assess the validity of history matching
- Identifying the different elements of the FDP concept matrix (wells, hubs, transportation…)
- Cost estimation of various FDP concepts
- Scoping and ranking the different FDP concepts in terms of operability, installation, time to first production and reliability

Day 4

The FDP Concept Selection

- The FDP concept selection approval process
- Producing the FDP documentation of the selected development concepts
- Technical approvals of FDP document
- Securing the Final Investment Decision from stakeholders

Day 5

Actual Field Development Plans - Examples & Case Studies

- Oil reservoir case study
- Enhanced oil recovery case study
- Heavy oil reservoir case study
- Summary, conclusions and recommendations

Field Development Planning (FDP) - Subsurface

Duration 3 days
Code FDP/SUB/02

Course Objectives

Through completion of the course, delegates will;

- Develop an understanding of the theory and practice of field development planning.
- Recognise the importance and benefits of integration of disciplines through working as a multi-disciplinary team.
- Identify uncertainty, its significance and explain the importance of assessing it realistically.
- Appraise the trade-off between cost and value of data and assess how to ensure that the optimum amount of data is collected.
- Describe and relate the importance of commercial goals to technical goals.
- Develop a multi-discipline appreciation and team building skills through the team exercises.

Who Should Attend?

Engineers, Geoscientists, Project and Asset managers and those involved in project economics who wish to gain a better of field development planning in order to maximise the value of asset development.

Course Outline

Day 1

- Introduction & Course overview
- Taught Material
- Exploration and appraisal phase objectives
- Collection and analysis of data, including proving of resources and reduction of uncertainty and risk, understanding the value of data
- Group Activity
- Introduction to interactive case study (onshore or offshore case) and volumetric estimates

Day 2

Taught Material

- Introduction to facilities, onshore & offshore
- Constructing a field development plan and workflow
- Incorporating uncertainty management into the development plan
- Building static models, dynamic models and forecasting

Group Activity - Continuation of case study

- Appraisal drilling programme and data acquisition as defined by participants
- Preparation of development plans for chosen scenario
- Teams present findings, uncertainty analysis, and preferred development scheme

Day 3

Group Activity

- Run basic economics on chosen development scheme and "actual" profiles
- Assess different development options and test the impact of appraisal costs on overall field economics
- Presentation of teams' development profiles (using digital model)
- Summary of economics, including project abandonment
- Summary of Field Developments
- How has uncertainty been dealt with, and how confident are we the optimum development scheme has been found

Day 4

Additional case study onshore or offshore (optional)

- Introduction to second interactive case study and volumetric estimates
- Appraisal and drilling programmes, economic modelling
- Preparation and presentation of development plans

Day 5

- Advanced facilities (optional)
- What are the key facilities issues?
- What are the key decisions, influencing factors
- Balance between levels of definition and risks

Field Development Planning (FDP) - Subsurface & Facilities

Duration 5 days
Code FDP/S&F/03

Course Objectives

Through completion of the course, delegates will;

- Develop an understanding of the theory and practice of field development planning.
- Recognise the importance and benefits of integration of disciplines through working as a multi-disciplinary team.
- Identify uncertainty, its significance and explain the importance of assessing it realistically.
- Appraise the trade-off between cost and value of data and assess how to ensure that the optimum amount of data is collected.
- Describe and relate the importance of commercial goals to technical goals.
- Develop a multi-discipline appreciation and team building skills through the team exercises.

Who Should Attend?

Engineers, Geoscientists, Project and Asset managers and those involved in project economics who wish to gain a better of field development planning in order to maximise the value of asset development.

Course Outline

Day 1

- Introduction & Course overview
- Taught Material
- Exploration and appraisal phase objectives
- Collection and analysis of data, including proving of resources and reduction of uncertainty and risk, understanding the value of data
- Group Activity
- Introduction to interactive case study (onshore or offshore case) and volumetric estimates

Day 2

Taught Material

- Introduction to facilities, onshore & offshore
- Constructing a field development plan and workflow
- Incorporating uncertainty management into the development plan
- Building static models, dynamic models and forecasting

Group Activity - Continuation of case study

- Appraisal drilling programme and data acquisition as defined by participants
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- Teams present findings, uncertainty analysis, and preferred development scheme

Day 3

Group Activity

- Run basic economics on chosen development scheme and "actual" profiles
- Assess different development options and test the impact of appraisal costs on overall field economics
- Presentation of teams' development profiles (using digital model)
- Summary of economics, including project abandonment

Summary of Field Developments

- How has uncertainty been dealt with, and how confident are we the optimum development scheme has been found

Day 4

Additional case study onshore or offshore (optional)

- Introduction to second interactive case study and volumetric estimates
- Appraisal and drilling programmes, economic modelling
- Preparation and presentation of development plans

Day 5

Advanced facilities (optional)

- What are the key facilities issues?
- What are the key decisions, influencing factors
- Balance between levels of definition and risks

Introduction to International Petroleum Economics

Duration 5 days
Code E&C/IIPE/01

Course Objectives

To give participants a good understanding of the concepts and importance of petroleum economics and to demonstrate and develop the skills to:

- Build economic models and perform economic evaluations
- Identify, assess and manage uncertainties and risks
- Analyse the outcome of any E&P project investment

The course will be suitable for:

- Economists in the oil & gas industry
- Decision-makers responsible for approving and managing new investments
- New Ventures, Planning, Commercial and Financial managers
- Geoscience and engineering professionals

Course Outline

Petroleum Economics - An Overview
- What is it and why is it important?
- How does it relate to the rest of the company

Fundamental Concepts
- What is petroleum economics
- Supply & demand - what controls product prices?
- It's all a matter of cash flow - revenues, costs, taxes
- Depreciation
- Looking to the future - dealing with historic costs
- The time value of money - discounting
- Economic parameters - NPV, IRR, CPI, Payback
- What do these parameters really mean?

How do You Evaluate a Field Development?
- Oil & gas price assumptions and economic parameters
- Estimates of field production rates and cost data
- Introduction to international fiscal regimes - Concession, production sharing, service agreements
- Structure of a discounted cash flow model
- Interpreting the results

Designing & Building a Discounted Cash Flow Model
- Differences and similarities between fiscal regimes
- Designing the portfolio model
- Modelling the different fiscal regimes

Portfolio Modelling
- The ring-fence concept
- Designing the portfolio model

Risk and Uncertainty
- Defining risks and uncertainties
- Methods of taking account of uncertainty
- Sensitivity analysis
- Expected monetary value & decision trees, risk analysis
- Other approaches - options theory & portfolio analysis

Applications of Economic Evaluations
- Project ranking and portfolio management
- Funding of development projects
- Incremental project economics
- Basis of corporate planning
- Analysis of business development opportunities

Petroleum Economics & Risk Analysis

Duration 5 days
Code E&C/PE&RA/02

Course Objectives

To give participants a good understanding of the concepts and importance of petroleum economics and to demonstrate and develop the skills to:

- Build economic models and perform economic evaluations.
- Identify, assess, quantify and manage uncertainties and risks.
- Analyse and forecast the outcome of any exploration, development or operations project.
- Rank projects and investigate economic robustness.

Covering these key areas:

- Introduction and exploration prospect evaluations
- Development project evaluations
- Risk management
- Applications of economic evaluations
- Case studies and group work

Who Should Attend?

The course will be suitable for Geologists, Geophysicists, Petrophysicists, Drilling Engineers, Reservoir Engineers, Production Engineers, Costs and Facilities Engineers, Development Planning Engineers, Commercial and Financial Analysts, Lawyers, Managers and any other professional staff involved in exploration and production in the oil industry.

Course Outline

The exercises and group work will be dependent on information from the client and the participants' abilities. Below is a high level summary of the course agenda for each of the days:

Introduction and Exploration Prospect Evaluations

- The purpose and importance of petroleum economics
- Basic concepts of economic evaluation and risk analysis
- Deterministic and probabilistic reserves estimations
- Risked reserves
- Expected monetary value and decision tree analysis

Development Project Evaluations

- Discounted cash flow models
- Field development planning
- Building an economic model
- Production profiles and costs
- Fiscal regimes and taxes
- Results and profitability indicators

Risk Management

- Defining risks and uncertainties
- Sensitivity analysis
- Technical risk management
- Commercial risk management

Applications of Economic Evaluations

- Project ranking and portfolio management
- Funding of development projects
- Incremental project economics
- Developing models for any project

Case Studies and Group Work

- Case studies of economic models from international projects
- Review of economic evaluations provided by the client
- Group work on building an economic model
- Group work on problem solving

Front End Loading for E&P Projects (FID)

Duration 5 days
Code E&C/FID/03

Course Objectives

This course is largely designed for E&P multi discipline engineers.

This course discusses and reviews the framework and the interaction between all the various disciplines involved in the project stages up to the Final Investment Decisions (FID).

- To conduct Field Development Feasibility Studies
- To build and develop project options scenarios
- To define scope for project (Front End) estimates
- To identify uneconomic projects
- To produce project development plans

Who Should Attend?

The course will be suitable for:

- Geologists
- Geophysicists
- Petroleum Engineers
- Reservoir Engineers
- Engineering professionals

Course Outline

Day 1

- Capital projects; the characteristics of the front end versus the design and construction phases
- The importance of front end loading using project examples
- The range of influencing factors (including commercial, environmental, operational factors) and the project selection criteria

Day 2

- The value of data; when more is needed and the articulation of risk if it isn't available
- Overall project objectives and their influence on decision making
- The opportunity framing process and the importance of clear boundaries from the outset

Day 3

- Concept identification processes; the challenges and pitfalls
- The value of, assessment and selection of new technology
- The use and value of development analogues

Day 4

- Concept classification and evaluation
- Sensitivities and changes in the external environment
- Robust concept selection and assessment

Day 5

- Concept 'handover' and associated risks
- Documentation of the front end loading decisions and influencing factors
- Operational Feedback
- Summary

Subsurface Engineering, Geosciences and Production Engineering Experts

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