NeftRa


NeftRa
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introduction

NeftRa is a specialized energy consultancy and technology partner, dedicated to advancing the technical capabilities of Iraq's oil and gas sector. By bridging global expertise with deep local understanding, NeftRa offers tailored solutions that support upstream operators, national oil companies, and international partners in navigating complex reservoir, production, and development challenges. With a focus on applied engineering, simulation, and capacity building, NeftRa plays an active role in supporting field development, optimizing production performance, and evaluating long-term energy strategies aligned with modern sustainability standards.

Operating with full cultural fluency and a strong regional presence, NeftRa simplifies complex international partnerships by providing trusted, bilingual support across all project phases. Whether facilitating software adoption, conducting independent reservoir studies, or organizing hands-on technical training, NeftRa remains committed to becoming a long-term partner in Iraq's evolving energy future.

vision

NeftRa's vision is to become the trusted bridge between global expertise and Iraq's energy future, empowering national and international operators with advanced technical capabilities, cutting-edge technologies, and practical solutions. We aim to support sustainable resource development by delivering world-class consulting, software enablement, and specialized training, all while nurturing local talent and building long-term, transparent partnerships across the region.

mission

NeftRa's mission is to deliver world-class technical consulting, advanced software solutions, and hands-on training that elevate the operational excellence of Iraq's oil and gas sector. By combining global standards with deep local knowledge, we empower operators, ministries, and energy professionals to optimize resources, embrace innovation, and build sustainable technical capacity for long-term growth.

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STREAMLINES

Training

At NeftRa, training is at the core of our mission to develop local expertise and technical independence in Iraq's energy sector. Through our strategic partnership with **Streamlines** , a recognized regional leader in oil and gas training, we deliver internationally accredited programs across reservoir engineering, production optimization, drilling operations, and emerging energy disciplines. This collaboration allows us to combine global expertise with local market understanding, ensuring the highest quality training delivery.

Each program blends advanced theory with hands-on exercises, real-world case studies, and interactive learning, enabling participants to immediately apply knowledge to field operations. Our courses serve engineers, technical teams, and management professionals looking to build capabilities that directly support safe, efficient, and optimized field development. With NeftRa and Streamlines, Iraqi professionals receive practical, modern training fully aligned with international standards and tailored to Iraq's operating environment.

Our Courses

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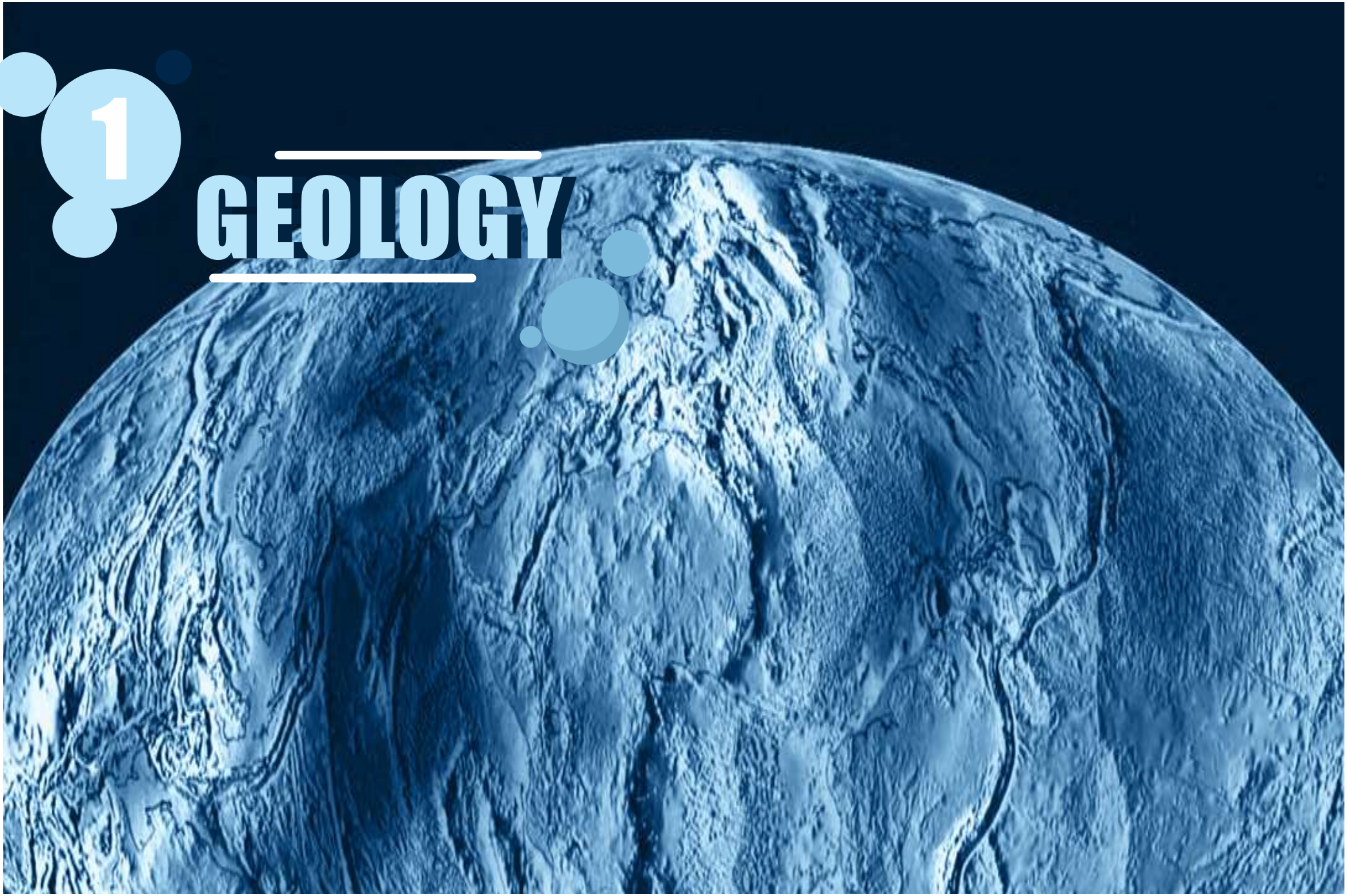
1 GEOLOGY



Petroleum Geology

Course Code: 0101 **Course Level:** Foundation

Course Description:

This course is an introductory course to the geological concepts and applications related to the oil and gas industry. The course covers main geological fundamentals including tectonics, geological principles and sedimentary processes.

The course introduces the participants to different depositional systems, structural and stratigraphic analysis.

Course Contents:

▷ **Geology fundamentals**
- Minerals and rocks.
- Plate tectonics, geological principles and geological time.
- Weathering and erosion.
- Deposition and bioturbation.
- Diagenesis & Siliciclastic depositional system.
- Carbonate depositional system.

▷ **Petroleum geology**
- Reservoirs.
- Structural geology and petroleum.
- Petroleum source rocks.
- Hydrocarbon migration and trapping.
- Pore systems and flow.

▷ **Petroleum geological analysis**
- Structural and stratigraphic correlations.
- HCIP calculations and 3D geo-cellular modelling.
- Introduction to seismic.
- Introduction to well logging.

Subsurface Mapping

Course Code: 0102 **Course Level:** Foundation

Course Description:

The course guides the participants through the process of developing subsurface maps of the petroleum system. It covers the main methods of data gathering, how to process the data and the interpretations data is used in.

The course includes hands on training for the participants to build their own structure contour maps, thickness map and how to use them to form their own volumetric calculations using different measurement techniques.

Course Contents:

- Hydrocarbon basins.
- Sedimentation cycle.
- Hydrocarbon life cycle.
- Structure regimes and tectonics.
- Seismic data gathering and processing.
- Structural styles and stresses.
- Contouring techniques.
- Thickness measurements.
- Dipmeter interpretation.
- Thickness maps.
- Folds and faults (reflecting them on Isopach, thickness map).
- Structural quality control.
- Map validation.
- Volumetric calculations.

Oil Field Geology

Course Code: 0103 **Course Level:** Foundation

Course Description:

Drilling and reservoir engineers' daily operation and activities get them across the geological system of the field. This course is designed to introduce the participants to the geology behind every operation that takes place in oil fields.

Course Contents:

▷ **Petroleum geology.**
- Petroleum system.
- Sedimentary environments.
- Reservoir structural geology (faults, fractures, etc.) and stratigraphy & pore systems.

▷ **Drilling geology.**
- Drilling rigs and their components.
- Well control, kicks and kill methods.
- Well design & mud logging.
- Directional drilling and geosteering.
- Wellbore stability (reasons, detection and failure circumstances). MWD and LWD.

▷ **Reservoir geological analysis.**
- Coring methods, equipment and analysis.
- Wireline log interpretation for lithology determination.
- Well testing and rock fluid interaction.
- Reservoir analysis and well placement.

Exploration Technologies

Course Code: 0104 **Course Level:** Foundation

Course Description:

The course is designed to link the theoretical background of petroleum geology, geophysics and petrophysics with the current technologies used to explore an oil and gas field.

The course covers technologies used in assessing the geology and the structure of the reservoir, the properties of the rock and the fluid properties. The course introduces participants to the main drilling rig technologies and appraisal techniques.

Course Contents:

▷ **Petroleum geology**

- Petroleum system overview.
- Sedimentation cycle.
- Exploration and production asset management.
- Reservoir fluid characteristics.
- Exploration and geophysics principles.

▷ **Petroleum technologies**

- Unconventional reservoirs.
- Exploration technologies.
- Introduction to seismic.
- Introduction to well logging.
- Drilling rigs, contracts and well design.
- Appraisal and reservoir evaluation.
- Well testing.
- Exploration economics.

Development Geology

Course Code: 0105 **Course Level:** Foundation

Course Description:

Petroleum field development depends mainly on the geology of the field in hand. This course studies the different geology factors impacting development of the field, methods to measure them and their effects on development decisions.

The course covers geology in building a static reservoir model (volumetric calculations, capillarity and structure), drilling plan and well design.

Course Contents:

- Reservoir fluid properties.
- Capillarity effect.
- Volumetric reserves estimation and calculation.
- Recoverable hydrocarbons determination calculation.
- Drive mechanisms and their influence.
- Structural types, traps, faults, seals, etc.
- Seismic data gathering, processing and interpretation.
- Reservoir pore space configurations.
- Static reservoir modelling.
- Field operations, well design and geological input.
- Introduction to secondary and tertiary field development.
- Developing old and marginal fields.

Basin Analysis

Course Code: 0106 **Course Level:** Foundation

Course Description:

The course provides participants with a solid understanding and familiarity with petroleum basin system and the analysis executed to fully understand a given basin.

The course covers sequence stratigraphy, tectonic subsidence, geothermic and geochemical analysis. It also includes the petroleum system modeling and uncertainty management.

Course Contents:

▷ **Introduction to basins**

- Petroleum system overview.
- Sedimentary basins.
- Basins: formation mechanism, classification and structural styles.

▷ **Basins analysis**

- Burial history and sequence stratigraphy.
- Depositional environment.
- Tectonic subsidence.
- Geothermic effect.
- Geochemical analysis (organic matter quality, quantity and maturity).
- Petroleum system modeling.
- Migration pathways and critical points.
- Uncertainty management.

Prospect and Play Assessment

Course Code: 0107 **Course Level:** Foundation

Course Description:

The course guides the participants through the process of developing a field from a lead. The course covers all the aspects of prospects and plays assessment including data collection and analysis and the methods to assess the lead and measure its potential.

The course includes volumetric calculation of the reservoir and the different statistical methods to calculate its probabilities. The course also introduces the participants to the risks associated and the risk assessment process.

Course Contents:

- **Prospect lead development**
  - Well potential productivity assessment.
  - Potential field development.
  - Expected production profiles.
- **Play assessment**
  - Data collection.
  - Basin potential assessment.
  - Entrapment.
  - Play maps and regional geology.
- **Prospect analysis**
  - Source rock estimation.
  - Seismic and well data interpretation.
  - Cross correlation and structural history.
  - HCIP calculation and uncertainty evaluation.
  - Deterministic and stochastic assessment of HCIP.
  - Risk assessment, geological risk and probability of success.
  - Exploration economics.
  - Economic risk.

Production Geology for Other Disciplines

Course Code: 0108 **Course Level:** Foundation

Course Description:

This course is designed as an introductory course to the geological background of different operations and designing processes.

The course covers main geological fundamentals and the geology involved in the drilling operations and design (borehole stability, formation testing and evaluation), reservoir modeling (rock and fluid properties and reserves estimation), completion and production (flow assurance and sand control).

Course Contents:

- **Geological fundamentals**
  - Petroleum geology and geophysics.
  - Reservoir formation and fluid migration.
  - Introduction to seismic.
  - Reservoir structural analysis.
- **Geology and operations**
  - Formation evaluation and testing.
  - Logging (open and cased hole logging).
  - Coring.
  - LWD and MWD.
  - Casing and cementing.
  - Directional drilling.
  - Perforation and well completion.
  - Formation damage and sand control.
- **Geology and design**
  - Reserves estimation.
  - Reservoir rock properties.
  - Reservoir fluid properties.
  - Reservoir simulation.
  - Production flow assurance.
  - Unconventional reservoirs and introduction to their geology.

Fundamentals of Geochemistry

Course Code: 0109 **Course Level:** Intermediate

Course Description:

This course provides the participants with an in-depth understanding of the chemistry involved in the petroleum system development. The course covers the main geochemical factors involved including the TOC, pressure, temperature and tectonics and their effect on the petroleum system development.

The course guides the participants through the analysis performed to understand the geochemistry of a given field and the modeling process that follows.

Course Contents:

▷ **Petroleum system**

- Petroleum system overview.
- Basin and petroleum system modeling.
- Timing of petroleum system events.
- Introduction to 3D modeling.

▷ **Geochemistry of the petroleum system**

- Thermal maturity.
- Total organic content and Rock-Eval.
- Geochemical logs, fractional conversion and expulsion efficiency.
- Boundary conditions and their effect on reservoir conditions.
- Pore pressure, compaction and tectonic history.
- Chemical reaction kinetics.
- PVT analysis.
- Modeling of unconventional resources.
- Model calibration and risk associated.

Sandstone Reservoirs

Course Code: 0110 **Course Level:** Intermediate

Course Description:

This course is tailored to describe sandstone reservoirs, their rock properties and the structural geology involved in them.

The course introduces the different types of data obtained about the reservoir and wells geology and their impact on the field development and modeling including structural data, wireline data, mud logging and coring data.

Course Contents:

- Reservoir geology.
- Geological evaluation.
- Seismic, structure and stratigraphy.
- Capillarity and pressures.
- Wireline logging and coring.
- Depositional systems.
- Cut-offs.
- Facies models.
- Deepwater systems.
- Reservoir structure and volumetric calculation.
- Reservoir rock properties.
- Reservoir evaluation and analysis.
- Reservoir exploration and production.

Mudlogging Operations

Course Code: 0111 **Course Level:** Intermediate

Course Description:

This course focuses on the mud logging process and mud logger responsibilities in the field. The course discusses the data obtained through mud logging process and safety procedures associated with it.

The course covers geological data obtained from mud logging, importance of the data obtained while drilling as well as safety and well stability role of the mud logging process.

Course Contents:

- Petroleum geology.
- Rock classifications and properties.
- Rig types and components.
- Introduction to drilling and completion.
- Safety on drilling rigs.
- Mud loggers' responsibilities.
- Data acquisition process.
- Sampling and cutting analysis.
- Gas detection.
- Introduction to the degassing process.
- Gas analysis and volume calculations.
- Formation pressure.
- Borehole problems.

Sedimentology

Course Code: 0112 **Course Level:** Intermediate

Course Description:

This course provides the participants with a solid understanding of the formation of sedimentary rocks. The course covers the detailed information of the sedimentation process, sediment types, description and sedimentary basins and their structures.

The course uses the theoretical understanding to apply main analysis and interpretation based on core data to describe the depositional environment and sedimentary structure of the reservoir.

Course Contents:

▷ **Sedimentology fundamentals**

- Nature and classification of sediments.
- Physics of sedimentation.
- Sedimentary structures.
- Siliciclastics and carbonates.
- Diagenesis.
- Paleontology and depositional environments.
- Stratigraphy and sedimentary basins.

▷ **Sedimentology and petroleum engineering**

- Introduction to coring processes.
- Grain size analysis.
- Trace fossils and sedimentary structures identification.
- Depositional environment interpretation.
- Core description and analysis.

Reservoir Geomechanics

Course Code: 0113 **Course Level:** Intermediate

Course Description:

Stresses present in the reservoir and around the borehole play an essential role in designing and executing drilling programs.

This course is designed to introduce participants to the rock mechanics and stress in play and the effect of the geomechanical properties of the reservoir. The course covers the main data collection methods and modeling of reservoir geomechanics.

Course Contents:

▷ **Petroleum geomechanics fundamentals**

- Introduction to rock mechanics.
- Tectonic stress field and formation pore pressure.
- Basic constitutive laws.
- Rock strength and deformation.
- Faults and fractures.
- Reservoir compaction.
- Mechanical earth modeling.
- Thermal effects (stresses and rock properties).
- Caprock integrity and fault reactivation.

▷ **Geomechanical data collection and modeling**

- Log data.
- Core data.
- Reservoir geomechanics coupled modeling.
- Segmental modeling.
- Reservoir monitoring techniques and data usage.

Horizontal Well Placement

Course Code: 0114 **Course Level:** Intermediate

Course Description:

In order to maximize production, some wells are required to be drilled in a horizontal or inclined orientation. Well placement plays a major role in assuring a successful drilling process.

This course covers the main well placement techniques and problems associated with directional drilling. The course includes MWD and LWD use in formation evaluation and the geosteering process.

Course Contents:

▷ **Fundamentals of well placement**

- Fundamentals of directional drilling .
- Basic concepts and applications of geological well placement .
- Basic reservoir geology elements.
- MWD position and drilling-related data.
- MWD techniques and tools.

▷ **Formation evaluation and LWD**

- LWD tools and techniques.
- Formation evaluation techniques.
- LWD images, acquisition and applications.
- Directional drilling problems (uncertainties, stick slip, dogleg) .

▷ **Well placements techniques**

- Well planning and geosteering.
- Using the intermediate casing to extrapolate to the bit and drill out.
- Model-compare-update method.
- Incorporating real-time dip analysis.
- Remote boundary detection.

Carbonate Reservoirs

Course Code: 0115 **Course Level:** Advanced

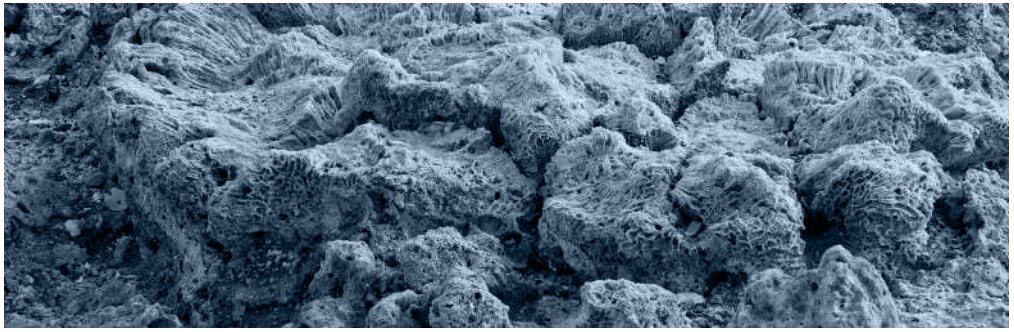
Course Description:

The course provides a solid understanding about Carbonate reservoirs. The course familiarizes the participants with the Carbonate reservoirs occurrence, their structure, facies and stratigraphy.

The course covers the main properties of carbonate reservoirs including their porosity, permeability, stratigraphic patterns and fractures.

Course Contents:

- Carbonates environment, nature and sedimentation.
- Carbonate facies models.
- Depositional environments.
- Sequence stratigraphy.
- Stratigraphic patterns and subsidence rates.
- Sequence stratigraphic models (occurrence and classification).
- Seismic sequence stratigraphy of carbonates.
- Diagenesis and porosity evolution.
- Permeability evolution.
- Near-surface diagenetic environments of limestones and dolomites.
- Natural fractures in carbonates.
- Carbonate platforms, facies and reservoirs.



Analysis of Structural Traps in Extensional Settings

Course Code: 0116 **Course Level:** Advanced

Course Description:

This course is designed to help participants understand and picture structural traps formation, the effect they have on the structure of the adjacent area and the main process through which they are formed.

The course guides the participants through analyzing different structure data to identify the structural trap.

Course Contents:

- Introduction to the trapping process.
- Types of traps.
- Extensional structure styles.
- Tectonic habitats and models of rifting.
- Transtensive structures.
- Structure map patterns.

▷ **Faults**

  - Causes.
  - Types.
  - Fault related structures.

- Structure validation.
- Balancing and restoration techniques.
- Slips and shears.

▷ **Folds**

  - Causes.
  - Types.
  - Fold related structures.

- Sequential restoration of growth structures.
- Fracturing.

Deep-water Turbidite Depositional Systems and Reservoirs

Course Code: 0117 **Course Level:** Advanced

Course Description:

This course covers the geology, sedimentology and structure of the deepwater systems. The course covers the history of the deepwater systems (sediments, depositional environment, compaction and flow systems).

The course includes main testing and assessment methods in a deepwater depositional system including seismic and wireline logs.

Course Contents:

▷ **Geology fundamentals**
- Sedimentology.
- Stratigraphy.
- Heterogeneity effect on fluid flow and fluid flow modeling.
- Sediments and transportation.

▷ **Deepwater depositional systems analysis**
- Turbidite settings process and models.
- Deepwater systems (source to sink).
- Canyons and channels.
- Confined slope systems.
- Mass distributive systems.
- Carbonate systems.
- Seismic of deepwater systems.
- Wireline logs of deepwater systems.
- Prediction of sand distribution.

Integrated Carbonate Reservoir Characterization

Course Code: 0118 **Course Level:** Advanced

Course Description:

This course provides the participants with solid understanding of carbonate rocks and reservoirs. The course covers the carbonate characteristics, evaluation techniques and the heterogeneities and complexities associated with carbonate reservoir rocks.

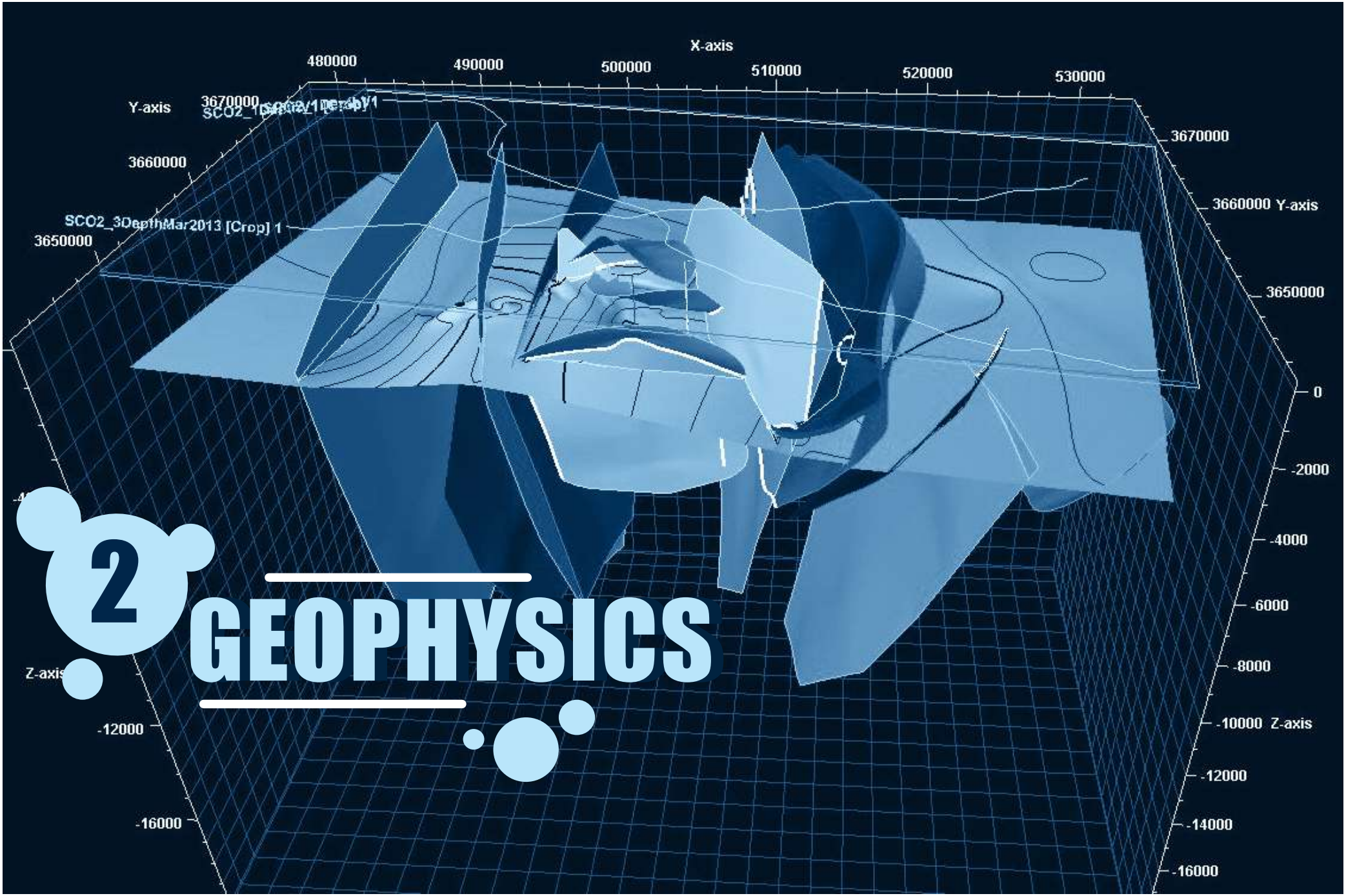
During the course, participants will be able to learn about the geostatistical models of carbonate reservoirs and how to deal with reservoir heterogeneity and architecture.

Course Contents:

▷ **Geological fundamentals**
- Carbonate rock formation.
- Structural geology and rock mechanics of carbonate reservoirs.
- Heterogeneities of carbonate reservoirs.
- Carbonate pore system, properties and core analysis.

▷ **Carbonate Reservoir Evaluation**
- Well log.
- Lithology, porosity and permeability.
- Fracture identification and distribution.
- Porosity vs depth correlation.

▷ **Carbonate reservoir development and modeling**
- Carbonate pore architecture.
- Depositional facies and reservoir quality.
- Reservoir heterogeneity.
- 3D geostatistical models including reservoir heterogeneity and architecture.



2 GEOPHYSICS

Fundamentals of Geophysics

Course Code: 0201 **Course Level:** Foundation

Course Description:

The course introduces participants to the concepts of geophysics and the scientific background of seismology. The course is designed to familiarize the participants with different data acquisition techniques, the data obtained and seismic data interpretation including creating a time vs depth chart, velocity model, seismic inversion and other seismic attributes.

Course Contents:

▷ **Introduction to geophysics**
- Overview on geophysics.
- Geophysical techniques.
- Wave propagation concept.

▷ **Seismic process**
- Introduction to seismic.
- Seismic velocity as a rock imaging and characterization method.
- Seismic data acquisition.
- Marine seismic acquisition.
- Seismic data conditioning and imaging process.

▷ **Seismic data interpretation**
- Pore pressure prediction.
- Time and depth imaging, velocity modeling.
- Structural mapping and contouring.
- Direct hydrocarbon indicators and AVO.
- Seismic inversion and attributes.
- Time lapse reservoir monitoring.

Seismic Oil Exploration

Course Code: 0202 **Course Level:** Foundation

Course Description:

The course offers to participants the basic understanding of the role of seismic data in exploration process where participants are introduced to seismic stratigraphy.

Participants will gain a solid foundation in the understanding of the applications and the role of seismic data in recognizing facies and sedimentary bodies. Participants are also introduced and have the opportunity to identify the formation process of a given basin and the chronostratigraphy associated.

Course Contents:

- Introduction to seismic stratigraphy.
- Stratigraphic sequences and how to recognize them on seismic data.
- Seismic facies.
- Geometry of the sedimentary bodies.
- Lithology and seismic wave velocity.
- Seismic display parameter and seismic data processing.
- Sea-level and sedimentation patterns.
- The chronostratigraphic chart.
- Basin formation processes and how to identify sedimentation patterns.
- Deposition of source rocks.
- Carbonate depositional environments.
- Mapping seismic facies and prospectivity assessment.
- Exercises and seismic data practices for every assessment process.

Seismic Acquisition and Processing

Course Code: 0203 **Course Level:** Foundation

Course Description:

The objective of this course is to introduce entry level junior Geophysicists and Geoscientists to the essential acquisition and technical processing concepts and principles of seismic applications in exploration, field appraisal, and reservoir management.

Course Contents:

▷ **Seismic interpretation fundamentals**
- Introduction to seismic data.
- Seismic data types.
- Interpreting seismic data.
- Body and surface waves - reflection and refraction.
- Stacking diagrams.
- Seismic data acquisition.

▷ **Seismic reflection principles**
- Field data acquisition principles.
- Land acquisition systems and operations.
- Marine acquisition systems and operations.

▷ **Seismic data processing**
- Near-surface distortion correction.
- Wavelets and wavelet shaping.
- Regularization.
- Noise attenuation and multiple attenuation.
- Velocity analysis and velocity model building.
- Imaging and imaging with anisotropy.
- Survey design.

Seismic Interpretation Software Basics

Course Code: 0204 **Course Level:** Foundation

Course Description:

The course offers to participants the basic introduction to the role of seismic data in creating a geological and geophysical model using Petrel.

Participants will gain a hand on knowledge of the applications and the role of seismic data in recognizing facies, sedimentary bodies and incorporating it to the G&G Model.

The course is computer based where participants create their model starting from seismic data by creating contour and fault maps, participants then add the geophysical data and stratigraphic data and define facies.

Course Contents:

▷ **Geological and geophysical (G&G) modeling basics**

- Geological basics.
- Contour maps and how to create them.
- Geophysical basics.
- Interpretation basics.
- Depth conversion, velocity modeling.
- Sequence stratigraphy, seismic stratigraphy and facies.

▷ **Geological and geophysical (G&G) model building**

- Stratal slicing and geomorphology.
- 3D fault mapping and ant tracking.
- Direct hydrocarbon indicators.
- Reservoir fluids and rock physics.
- Amplitude versus Angle/Offset (AVA/AVO).
- Inversion 3D.
- Facies classification.
- Fractured reservoirs.

2D and 3D Seismic Interpretation

Course Code: 0205 **Course Level:** Advanced

Course Description:

This course covers seismic operation process, theoretical and scientific background of 2D and 3D seismic. The course provides the participants with a solid understanding of the interpretation process of seismic data obtained to determine the structural, the stratigraphic and characterization aspects of the reservoir.

During the course participants will be provided with the analysis and the interpretation process and guided through data analysis activities.

Course Contents:

▷ **Seismic reflection surveying**

- Introduction to seismic geophysics.
- Reflection surveying principles.
- Wavelength and resolution.
- Survey design and optimization.
- Primary and multicomponent surveys.
- P-wave and S-wave surveys.
- Data extraction and inverse modeling.

▷ **Seismic interpretation.**

- Principles of interpretation techniques.
- Exploration and reservoir characterization.
- Structural interpretation and texture mapping.
- Rock physics measurements and applications to model seismic response.
- Scaling problems.
- Seismic attributes (amplitude, phase, frequency and AVA).
- Stratigraphic interpretation.
- AVO and fluid content determination.
- Porosity and net pay evaluation.

▷ **Advanced seismic applications.**

- Seismic monitoring.
- Well to well seismic.
- Seismic integration with well logs.
- General geological analysis.

Non-seismic Geophysical Techniques

Course Code: 0206 **Course Level:** Intermediate

Course Description:

The course offers to participants the basic introduction to the role of gravity, magnetic and electromagnetic methods in the exploration, reservoir description and reservoir management in oil and gas industry.

Participants will gain a solid foundation in the understanding of the applications and the role of gravity, magnetics and electromagnetics. Applications included in the course are magnetic, electric and gravity methods for hydrocarbon exploration.

Course Contents:

▷ **Theoretical foundations**

- Gravity method foundations.
- Electrical and magnetic methods foundations.
- Poisson's relationship.
- EM induction prospecting principle.
- The role of non-seismic methods in the E&P business.

▷ **Non-seismic methods**

- Gravity surveying.
- Gravity responses calculation and depth estimation methods.
- Gravity resolution of bodies and structures.
- Electrical surveying methods.
- Calculating resistivity profiles and effective resistivity.
- Types of EM systems, fundamental equations.
- Marine EM.
- Calculations of E refraction, MT resolution, EM skin depth and velocity.
- CSEM modeling and inversion.
- Time-Lapse gravity and electrical methods.
- Joint inversions.

Seismic Velocities and Depth Conversion

Course Code: 0207 **Course Level:** Intermediate

Course Description:

This course covers seismic operation process, theoretical and scientific background of 2D and 3D seismic. The course focuses on time, distance and velocity conversions, algorithms used and analysis based on them.

During the course participants will be provided with the analysis and the interpretation process and guided through data processing, computations and analysis activities.

Course Contents:

- Introduction to seismology.
- Wave propagation and types of velocity.
- Different methods to obtain velocity.
- Synthetic seismogram (creating and upscaling).
- Well and seismic data integration.
- Time to depth conversion.
- Migration velocity and algorithms.
- Tomographic velocity analysis.
- Velocity model building.
- Seismic well validation and calibrations.
- Depth imaging quality control and uncertainty.
- Introduction to anisotropy.
- Pore pressure prediction.

Applied Geological Subsurface Imaging and Velocity Model Building

Course Code: 0208 **Course Level:** Intermediate

Course Description:

Participants will get a full understanding of the different types of velocity and corresponding methods for their measurement, especially interval velocities and their relationship with rock properties and pre-stack depth migration.

They will become familiar with the different methods of migration and their subsequent implementation. They will be able to judge the strong and weak points of each algorithm and they can select their proper parameters. They can select and apply the method that is most appropriate for velocity model building based on the data, pre-processing results, geological information and stated objectives.

Course Contents:

- Seismic data acquisition.
- Rock physics, wave equations and anisotropy.
- Wave propagation and seismic amplitude.
- Seismic imaging.
- Data distortion, filtering and deconvolution.
- Time processing and velocities.
- Stacking velocity analysis.
- Time-depth relationships.
- Horizontal and vertical transverse isotropy.
- Migration principles and algorithms.
- DMO and AVO.
- Velocity field building.
- Pre-stack time and depth migration.
- Noise identification.
- Dynamic map migration and migration velocity analysis.

Advanced Seismic Interpretation Software Techniques

Course Code: 0209 **Course Level:** Intermediate

Course Description:

This course is a computer based training where participants are introduced to OMEGA and practice using it to create their model and quality check their seismic data. Participants are then introduced to a set of tasks where they practice Omega tools for seismic data preparation and interpretation and create models using these data.

Course Contents:

- Introduction to OMEGA.
- Creating the global parameter database.
- Monitoring jobs and managing data.
- Job QC.
- Interactive toolkits and job triggering.
- Grids and OMEGA utilities.
- Seismic data reformat.
- Data sorting.
- Basic refraction statics.
- Surface consistent techniques and noise attenuation.
- Velocity picking.
- Interpolation and smoothing.
- Kirchhoff pre-stack time migration.

Advanced Seismic Data Processing: Theory and Implementation

Course Code: 0210 **Course Level:** Advanced

Course Description:

This course covers the theoretical and scientific background of seismic processing. The course provides the participants with a solid understanding of the processing seismic data goes through to be ready for interpretation.

Course Contents:

▷ **Seismic surveying**

- Fourier analysis and Z-transform.
- Sampling.
- Principles of data acquisition and wave principles. Introduction to processing.

▷ **Seismic data processing**

- Static corrections.
- First breaks and LVL.
- CDP method.
- Deconvolution, filtering and elimination.
- Near-surface distortion correction.
- Wavelets and wavelet shaping.
- Regularization.
- Noise attenuation and multiple attenuation.
- DMO (dip move out) and NMO correction.
- Velocity analysis seismic migration and imaging.
- Imaging and imaging with anisotropy.
- Inversion, attributes, AVO, AVA and multi-component seismic.
- Wavelet processing.

AVO, Inversion, and Attributes: Principles and Applications

Course Code: 0211 **Course Level:** Advanced

Course Description:

This course is designed to provide a solid understanding of seismic attributes and the use of AVO and inversion techniques to create petrophysical subsurface models compatible to the dynamic reservoir models based on reservoir measurements and computations.

The course covers the concepts of quantitative seismic analysis and interpretation process based on AVO, inversion techniques and well-to-seismic calibrations.

Course Contents:

▷ **Seismic fundamentals**

- Introduction to seismic principles.
- Rock physics and rock filling materials.
- Seismic operations overview.
- Seismic interpretation overview.
- Seismic attributes.
- Attribute and multi-attribute analysis.

▷ **AVO and inversion**

- Direct hydrocarbon indicators and AVO.
- AVO theory.
- Seismic processing and AVO analysis.
- Inversion theory and methods.
- Well to seismic tie and borehole seismology.
- Seismic inversion applications.
- Seismic modeling and fluid replacement.
- 4D inversion, 3C inversion.
- Stochastic inversion.

Seismic for Resevoir Characterization

Course Code: 0212 **Course Level:** Advanced

Course Description:

This course discusses the use of seismic attributes in the prediction of reservoir properties. The course introduces participants to rock and fluid properties and how they affect seismic attributes.

During the course, participants will gain a solid understanding of the techniques applied on the seismic obtained attributes in order to estimate and evaluate reservoir properties.

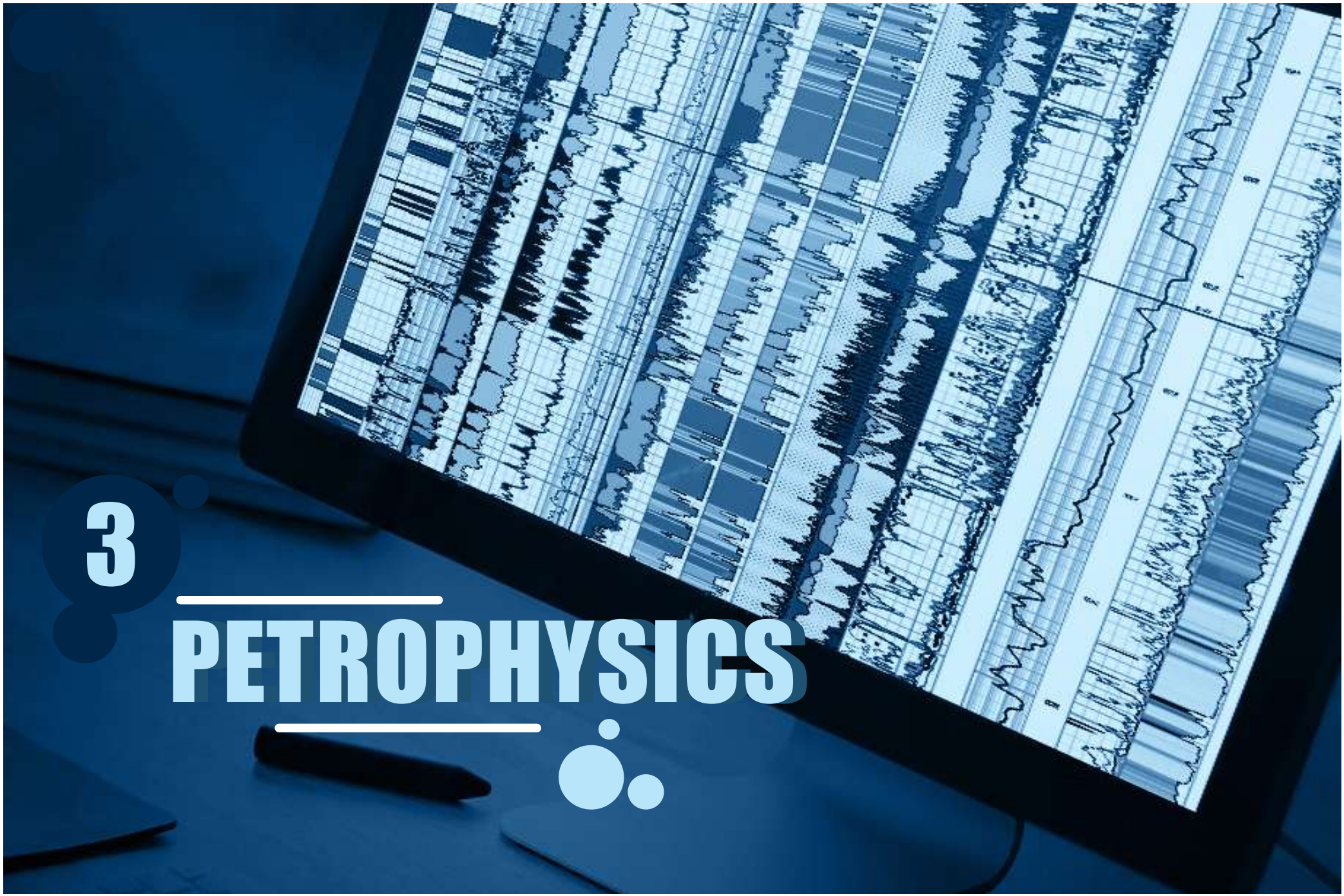
Course Contents:

▷ **Reservoir engineering fundamentals**

- Introduction to rock physics.
- Reservoir rock properties and parameters.
- Reservoir fluid properties.
- Pressures and stresses affecting the reservoir.

▷ **Seismic attributes and analysis**

- Types of attributes.
- Preconditioning seismic data.
- Attributes computation algorithms.
- Structure and stratigraphic prediction.
- Seismic velocity modeling (bounding method).
- Gassmann fluid substitution.
- Multi-attribute analysis.
- Reservoir characterization process.
- Stratigraphic grids construction.
- Deterministic and stochastic elastic inversion.
- AVO interpretation.
- Cascaded petrophysical inversion.
- Reservoir properties prediction.



3 PETROPHYSICS

Foundations of Petrophysics

Course Code: 0301 **Course Level:** Foundation

Course Description:

This course is an introductory course for the petrophysical activities related to the oil and gas field. The course introduces the participants to the petroleum system, rock types and the different petrophysical measurements and tests ranging from coring, open hole logging, cased hole logging, MWD and LWD. The course includes the fundamentals of core analysis, log interpretation and evaluation.

Course Contents:

- **Fundamentals of reservoir**
  - Depositional systems.
  - Rock petrophysical properties.
  - Basic rock mineralogy.
- **Coring and logging**
  - Fundamentals of coring.
  - Basic coring analysis.
  - Introduction to logging.
  - Theory of resistivity, radioactivity, and acoustic tools.
  - MWD and LWD
  - Open hole common logging tools.
  - Cased hole logging.
  - Economics versus petrophysical testing.

Logging and Formation Evaluation

Course Code: 0302 **Course Level:** Foundation

Course Description:

The course focuses on open hole data acquisition techniques and interpretation, it covers a range of common logging tools and analysis and how to plan a successful, commercial logging program. The course also covers other data acquisition methods such as MWD, LWD, coring and mud logging.

Course Contents:

- **Reservoir rock understanding**
  - Basic rock properties.
  - Basic logging.
  - Logging scientific background (resistivity, spontaneous potential, GR).
- **Well logging measurements and interpretation**
  - Wellsite mud logging.
  - Basic log types and measurements (acoustic, density, resistivity).
  - Advanced measurements (neutron porosity, shallow reading resistivity, NMR).
  - Archie equation, saturation determination.
  - Computing V_{sh}, Sw in shale presence.
  - Preparing well logging program.
- **Different measurements**
  - Basic coring concepts.
  - Borehole imaging.
  - MWD and LWD.
  - Wireline formation testing.
  - Borehole corrections.
  - Carbonates and shale challenges.

Core Analysis Techniques

Course Code: 0303 **Course Level:** Foundation

Course Description:

This course guides the participants through the process of coring, starting from the objectives of coring, best practices in core handling, core sample preparation, cleaning and drying. The course includes in-depth demonstration of routine and special core analysis including relative permeability and wettability. During the course, the participants are instructed to design a complete core program.

Course Contents:

- **Introduction to coring**
  - Coring objectives.
  - Coring process (handling, sample preparation).
  - Cleaning and drying methods o Fundamentals of core-log integration.
  - Creating effective lab programs.
- **Core Analysis**
  - Porosity, permeability, and fluid saturation.
  - QC in core analysis.
  - Petrophysical rock types, petrography and mineralogy.
  - Relative permeability, wettability, and saturation height modeling.
- **Core Analysis Applications**
  - Core-log correlation and calibrations.
  - Data integration in reservoir simulation.
  - Designing a full coring and core analysis program.

Repeat Formation Tester (RFT) Analysis

Course Code: 0304 **Course Level:** Foundation

Course Description:

Reservoir Fluid condition is in a dynamic state relative to the reservoir conditions. The course helps participants understand the hydrocarbon nature and its phase change. The course covers the RFT field related activities including sample handling and preservation. The course guides the participants through the process of sample testing and analysis including pressure and EOS tests and modeling.

Course Contents:

▷ **Reservoir fluid**

- Hydrocarbon fluid fundamentals.
- Understanding hydrocarbon behavior with pressure and temperature change o Equilibrium constant and phase change.
- Reservoir pressure and fluid conditions.

▷ **RFT execution and basic interpretation**

- RFT objectives.
- Process of RFT.
- Quality check of RFT samples.
- RFT data interpreted on wellsite.
- Pressure gradient analysis and mobility quality grading.

▷ **Advanced RFT interpretation**

- Formation fluid lab testing and equation of state modeling.
- Permeability anisotropy measurement.
- Mini-drillstem test (DST) and productivity assessment.
- In-situ stress and minifrac testing o Integrating RFT results with reservoir simulation.

Cased Hole Logging

Course Code: 0305 **Course Level:** Foundation

Course Description:

During the course, participants are introduced to the basic techniques of cased hole logging and the scientific concept upon which it is based. The course then guides the participants through basic and advanced cased hole logging applications, tools and analysis including formation evaluation, well integrity pulsed neutron capture and C/O logging, single and multi-phase flow measurements and analysis.

Course Contents:

▷ **Overview of cased hole logging**

- Introduction to reservoir engineering and flow dynamics in wells.
- Major problems associated with well production.
- Introduction to cement evaluation methods and tools.
- Introduction to corrosion monitoring methods and tools.

▷ **Basic cased hole logging**

- Basic cased hole logging sensors and their uses.
- Introduction to computer based analysis and evaluation models.
- The analysis of single-phase flow in wells, using basic flowmeter logs.
- Exercises and problems.
- Formation evaluation through casing.
- Well integrity - cement and casing inspection.

▷ **Advanced cased hole logging**

- Water identification and fluid movement in both injection and production wells.
- Monitoring saturation through casing through pulsed neutron capture and C/O Logging.
- The analysis of multi-phase flow using fluid density and hold-up measurements.
- The use of production logging techniques in horizontal wellsThe analysis of reservoir problems and basic survey planning to maximize useful information.

Production Logging and Reservoir Monitoring Techniques

Course Code: 0306 **Course Level:** Foundation

Course Description:

To evaluate the performance of a well or the reservoir, production logging is normally performed on the completed injection or production well. Production logs can evaluate the well completion or the formation and its fluids in the near-well vicinity behind the pipes.

This course teaches you advanced techniques for production logging and reservoir monitoring. Participants are expected to learn to design a data acquisition program to evaluate wellbore or reservoir behavior, learn how the program is executed and how to interpret the data obtained from the logs.

Course Contents:

- **Fundamentals of production logging and reservoir monitoring**
  - Inflow performance.
  - Fluid and slippage velocities.
  - Single phase flow rate.
- **Multi-phase flow nature and flow regimes Production logs**
  - Different productions logs.
    - Temperature logs.
    - Radioactive tracer logs.
    - Fluid capacitance and density logs.
    - Spinner flowmeter logs.
    - Noise logs.
    - Ultrasonic pulse-echo logs.
    - Pulsed neutron logging tools.
  - Reservoir monitoring inelastic mode.
  - Reservoir monitoring applications.

Techlog

Course Code: 0307 **Course Level:** Foundation

Course Description:

The **Course** is specific for teaching main uses of Techlog for petrophysical interpretation. The course covers main interface, data structure and data management. The course includes some of the main uses of Techlog for formation evaluation, cased hole formation evaluation, executing different models and analysis using Techlog.

Course Contents:

- **Techlog fundamentals**
  - Techlog interface and data structure.
  - Data management and quality control techniques.
  - Basic plotting tools.
  - Using Quanti to create workflows for deterministic evaluation.
- **Techlog petrophysics.**
  - Techlog acoustics processing and interpretation.
  - Techlog formation evaluation.
  - Techlog cased hole formation evaluation.
  - Techlog wellbore integrity evaluation.
  - Techlog saturation height modelling.
  - Techlog formation pressure analysis.
  - Application for geomechanics and petrophysics.
    - Sonic processing.
    - Anisotropy analysis and its applications.
    - How to use acoustic outputs in the geomechanical workflows.
    - Petrophysics applications of sonic data.

Capillarity in Rocks

Course Code: 0308 **Course Level:** Intermediate

Course Description:

This course offers a solid understanding of the capillarity principles and forces in the reservoir and the effects it has on the hydrocarbon distribution and flow. The course provides the participants with an opportunity to understand and practice methods of calculating and representing the capillarity in the reservoir and using the capillarity to make informed decisions.

Course Contents:

- **Capillarity fundamentals**
  - The concept of capillarity.
  - Capillary pressure influence in the reservoir.
  - Pore geometry and wettability.
  - Drainage and imbibition process and its effect on capillarity.
  - Capillary forces in the reservoir.
  - Reservoir characterization and rock properties estimation.
  - Relationships between initial and residual saturation.
  - Interpretation of single and multiple pore system rocks.
  - Review over petrophysical rock types.
  - Creating applied saturation-height model.
- **Capillarity measurements**
  - Application of drainage and imbibition capillary pressure analysis.
  - Measuring capillary pressure using:
    - Porous plate method.
    - Centrifuge method.
    - High pressure mercury injection.

Shaly Sand Petrophysics

Course Code: 0309 **Course Level:** Intermediate

Course Description:

Presence of shale laminations in a sandstone reservoir alters the overall properties of the reservoir, hence, adding the shale laminae into the equation results in a clearer understanding of the reservoir.

This course provides the participants with a solid understanding of the petrophysical and geochemical parameters of shaly sand reservoirs. The course covers the main logging and coring methods and the interpretation and modeling methods for shaly sand reservoir. The course includes the flow potential and productivity calculation of shaly sand reservoirs as well.

Course Contents:

- **Fundamentals of petrophysics**
  - Basic coring analysis.
  - Introduction to logging.
  - Theory of resistivity, radioactivity, and acoustic tool.
  - MWD and LWD.
- **Petrophysics of shaly sand**
  - The nature of clay minerals and shale laminations.
  - The effect of clay minerals and shale laminations on petrophysical properties and depositional environment.
  - Relation to diagenesis.
- **Complex interpretation methods**
  - Total and effective porosity.
  - Archie, Waxman-Smits, dual water and Juhasz saturation methods .
  - Clay / shale type determination.
  - Laminated sand-clay model.
  - Prediction of permeability and productivity.
  - Integrating NMR, BHI and dip-meters with core data.

Advanced Formation Evaluation

Course Code: 0310 **Course Level:** Advanced

Course Description:

The course is designed to provide participants with an in-depth understanding of open hole logs and coring processes used in evaluating reservoir parameters and properties such as lithology, porosity, permeability and saturation. The course guides the participants through the process of analyzing and interpreting well logs and cores extracted from the reservoir and selecting the optimum tool for a given situation.

Course Contents:

▷ **Reservoir rock properties**

- Overview on reservoir rock properties.
- Permeability and wettability.
- Coring techniques.
- Interpretation of basic rock properties.
- Special core analysis.

▷ **Petrophysical logs and Testing**

- Basic geologic logs.
- Rock mineralogy and log responses.
- Drill stem testing (operation and tools).
- Production logging (objectives, flow measurements and fluid typing).
- Wireline formation testing (tools, analysis and production estimation).

▷ **Advanced log analysis techniques**

- Fracture and abnormal pressure identification.
- Advanced reservoirs lithology identification.
- Shale gas reservoirs (defining the clay type, standard logging tools).
- Multi-mineral solutions for shale mineralogy.

Advanced Well Log Interpretation

Course Code: 0311 **Course Level:** Advanced

Course Description:

Well Logging is in constant progress and development. This course is planned for participants to get a solid understanding of the advanced logging methods including nuclear magnetic resonance, formation micro-imaging logging, understanding the physical concepts behind them and interpretation of these logs.

The course focuses on interpretation of several well logs, cross referencing them and the methodologies of scaling and evaluating the logs to create various models.

Course Contents:

▷ **Physical concepts**

- Review over common logging physical concepts.
- Physics behind formation micro-imaging logging.
- Physics behind NMR.
- Borehole geophysics challenges.

▷ **Log interpretation**

- Depth measurements and control.
- Calculation of net pay.
- GR, SGR and PE logs & Borehole calipers.
- Acoustic, neutron, density logs.
- FMI log. NMR log.

▷ **Log evaluation and models**

- Linear movable oil plot.
- Surveying techniques, Rwa, FR/FP, logarithmic scale.
- Porosity-resistivity incorporation.
- Permeability relationships.
- Pressure measurements.
- Saturation/height analysis (core-derived functions).
- Computer based log evaluation.

Advanced MWD and LWD Applications

Course Code: 0312 **Course Level:** Advanced

Course Description:

Measurement and Logging while drilling have become a major activity in the drilling process since it can save time and cost and make the drilling decision makers more informed.

This course offers a solid understanding of MWD and LWD scientific background, activities, common and sophisticated sensors and measurements including acoustic, resistivity and borehole imaging. The course provides the participants with an opportunity to understand and practice log data integration and MWD data acquisition processes.

Course Contents:

▷ **MWD and LWD Fundamentals**

- Overview on MWD and LWD.
- Principles of data transmission.
- Integrated log data.
- LWD common sensors.
- MWD data acquisition.
- Geosteering fundamentals and physical concepts.

▷ **MWD and LWD Measurements**

- Acoustic measurements.
- Seismic measurements.
- Formation pressure.
- Magnetic resonance imaging (MRI).
- Resistivity measurements.
- Borehole imaging.
- Source-less neutron and density data acquisition.
- Geosteering applications.
- Integrating borehole imaging with geosteering.

Integration of Rocks, Log and Test Data

Course Code: 0313 **Course Level:** Advanced

Course Description:

Data sources vary throughout a given field's life, integrating the numerous data sets is a challenging process. During the course, participants are introduced to basic and advanced reservoir properties, the different methods of testing and evaluation and the right methodology of integrating, conditioning and synchronizing the data obtained.

Course Contents:

▷ **Reservoir rock understanding**

- Rock properties, depositional environment and its impact.
- Petrophysical rock typing (texture, porosity, permeability and clay).
- Advanced rock properties (relative permeability, wettability and capillary pressure).

▷ **Rock testing methods**

- Basic logging tools.
- Basic log analysis.
- Rock sampling (cuttings and coring).
- Basic core analysis o Formation testing (DST).
- Testing analysis.
- Cation exchange capacity (CEC) uses and measurements.

▷ **Data integration**

- Data conditioning.
- Integrated interpretation methodology.
- Clastic and carbonate rock types.
- Using production profiles and pressure transient analysis.
- Calculating clay volume in shale, porosity and effective porosity in complex lithologies.

Structural and Stratigraphic Interpretation

Course Code: 0314 **Course Level:** Advanced

Course Description:

Dip-meters, micro-resistivity logs and borehole imaging can provide video, density, gamma-ray, acoustic, and/or electrical images of the borehole. These tools can be used to interpret main structural and stratigraphic properties of the reservoir including natural and induced fractures, faults, fold axes, unconformities, and in situ stress.

Course Contents:

▷ **Dip-meters and borehole imaging**

- Data acquisition, measurements and processing.
- Quality check and control.
- Application and types of dip-meters and borehole images.

▷ **Structural interpretation**

- Quantitative analysis using cumulative dip plots, vector plots, and SCAT plots.
- Borehole breakout and operations induced fractures.
- Estimating the in-situ stress.
- Identification of fractures and faults (fracture spacing, micro-faults and unconformities).
- Interpretation of borehole images.

▷ **Stratigraphic interpretation**

- Thin bed analysis.
- Net sand count.
- Carbonates porosity interpretation.
- Using image data in reservoir characterization and modeling.
- Integrating core, petrophysical and geophysical data with image data.
- Economics and the choice of dip-meters and borehole imaging.

Unconventional Reservoirs Petrophysics

Course Code: 0315 **Course Level:** Advanced

Course Description:

Unconventional reservoirs contribute majorly to the energy map and are expected to be the number one oil source in the near future.

This course provides the participants with a solid understanding of the petrophysical and geochemical parameters of major unconventional reservoirs. It covers the main logging and coring methods specific for unconventional reservoirs and the interpretation methods following them. The course includes the flow potential and HCIP calculations as well.

Course Contents:

▷ **Unconventional reservoirs**

- Geology of each major unconventional reservoir.
- Unconventional reservoir chemistry and geochemical parameters.
- Storage mechanisms.
- TOC and resource parameters.
- Kerogen classification.
- Major extraction techniques of unconventional reservoirs.

▷ **Unconventional reservoirs testing**

- Assessing the geochemical parameters (Tmax, kerogen maturity).
- Special core sampling techniques.
- Special core analysis and tests.
- Wireline logging.

▷ **Unconventional reservoirs analysis**

- Gas ratio analysis.
- Using e-logs to calculate petrophysical parameters.
- Flow potential estimation.
- Geomechanics and fracturing.
- Determination of stress for completion design.
- Key recommendations for data acquisition and evaluation.

Applied Rock Mechanics

Course Code: 0316 **Course Level:** Advanced

Course Description:

The course provides the participants with a rich content of rock mechanical concepts and applications. The topics range from rock mechanics and stresses calculation and testing techniques including wire-line based, field based, lab based techniques to rock mechanics applications.

Course Contents:

▷ **Rock mechanics fundamentals**
- Overview.
- Mechanics concepts of rocks and their nature.
- Rock mechanical properties.

▷ **Rock mechanics calculations**
- Basic constitutive laws.
- Faults and fractures analysis.
- Stress orientation estimation techniques.
- Examples and problems.

▷ **Reservoir rock mechanics**
- Pressure, stresses and loads.
- Structural analysis & Field tests and measurements.
- State of stress in sedimentary basins.

▷ **Rock mechanics analysis and techniques**
- Common rock mechanics tests.
- Stress orientation estimation.
- Rock behavior and deformation mechanisms.
- Borehole stability.

▷ **Rock mechanics applications**
- Sand control mechanisms and techniques.
- Fracture mechanics.
- Reservoir engineering compaction based drives and applications.
- Fracture simulation.
- Unconventional reservoir applications.

4 DRILLING

Basic Drilling Engineering

Course Code: 0401 **Course Level:** Foundation

Course Description:

The course will cover well planning and design process, and equipment required to drill oil and gas wells. The drilling engineer role and responsibilities to initiate a well plan and well design will be included so that participants can see how this is done by the drilling team.

This course will introduce junior drilling engineer to the profession. Upon completion of the course, participants should be able to identify rig components, make simple rig sizing calculations, and describe basic drilling fluids, drill bit selection concepts, directional drilling plans, and tools used in the drilling technology. Additionally, some cost estimation processes, fundamentals of well control, drilling tools selection, and the important standards used in the drilling industry will be covered.

Course Contents:

- Introduction to exploration, appraisal, and development drilling.
- Rig components and operation sequence.
- Well costing, and AFE process.
- Formation pressure and fracture gradient, prediction methodology and modelling.
- Casing seat selection and preliminary casing design.
- Directional planning.
- Bit and BHA selection concept and process.
- Types of well evaluation during drilling, LWD and MWD tools application. Drilling fluid types and mud selection.
- Introduction to cement design and slurry types.
- Wellbore stability and downhole problems.
- Leak off test applications in drilling and kick tolerance.
- Introduction to well control theory and basic calculations.
- Well suspension and abandonment techniques.

Basic Drilling Technology

Course Code: 0402 **Course Level:** Foundation

Course Description:

This basic drilling technology course covers a fundamental view point of nowadays oil and gas drilling technology, equipment and procedures. The overall drilling process is presented along with definitions and descriptions of drilling equipment plus the vocabulary to understand the drilling process. During the remainder of the week, the various components and procedures are discussed in greater detail with explanations of the basic science concepts which guide these processes. Introduction to drill bits, directional drilling, drilling fluids, solids control, cementing, casing, well bore stability, well control, stuck pipe, lost circulation, and well bore hydraulics is the main core of the course. Pressure and pressure effects help to explain many of the procedures and problems associated with drilling wells.

Course Contents:

- The overall drilling process and equipment.
- Drilling terminology and abbreviations associated with drilling.
- Rig equipment and types.
- Types of drill bits.
- MWD and LWD tools.
- Drillstring design basics and bit selection.
- Drilled solids management.
- Mud systems.
- Drilling fluid properties.
- Well control.
- Cementing.
- Casing design.
- Hole problems (stuck pipe, lost circulation).
- Directional drilling operations and tools.

Drilling Hydraulics

Course Code: 0403 **Course Level:** Foundation

Course Description:

An advanced drilling hydraulics course intended for individuals with prior experience in drilling fluids to extend their knowledge of drilling hydraulics.

It is meant to provide basic understanding of drilling hydraulics, the methods and techniques used for pressure drop estimation, overview of drilling fluid rheology and how it affects drilling hydraulics and hole cleaning.

Course Contents:

- Introduction to drilling fluid circulation system, mud pumps and pumping pressure.
- Functions and properties of drilling fluids.
- Drilling fluid rheology and different factors that can alter significant drilling fluid properties.
- Different rheological models (Newtonian, Bingham plastic, power law, Herschel Buckley).
- Measurements in the drilling fluid circulation system.
- Understand the different types of flow (laminar, turbulent and transitional flows).
- Pressure losses in drilling pipe and annulus, equivalent circulating density.
- Pressure losses and how to identify reasons behind pressure losses.
- Optimization of bit hydraulics, nozzle velocity and diameter.
- Understand surge and swab effect and calculations.
- Impact of bit hydraulics on ROP, bit cleaning.
- Introduction to Drill Bench and Virtual Hydraulics software.

Drilling Fluids and Mud Systems

Course Code: 0404 **Course Level:** Foundation

Course Description:

This course is designed for engineers and field personnel involved in the planning and implementation of drilling programs. The course covers all aspects of drilling fluids technology, emphasizing both theory and practical application. Drilling is a complex operation requiring the marriage of different technologies and disciplines. Today's drilling personnel must have a working knowledge of drilling fluid to effectively drill a well. The course provides the fundamentals necessary to drill a well, whether it is a shallow well or a complex, high pressure high temperature deep well.

Course Contents:

- Drilling fluids functions.
- Drilling fluids types.
- Clay chemistry and composition.
- Basic rheology and mud properties.
- Lap testing for both water and oil base muds.
- Deep water and HPHT considerations.
- Chemicals and fluid stability.
- Chemicals handling and MSDS.
- Drilling fluid onsite calculations and mathematics.
- Drilling fluid reporting.
- Wellbore stability.
- Bit balling and hole cleaning considerations.
- Downhole problems (formation damage, stuck pipe, hole cleaning,..).
- Composition and properties of water and oil based drilling fluids.
- Identification and treatment of drilling fluid contaminants.
- Best practices of drilling fluid displacement in open and cased hole.
- Introduction to solid control equipment and process.
- Loss of circulation and LCM decision tree.
- HPHT challenges and considerations.
- Reservoir drill-in and completion fluids.

Directional Drilling and Surveying

Course Code: 0405 **Course Level:** Foundation

Course Description:

This course builds a firm foundation in the principles and practices of directional drilling, calculations and planning for directional and high angle wells. Specific problems associated with directional drilling such as torque, drag, hole cleaning, logging, and drillstring component design are included. The basic applications and techniques for multi-lateral wells are covered in the course. Additionally, you will become familiar with the tools and techniques used in directional drilling such as survey instruments, bottomhole assemblies, motors, steerable motors, and steerable rotary systems. Participants will be able to predict wellbore path based on historical data and determine the requirements to hit the target.

Course Contents:

- Geodetic coordinate systems.
- Surface positioning system.
- Well trajectory planning.
- Survey calculation methods.
- Survey tools and types.
- Well position uncertainty.
- Magnetic interference.
- Well path management and anti-collision.
- Relief well planning.
- Directional technology and wellbore positioning.
- Kick off and side track options.
- Directional drilling tools.
- BHA design and rotary steerable systems.
- TQ and drag modelling in directional wells.
- Vibration management during directional drilling.
- Hole cleaning and wellbore stability considerations.

Introduction to Well Control

Course Code: 0406 **Course Level:** Foundation

Course Description:

This introductory course is designed to provide every member of the rig crew an understanding of the fundamental principles of well control. This course discusses the concept of safety during the drilling process. It also introduces the basic concepts of well control in an easy to understand, straight-forward manner. The course aims to simplify the concept of well control and emphasize on the importance of well control and consequences of well control failure.

This course will cover principle of controlling well pressure while drilling. Starting by meaning of formation pressure, fracture pressure, and elements of primary and secondary well control methods. Hydrostatic column of mud and well design concepts essential to overbalance well pressure and reduce risk of secondary well control situations will be covered in detail. Participants will learn how to respond to well control situations before their occurrence. Introduction to well control equipment, their operation, and testing will be covered in addition to well control methods and several well control problems that will be worked using several standard well control worksheets.

Course Contents:

- Well control definitions.
- Causes of kicks.
- Warning signs and indicators of kicks.
- Shut in procedures.
- Killing methods.
- Kill sheet.
- Kick tolerance.
- Well control prevention.
- Well control equipment and testing.
- Well control practices and considerations.

Well Completion and Workover Operations

Course Code: 0407 **Course Level:** Foundation

Course Description:

Completions and workover operations course provides an integrated introduction to many facets of completion and intervention technology. The course introduces basic concepts of completion engineering and familiarizes the attendants with conventional completions and equipment. Intelligent completions (ICV and ICD) are also explained. The material progresses through each of the major design, diagnostic, and intervention technologies concluding with some common remedial measures and well abandonment. The course focuses on the practical aspects of each of the technologies, using design examples, successes and failures, to illustrate the key points of the design and the risks/uncertainties. The overall objectives of the course focus on delivering and maintaining well quality. At the end of the course, attendants will understand the criteria for completion selection, the functions of typical completion equipment and accessories.

Course Contents:

- Completion types.
- Wellheads.
- Casing suspension.
- Tubing selection.
- Upper and lower completion accessories.
- Safety valves.
- Packers.
- Artificial Lift.
- Multilaterals well completion.
- Sand Control.
- Fracturing.
- Intelligent completions.
- Coiled tubing and slackline equipment during well completion.
- Perforations.

IWCF Drilling Program - Level 2

Course Code: 0408 **Course Level:** Foundation

Course Description:

The aim of this course is to provide a basic understanding of the features of drilling a well and the fundamental principles involved in maintaining well control. The Level 2 (Introductory) course is designed for candidates currently working in roles which may directly contribute to the creation, detection or control of a well influx. This training and certification is recommended for those working in roles such as roughneck, derrickman, barge engineer, BOP/subsea engineer, mud logger or wellsite drilling data engineer, and many others.

Course Contents:

- Introduction to well control.
- Barriers.
- Risk management.
- Causes of kicks.
- Kick warning signs and kick indicators.
- Circulating system.
- Influx characteristics and behaviour.
- Shut in procedures.
- Well control methods.
- Well control during casing and cementing.
- Well control management.
- Blow Out Preventers (BOPs).
- Associated well control equipment.
- Choke manifolds and chokes.
- Auxiliary equipment.
- Testing.
- BOP control systems.

IWCF Drilling Program - Level 3

Course Code: 0409 **Course Level:** Foundation

Course Description:

This course is essential training for those currently working in a role that is expected to shut-in a well. The course aims to reinforce and improve the candidate's existing knowledge and appreciation of the various stages of shutting-in a well; from kick detection to shutting in the well, to monitoring once the well is shut in and monitoring the well-kill operation. The level 3 (driller) course is designed for anyone expected to shut-in a well in case of unintended or unexpected flow, such as drillers and assistant drillers.

Course Contents:

- Introduction to well control.
- Barriers.
- Risk management.
- Causes of kicks.
- Kick warning signs and kick indicators.
- Circulating system.
- Influx characteristics and behaviour.
- Shut in procedures.
- Well control methods.
- Well control during casing and cementing.
- Well control management.
- Blow Out Preventers (BOPs).
- Associated well control equipment.
- Choke manifolds and chokes.
- Auxiliary equipment.
- TestingBOP control systems.

IWCF Drilling Program - Level 4

Course Code: 0410 **Course Level:** Foundation

Course Description:

This course is essential training for those working in wellsite supervisory roles and for office-based personnel that are primarily involved in the operational decision-making process and/or well design. The course aims to build on Level 3 course content (including kick detection and shut-in) and focus on more complex aspects of well control and well kill methodology. The level 4 (supervisor) course is designed for anyone working in a supervisory role and involved in the well design and operational decision-making process of drilling,.

Course Contents:

- Introduction to well control.
- Barriers & Risk management.
- Causes of kicks.
- Kick warning signs and kick indicators.
- Circulating system.
- Influx characteristics and behaviour.
- Shut in procedures.
- Well control methods.
- Well control during casing and cementing.
- Well control management.
- Blow Out Preventers (BOPs).
- Associated well control equipment.
- Choke manifolds and chokes.
- Auxiliary equipment.
- Testing.
- BOP control systems.

IADC WellSharp Driller Level

Course Code: 0411 **Course Level:** Foundation

Course Description:

This course is a new revolutionary well control training and assessment program. The result of a collaborative industry effort, the new WellSharp program emphasizes rigorous training for every person with well control responsibilities, whether office- or rig-based. It offers the understanding of well control techniques for surface and subsea BOP installations at driller level according to IADC WellSharp standards.

Course Contents:

- Well control awareness.
- Basic well control concepts.
- Mud and pit management.
- Pre-recorded data.
- Causes of kicks.
- Barriers.
- Shallow gas, shallow water flows and top-hole drilling.
- Abnormal pressure warning signs.
- Well control drills.
- Kick detection.
- Shut-in pressures and verification.
- Post-shut in monitoring and activities.
- Well control methods.
- Casing and cementing considerations.
- Risk management.
- Surface well control equipment.
- Subsea well control equipment.
- Simulator and written examinations.

Drillstring and Tubular Design

Course Code: 0412 **Course Level:** Intermediate

Course Description:

Drillstring is the driver of successful drilling of a hole section that needs a proper drillstring selection and engineering design. The course will introduce the steps for a standard drillstring design with a prospective of avoiding operations problems, downhole failure and equipment wear applying global API standards. BHA design includes several loads and stress checks in parallel to direction and well profile application that will be discussed in detail in the course with the engineering calculations and software needed for design. Vibrations are also a main factor that needs consideration in the drillstring design, so the course will cover vibrations types, prevention, and first action for longer BHA life time. Best practices and history of failure is a key factor in BHA optimization process to avoid any design mistakes and have a smooth drilling progress.

Course Contents:

- Introduction to drillstring design concepts and steps.
- Introduction to API RP7G for drillstring design and operating limits.
- Mechanical properties of steel and basic concepts, strength and deformation.
- DP specs, connection types, tension limits and loads design.
- Bottom hole assembly selection and design.
- Directional equipment and DD applications.
- Bending strength ratio, stiffness ratio, and stress relief features.
- Drillstring dynamics and buoyancy behaviour.
- Jar placement and stabilization.
- Failures of drillstring and its prevention.
- Drillstring buckling and fatigue mechanism.
- Heavy duty landing string and slip crushing.
- Vibrations types and reactive TQ concerns and prevention.
- Drilling equipment inspection process and specification identification.
- Case study for designing a drillstring.

Downhole Problems

Course Code: 0413 **Course Level:** Intermediate

Course Description:

Downhole problems can be categorized in various levels. They could lead to losing the well and could only be a cause of NPT. In general, it is time lost whether hours or months depending on the severity of the problem. First and proper action responding to the problem is a key factor in managing the situation and getting it under control with less impact on the well and drilling operations. Stuck pipe, loss of circulation, well control, BHA failure, wellbore stability, formation damage, and zonal isolation will be covered in the course. Prevention, indicators, first action, and mitigations are common agenda of the course. Participants will learn basic knowledge that suits different levels of responsibility requirements when dealing with drilling problems.

Course Contents:

- Stuck pipe mechanisms and identification.
- Causes of stuck pipe and driller first action.
- Wellbore stability and proper wellbore cleaning.
- Loss of circulation categories and first action.
- LCM pill types, decision tree, and preparations.
- Introduction to well control operations and killing procedures.
- Well control with losses and underground blowout.
- BHA downhole failure causes, and mitigations.
- Formation damage causes and prevention.
- Drilling fluids and reservoir drilling.
- Zonal isolation API standard requirements.
- Annulus pressure management for failed zonal isolation.

Stuck Pipe and Fishing Operations

Course Code: 0414 **Course Level:** Intermediate

Course Description:

This course is intended to teach participants what are the common causes of stuck pipe, so that they can understand the warning signs and indicators of impending stuck pipe, participants will be able to better design wells to reduce the occurrence of stuck pipe. Defining the stuck mechanism is the key factor to determine the right way to act on the stuck pipe and the driller first action.

Good practices will be a main discussion theme for the course aiming for a best industrial reference and knowledge to deal with stuck pipe efficiently and avoid this NPT if the stuck pipe leads to back off, fishing, and even a side track. The course will introduce use of fishing tools, and tools selection methods. It will discuss operations and techniques available to recover the fish and side-tracking.

Course Contents:

- Introduction to stuck pipe and hole cleaning concepts.
- Causes of stuck pipe.
- Stuck pipe mechanisms.
- How to identify a stuck pipe mechanism.
- Hole conditions monitoring and identifying proper or improper hole cleaning process.
- Continuous and effective hole cleaning.
- Stuck pipe avoidance.
- Different stuck pipe cases discussion.
- Introduction to fishing operations.
- Jar operations and calculations.
- Driller stuck first action.

Drilling Software Applications

Course Code: 0415 **Course Level:** Intermediate

Course Description:

Software in oil and gas industry became a necessity for each and every engineer. In this course, we will introduce common and popular software for drilling. This is a unique course as it is not company oriented, it is more knowledge oriented to introduce engineers to various software from different companies.

The course will go into the software usage and applications in the oil and gas industry and will include methods to get the best benefit out of each software.

The course will cover Landmark package of Well Plan, Stress Check, Compass, Open Wells, and other drilling engineering, well design and hydraulics related software like Virtual Hydraulics, and Drill Bench.

Course Contents:

- Software and new technology impact on oil and gas operations' time optimization.
- Introduction to common software (Drill Bench, Virtual Hydraulics, Auto Drill, Open Wells, Well Plan, Compass, Stress Check).
- Basic training on using common software.
- How to make the best use of available software and how this can help increase efficiency.
- Handling software error and failures.
- Case Study for each software.

Advanced Drilling Engineering and Well Planning

Course Code: 0416 **Course Level:** Advanced

Course Description:

The course will address advanced drilling topics which are essential and timely in today's drilling technology climate. These topics were carefully selected to add to the skill set of advanced drilling engineer.

Course Contents:

- Offset data collection and interactive learning curve analysis.
- AFE statistical approach and technical limit.
- Drilling process and realtime performance monitoring.
- Pore pressure prediction and rock physics for pore pressure evaluation.
- Minimum horizontal stress for fracture data.
- Introduction to rock mechanisms and wellbore stresses.
- Rock failure criteria and wellbore stability models.
- Caving analysis and shale drilling interactions.
- Drilling fluid selection and hydraulics optimization.
- Solid control equipment and management.
- Barite sag and other fluid related problems.
- Downhole problems, mitigation and action (LOC, stuck pipe, well control, BHA failures, etc.).
- Advanced casing design, sizing, and seat selection.
- Tubular design software, standard and complex loads and stress concepts, casing wear management, and design factors.
- Directional planning and well directional techniques, survey tools and quality check. Anti-collision management, separation factor, and survey correction models.
- Drillstring design and dynamics, BHA and bit selection for directional applications. Drillstring failures and preventions.
- Cement slurry types, additives, lab testing, and high temperature cementing considerations.
- Well control operations and kick handling, well kill calculations and engineering modelling.
- Well integrity for well life time and production loads considerations.
- Introduction to completion design and operations.

Advanced Well Control Operations and Equipment

Course Code: 0417 **Course Level:** Advanced

Course Description:

This course is designed to provide detailed knowledge about well control operations and response and go beyond normal well control courses in terms of complex well control events and HPHT drilling in oil and gas fields.

Course Contents:

- Well control definitions.
- Causes of kicks & Warning signs and indicators of kicks.
- Kick detection and finger printing.
- Slow circulating rates & Shut in procedures.
- Gas behaviour and migration & Killing methods.
- Stripping operations / well control off bottom events.
- Kill sheet.
- Kick tolerance.
- Well control prevention & Fluid dynamics in well control.
- Well control practices and considerations.
- Well control drills and team competency.
- Team responsibility during well control operations on/off site.
- Underground blowouts.
- Non-sharable tubular across BOP.
- Well control complexity problems, surface and downhole.
- HPHT drilling considerations.
- Well control levels and crises management.
- Shallow gas risk and diverter operations.
- Well control equipment, API standards, reliability verifications, and testing.
- Floating drilling and subsea well control operations and equipment.
- Emergency disconnection and emergency response on floaters.
- Well control operations during wireline operations, casing running, and cementing operations.
- Relief well design and drilling for well control emergencies.

Advanced Casing Design

Course Code: 0418 **Course Level:** Advanced

Course Description:

This course is a significant part for any drilling engineer work scope. This course will focus on casing design, both from engineering and operation perspectives. The course will introduce a comprehensive overview of the design process, as well as working stress approach that is common in the industry. The course will examine the nomenclature of casing design, manufacturing processes, material properties and material selection. The theory of burst, collapse, and axial loading will be discussed, along with design policies and procedures. The course will cover casing design process starting by casing point selection, casing sizing, specification requirements, defining standard, special loads, and writing basis of design. Special cases, including HPHT and sour service, will also be covered. Participants will become familiar with common practices in casing design and how to consider well life cycle and failure modes.

Course Contents:

- Objectives of casing design.
- Types of oilfield tubulars and connections.
- Casing design fundamentals such as casing setting depths based on pore and fracture pressure.
- Determine casing sizes criteria.
- Load estimation methods for casing and liners.
- Typical design factors.
- Theories of strength and failure (standard collapse, burst, axial, yield basis for combined loads).
- Casing connection selection and design.
- HPHT casing design considerations.
- Casing wear & Software engineering design input.
- Basis of casing design documentation and verification.
- Design examples and exercises for all key loads and strings.
- Casing handling, running, and hanging practices.

Advanced Cement Design for Primary and Remedial Operations

Course Code: 0419 **Course Level:** Advanced

Course Description:

Cementing is a major operation in every oil and gas well. Cementing operations are crucial in the well construction process and failures in meeting their requirements can lead to catastrophic consequences. In this course, we will introduce cementing engineering design and operations aspects including cement properties, chemical additives, and testing procedures. The course will also introduce proper measurements used in cementing operation such as mud removal and centralization so that the participants can apply effective processes to ensure good cement job.

Course Contents:

- Introduction to cementing operations.
- Slurry types, properties, and chemical additives.
- Cement blending, mixing, and storage equipment.
- Cement job calculations and design.
- Software used in cementing operations modelling.
- Design cement jobs to include casing, multi-stage, liner, and tie-back strings.
- Temperature impact on cement and high temperature cement job design.
- Special purpose cements.
- Simulation of a cement job exclusion and evaluation.
- Cement evaluation and verification.
- Slurry laboratory testing.
- Special consideration and common problems.
- Remedial cementing, plugs, and squeeze operations.
- Standard API zonal isolation and well construction requirements.

Deepwater Well Engineering and Operations

Course Code: 0420 **Course Level:** Advanced

Course Description:

This course is intended to introduce the new technologies that helped drilling through deepwater reservoirs. Deepwater operators as well as equipment and service providers have faced great challenges to be able to safely explore and produce in deep waters maintaining all safety measures and control of work.

Course Contents:

- Floating drilling rigs and equipment.
- Unique challenges of deepwater.
- Currents, VIV, vessel hydrodynamics and motion compensation.
- Shallow hazards.
- Deepwater planning cycle.
- Subsea BOP equipment.
- Subsea well control issues.
- Riserless drilling.
- Casing shoe depth considerations in DW.
- Annular pressure buildup in casing strings.
- Regulatory requirements.
- Subsea cementing process.
- Subsea WH systems, casing and liner hangers.
- Hydrates problems and prevention.
- Slip crushing for drillstring design.
- Landing string design.
- Relief well planning for DW.
- Abandonment of subsea wells.
- Managed pressure drilling technology.
- Subsea completions, processing, control systems, well maintenance, and seafloor processing.
- Logistics and vessel boat management for deep water offshore drilling.

Subsea Drilling Equipment and Operation

Course Code: 0421 **Course Level:** Advanced

Course Description:

An overview of different types of deepwater drilling units, all their necessary specific equipment and techniques to spud a well, rig equipment and components and how they are integrated in field to drill a well by a floater. **Course** will cover a basic understanding of the various subsea components used in all water depths, from relatively shallow water to ultra-deepwater. The participants will all learn how the components are integrated into subsea field developments, which will accelerate learning and productivity. Individual and group exercises are used throughout the course, including a case study to develop field architecture recommendations, basic component selection, and high-level project execution plans for a subsea development. **Course** will also cover major issues and solutions faced in deepwater drilling operations including environmental forces and their impacts on deepwater operations

Course Contents:

- Floater rig types (Semi-sub and Drillship).
- Riser types and systems.
- Subsea BOP operating and controls.
- Subsea wellheads.
- Tensioners, mooring, and dynamic positioning for rig stability.
- Environmental concerns.
- Spudding subsea wells.
- Logistical challenges for offshore subsea wells.
- Limitations of deepwater subsea operations.
- Emergency systems and response on floater rigs.

HPHT Drilling Engineering and Operations

Course Code: 0422 **Course Level:** Advanced

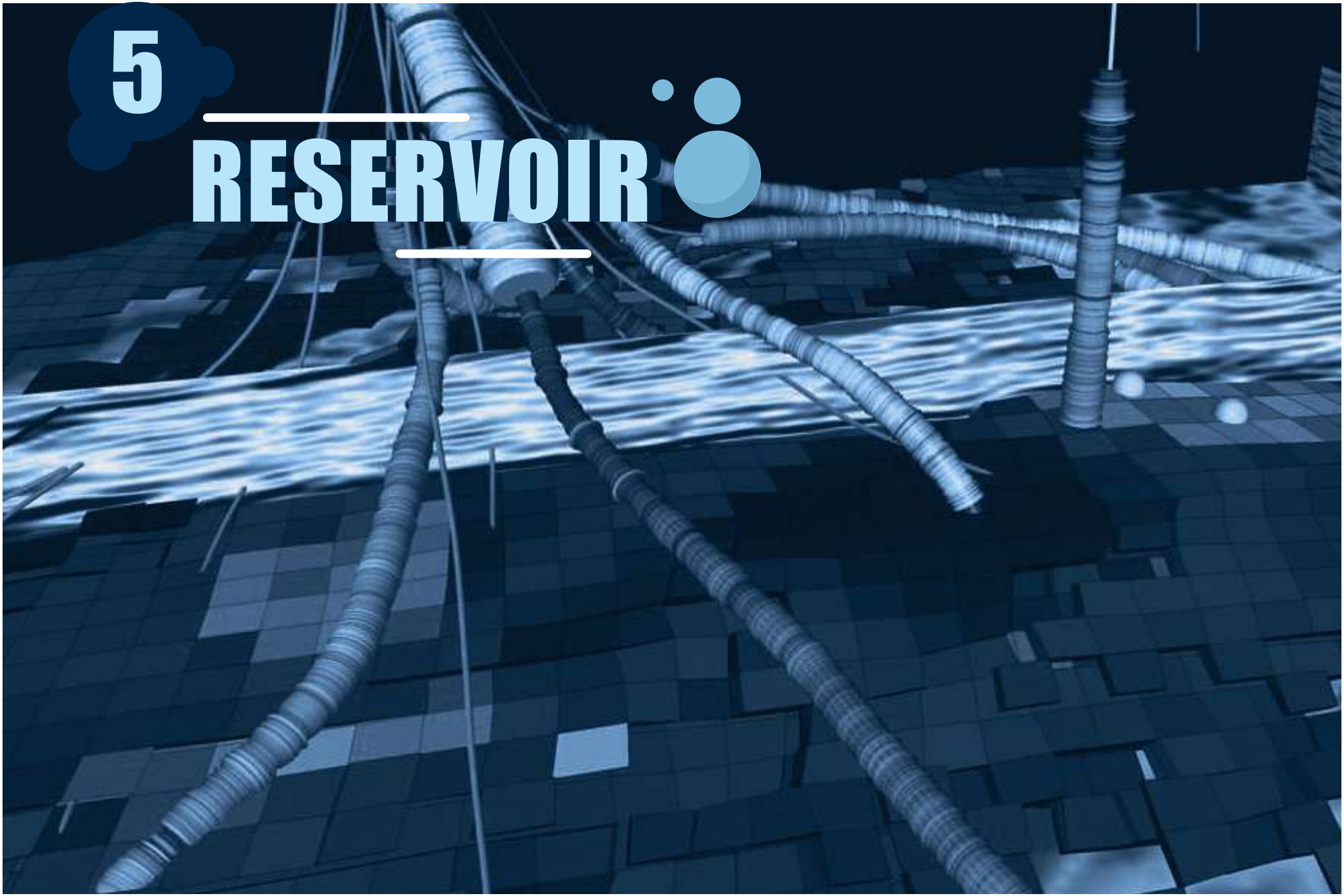
Course Description:

This course covers HPHT well construction process. It includes the theories, technicalities and practicalities of drilling and completing HPHT wells. With the ever-developing technology, more high pressure and high temperature reservoirs can now be accessed for development. Not only is the number of HPHT wells that are drilled increasing, but the envelope itself is being pushed to higher temperatures and higher pressures. This course provides engineers with the fundamental challenges associated with higher pressures and temperatures and provides candidates the knowledge required to start planning and drilling HPHT wells and fundamental challenges associated with HPHT drilling and completions. Many practical exercises and interactive discussions are scheduled during the course to address all of the issues and technical challenges. Case studies from HPHT projects will be presented and analysed and a complete HPHT program is used as practical guide for this course.

Course Contents:

- Defining the HPHT environment.
- History of HPHT drilling operations.
- Applicable standards and guidelines.
- Geological and geophysical aspects of abnormal pressures.
- Differences between HPHT drilling and normal well operations.
- Challenges faced in HPHT wells.
- Pore pressures, fracture pressures and pressure ramps.
- Wellbore stability.
- Temperature gradients.
- Design considerations.
- Casing and tubing design, casing connections, and seat selection.
- HPHT cementing.
- Drilling fluids selection for high temperatures design.
- HPHT drilling practices.
- Supercharging and ballooning effects
- HPHT well control considerations and kick tolerance
- MGS sizing and management
- Mud cooling and ECD management

5 RESERVOIR



Fundamentals of Reservoir Engineering

Course Code: 0501 **Course Level:** Foundation

Course Description:

This course presents material-balance and decline curve analysis techniques used to analyze reservoir performance. The course covers the full scope of reservoir recovery mechanisms, attendees learn a mechanistic and physical understanding of the factors affecting fluid production. The course also covers the full spectrum of reservoir fluids. Generalized methods of analysis are presented. Attendees learn how material balance is used to history-match reservoir performance.

Course Contents:

- Primary reservoir drive mechanisms and producing characteristics.
- Fundamentals of fluid flow in porous media.
- Principles of material balance calculations, applications and limitations.
- Reconciliation and QC of input data (pressure, production, hydrocarbons initially in place) and associated uncertainties.
- Generate forecasts with material balance models for simple systems.
- Apply material balance techniques to establish drive mechanisms, estimate aquifer strength, estimate STOIIP / GIIP, and evaluate impact of uncertainties.
- Quantify the impact of key reservoir system parameters such as mobility, gravity and capillarity on recovery efficiency.
- Understand classic and current decline curve analysis methods, theory and applications to single- and dual-fluid production systems.
- Understand performance curves: exponential, hyperbolic, and harmonic declines.
- Understand pseudo steady-state flow equation, Blasingame-Lee solution, production performance plots.
- Apply Fetkovich, Arps, and transient type curves.
- Use a combination of appropriate forecasting techniques and the appropriate aggregation of well-by-well forecasts to produce field forecasts.

Basic Reservoir Fluid Properties

Course Code: 0502 **Course Level:** Foundation

Course Description:

This course will present the methods for obtaining values of reservoir fluid properties from laboratory data and correlations. Chemical properties of hydrocarbons, conventional laboratory PVT (Pressure-Volume-Temperature) tests and quality control will also be covered. Participants will learn about phase diagrams, mixing rules, EOS, EOS tuning, and fluid properties. Each day participants will be given examples and problems to solve.

This course will help participants gain a better understanding of the relationship between the five reservoir fluid types and how to manage reservoir fluid properties with increased confidence.

Course Contents:

- Classification of reservoirs and reservoir fluids.
- Definitions of basic PVT parameters.
- Fluid sampling techniques.
- Laboratory analysis of reservoir fluids, PVT experiments for oil and gas condensate.
- Knowledge of routine laboratory/PVT report contents.
- Recognize significance of PVT data in reservoir engineering applications.
- Qualitative and Quantitative phase behavior of fluid systems, applications and limitations.
- Dry gas models.
- Brine models.
- Wet gas models & Dead oil models.
- Black oil models.
- Volatile oil models.
- Gas condensate models.
- PVT correlations and their applications.
- Uncertainty analysis of fluid data for reservoir initialization.
- Reading a PVT report & Quality checks on a PVT report.
- Equations of State.

Routine core Analysis

Course Code: 0503 **Course Level:** Foundation

Course Description:

Retrieval and analysis of cores is essential to all phases of the petroleum industry. Cores offer the only opportunity to obtain intact, vertically continuous samples that allow the visual examination of depositional sequences and variations in reservoir character. Properly analyzed cores provide data available from no other source, these data should provide direct evidence of the presence, quantity, distribution, and deliverability of hydrocarbons. Cores are essential to understand the nature of the pore system in the potential reservoir unit. The knowledge gained from cores enhances our ability to predict reservoir performance and to select procedures to maximize profitable hydrocarbon recovery.

Course Contents:

- Core Analysis in Petroleum Systems in Carbonate and Sandstone Environments.
- Core analysis in petroleum systems.
- Sandstone and carbonate depositional environments.
- Coring process and the value of core analysis.
- Core handling at the well-site.
- Core Planning, Core Preparation, and Porosity.
- Various core planning options.
- Core cleaning and drying.
- Porosity & Porosity evaluation workshop.
- Permeability, Net Mean Stress, and Sample Selection.
- Core sampling workshop.
- Reservoir evaluation.
- Sandstone and carbonate case studies.
- Optional tour of commercial “routine core analysis lab”.
- Special Topics.
- Scaling issues when comparing core data to logs.
- Quality control workshop.
- Core-log integration.

Fundamentals of Well Test Analysis

Course Code: 0504 **Course Level:** Foundation

Course Description:

Well test interpretation, which is the process of obtaining information about a reservoir by analyzing the pressure transient response caused by a change in production rate, plays a very important role in making overall reservoir-management decisions.

This course will focus on the different types of tests and techniques, both analytical and graphical, for data representation and analysis of well tests. Types of techniques covered will include diagnostic plots, derivative for draw down, and buildup tests. Participants will learn about the interpretation of complex data, such as those from well test in naturally fractured reservoirs, hydraulically fractured wells, horizontal wells. Each day participants will see examples of the types and techniques discussed along with practice problems.

Course Contents:

- Steady state, semi-steady state, and transient well performance.
- Basic concepts of test analysis.
- Types of well tests.
- Behavior of simple ideal systems.
- Wellbore skin.
- Wellbore storage mechanisms.
- Semi-log analysis.
- Type curves.
- Hydraulically fractured wells.
- Superposition and Horner plots.
- Average reservoir pressure.
- Derivative curves.
- Types of fluid flow geometries, radial, linear, spherical and hemispherical flow.
- Sealing faults and stratigraphic pinch-outs.
- Late time boundary and depletion effects.

Gas Reservoir Engineering

Course Code: 0505 **Course Level:** Foundation

Course Description:

Natural gas production has become a major part of every petroleum company's asset base and continues to grow in importance throughout the world. This course will help participants understand the engineering drivers on gas reservoir management and how a gas reservoir's value can be maximized through sound engineering practices.

Course Contents:

▷ **Basic Gas Reservoir Engineering and Gas Reserves**

- Fluids and fluid types.
- Drive mechanisms.
- Properties of natural gas.
- Material balance & Determining gas reserves.

▷ **Gas Deliverability**

- Basic gas deliverability.
- Deliverability of gas wells.

▷ **Nodal Analysis**

- Introduction to nodal analysis.
- Inflow performance for gas wells.
- Outflow or tubing curves.
- Vertical multi-phase flow & Production data analysis.

▷ **Well Testing**

- Introduction to well testing.
- Radial flow and radius of investigation.
- Wellbore storage, damage, and stimulation.
- Introduction to flow and build-up tests.
- Analysis of late-time data.
- Semi-log analysis for gas wells & Modification for gas.
- Manual log analysis & Type curve analysis.
- Well test analysis using type curves.

▷ **Flow regimes and diagnostic plot Basic Reservoir Modelling**

Basic Reservoir Modelling

Course Code: 0506 **Course Level:** Foundation

Course Description:

The course is designed to give an introduction to the fundamental and practical aspects of modern reservoir simulation. Particular emphasis is placed upon the available data and its integration into a data set that reflects a coherent model of the reservoir. These aspects are reinforced with small practical examples run by groups of the course participants.

Course Contents:

- Definition of reservoir simulation.
- Types of reservoir simulation models.
- Reservoir simulation applications.
- Process of a reservoir simulation study.
- Fundamentals of reservoir simulation, model selection, data preparation, grid design.
- Role of simulation in reservoir management, and its limitations.
- Differences between types of models: Black oil, compositional, thermal, miscible, dual porosity.
- Data used in a reservoir simulation study, practical guidelines for use of reservoir simulators.
- Calibrate well properties and drainage areas with PTA/RTA and other analytical techniques.
- Prepare well model input to appropriately model near well-bore effects.
- Define and run history matching parameters (including the geological model) and criteria.

Resources and Reserves Evaluation, Probabilistic and Deterministic Methods

Course Code: 0507 **Course Level:** Intermediate

Course Description:

This course will include the presentation of various reserve estimating methodologies, elaborate the difference between resources and reserves. The classifications and definitions of these reserves and resources, along with a guideline for the application of these definitions. PRMS, SPE, WPC, AAPG, SEC, and other guidelines will be discussed.

The course will update geoscientists and reservoir engineers with the newest and accurate methods for obtaining the value of reserves. Following the completion of this course, all participants should be able to manage deterministic and probabilistic methods, with the aim of gaining a thorough understanding of various reserve levels.

Course Contents:

- Classifications and definitions of reserves and resources.
- Deterministic and probabilistic definitions.
- Describe various reserve estimating methodologies including analogy, volumetrics, material balance, decline curve analysis, production data analysis, and simulation.
- Guidelines for the application of reserves definitions: SPE, WPC, AAPG, SEC, and other regulatory authorities' guidelines.
- Describe the uncertainties in each of the parameters determining the In-Place volumes and quantify their impact.
- Economic evaluation of reservoirs and the methods of dealing with risk and uncertainty.
- Determine the appropriate level of aggregation to estimate and report resource volumes.
- Review resource volumes reported and ensure that they are compliant with guidelines and standards.
- Describe the impact of proven booked reserves on the financial analysis of an asset.
- Coordinate hydrocarbon maturation plan as input to the business plan.

Special Core Analysis (SCAL)

Course Code: 0508 **Course Level:** Intermediate

Course Description:

Ensure that robust field development decisions are made with reliable predictions of rock properties, hydrocarbons in place and recovery performance. State-of-the-art reservoir management requires knowledge of how changing saturations and changing rock properties influence surveillance observations. Developing an understanding of these issues ultimately rests on obtaining quality laboratory measurements and interpreting them correctly. These laboratory measurements are collectively referred to as Special Core Analysis (SCAL).

Course Contents:

- Understand routine and special core laboratory analysis and interpretation.
- Basic SCAL laboratory data QC and integration.
- Explain capillary pressure, relative permeability and compressibility effects on reservoir performance.
- Explain wettability restoration methods.
- Model capillary pressure functions in dynamic models.
- Reconcile dynamic model saturations with static model data.
- Explain wettability restoration methods.
- Reconcile SCAL-derived dynamic model volumes with static model in-place volumes, Integrate petrophysical and geological data.
- Assess implications of SCAL for choice of production mechanisms, wells, and facilities.

Waterflooding

Course Code: 0509 **Course Level:** Intermediate

Course Description:

Water Flooding has long been proven as the simplest and the lowest cost approach to maintaining production and increasing oil recovery from an oil reservoir. However, these benefits may fall far short of the expectations unless the time-tested concepts and practices are clearly understood and judiciously implemented. These concepts and practices aim at process optimization - reducing production cost while minimizing waste and maximizing oil recovery and income. This course is light on theory but heavy on proven and successful practices. Published case histories of projects around the world are reviewed to provide an understanding of divergent points-of-view, what works where, what fails when, and why. This training covers all elements of a waterflood project from A to Z - from source water selection to produced water disposal and everything in between.

Course Contents:

- Overview and terminology.
- Effect of rock properties.
- Effect of heterogeneity and anisotropy.
- Effect of fluid properties.
- Wettability.
- Capillary pressure.
- Relative permeability.
- Physics of water displacing oil.
- Statistical forecasting.
- Analytical forecasting.
- Numerical forecasting.
- Injector monitoring.
- Producer monitoring.
- Integrated monitoring.
- Effect of water impurities.
- Surface processing of injection and produced water.
- Water shut-off.
- Pattern rotation.
- Natural and hydraulic fractures.
- Horizontal well applications.
- Downhole separation.
- Enhanced waterfloods.
- Waterflood planning.
- Case histories.

Practical Well Test Operations and Analysis

Course Code: 0510 **Course Level:** Intermediate

Course Description:

This course is built on the previous practical knowledge assimilated during the fundamentals and advanced well test classes. In each of the elements constituting a well testing operation, we will focus on the aspects of job planning, job design and safe execution of each component of the operation. Some software will be used and practiced during this course.

Throughout this course, safety will be a primary focus and participants will be shown HSE best practices that should be implemented during each phase of well testing operations.

Course Contents:

- Use a range of numerical models to aid in well test/ production data analysis.
- Justify a test program in terms of its Value of Information and contribution to reducing subsurface uncertainty.
- Produce a detailed design for a complex well test (complex well configuration, interference or other non-standard test).
- Troubleshoot data acquisition problems and adapt designs.
- Use Advanced Production Analysis techniques (Blasingame, Argawal-Gardner, Flowing Material Balance) where suitable data are available and integrate those results with other methods. Integrate forecasts from these techniques with other tools. Assess completion efficiency and integrate PTA/RTA interpretations with completion and well information. Assess the associated uncertainties and implications for reservoir development.
- Describe the method(s) of deconvolution as implemented in PTA/RTA software and their application and limitations when applied to field data.

Advanced Reservoir Engineering

Course Code: 0511 **Course Level:** Advanced

Course Description:

This course covers numerous engineering practices, ranging from fluid and rock properties to reservoir simulation and field development planning. Reservoir engineering is also presented in the context of a modern, multi-disciplinary team effort using supporting computer technology. An extensive manual and set of references are included.

Course Contents:

- Understand different phases of reservoir life cycle (primary, secondary, and enhanced oil and gas recovery).
- Life under primary recovery phase: recovery targets and ways to improve.
- Understand the need to create a field development plan to appropriately exploit the reservoir.
- Maximizing economic recovery and minimizing capital investment, risk, and operating expenses.
- Generate forecasts for more complex systems such as water injection, gas injection and WAG projects.
- Discuss data integration and interdependence, including, integration and timing of subsurface and surface decision making.
- Solving common unconventional reservoir management problems:.
- setting initial spacing.
- valuing and planning infill drilling.
- development drilling sequence.
- Reservoir simulation versus non-simulation tools.
- Uncertainty issues.
- Definitions, characteristics, and types of unconventional reservoirs.
- Describe challenges to produce unconventional reservoirs.
- Describe the features of decline curve (DCA) analysis and rate transient analysis techniques used to forecast wells in unconventional reservoirs.
- Use pressure transient analysis and diagnostic fracture injection tests (DFIT) to characterize a well's stimulated reservoir volume.

Advanced reservoir Modelling

Course Code: 0512 **Course Level:** Advanced

Course Description:

This course aims to construct reservoir simulation models to optimize hydrocarbon recovery and development options, investigate dynamic processes within the reservoir and evaluate the impact of key uncertainties, and use the appropriate work flows to ensure upscaling retains sufficient geological detail and that the dynamic models are consistent with surveillance data.

Course Contents:

- Introduce correlative and statistical principles and techniques, calibrate static model with reservoir surveillance data.
- Upscale the static model, QC the upscaling process.
- Include production data and effective constraints, dynamic rock properties, cased hole and production logging data to validate the dynamic simulation model.
- Apply analytical and numerical techniques to model drainage and imbibition processes.
- Prepare well model input to model near well-bore effects.
- Formulate modeling strategy to address a development opportunity.
- Simulate fractured reservoirs and porosity systems, required upscaling in a carbonate system.
- Explain the effects of capillary forces and capillary hysteresis effects on drainage and imbibition processes in fractured reservoirs.
- Understand the mechanism of block-block interaction and the derivation of shape factors in fractured systems.
- Describe fully compositional modeling and associated uncertainties and their impact.
- Include artificial lift techniques and complex well completions.
- Construction of an Integrated Production System Model (IPSM).

Advanced Well Test Analysis

Course Code: 0513 **Course Level:** Advanced

Course Description:

This course focuses on design and interpretation of well tests to reduce uncertainty and acquire critical data for reservoir development decisions.

It will stress tests interpretation using pressure and rate transient analysis techniques and integrate the interpretations with production data analysis. It will also cover the different types of tests such as Interference test, fall off test, injectivity test and step rate multi rate test and multi-phase test.

Course Contents:

- Well test data quality check and assurance.
- DST key features, design and analysis.
- Interference tests.
- Reservoir limit tests.
- Well test design and step-by-step procedure.
- Modifications for gas wells and multiphase flow.
- Well test analysis in gas and gas condensate reservoirs.
- Pseudo-pressure and type curve analysis techniques.
- Phase redistribution.
- Detailed design of complex well tests (complex well configuration, interference or other non-standard test). Equipment requirements, acquisition parameters and analysis techniques.
- Interpret pressure transient response for a range of complex well configurations/reservoir combinations (including pressure fall-off tests in wells with induced fractures) using a range of type-curves and semi-log analysis and by matching to analytical reservoir models. Quantify uncertainties associated with these techniques.
- Interpret pressure transient response of multi rate smoothing rate and discrete rate tests and interpret the pressure transient response of multi-phase well tests.

Advanced Reservoir Fluid Properties

Course Code: 0514 **Course Level:** Advanced

Course Description:

This course goes beyond the usual description of reservoir fluid properties. Its purpose is to be able to prepare the most accurate possible set of values of fluid properties for use in engineering applications. An understanding of the advantages of the application of both laboratory data and correlations will be provided. Extensive exercises are used to illustrate the principles and to test the consistency of measured data. Equations of State calculations are introduced, and a tuning exercise is conducted on a PVT software.

Course Contents:

- Evaluate routine laboratory PVT reports, quality check the data and ensure proper data management.
- Select appropriate standard PVT experiments for a given application.
- Analyze and interpret experimental PVT data for use in Reservoir Engineering applications.
- Supply key fluid/PVT data for screening tools (IOR/EOR).
- Interpret a ternary diagram of fluid composition and its uses in reservoir engineering applications.
- Evaluate the levels of oil-based mud contamination and numerically decontaminate the samples.
- Select appropriate data acquisition methods and create sampling programs.
- Generate simulator input using component lumping/grouping.
- Heavy oil and bitumen PVT characterization.
- PVT and flow experiments required for EOR applications.
- Generate PVT descriptions for reservoir simulation (black oil and compositional) using calibrated PVT models.
- Viscosity models and their limitations, quality assurance of viscosity measurement data.
- Establish the presence of compositional grading, its impact and implications.

Fundamentals of Enhanced Oil Recovery

Course Code: 0515 **Course Level:** Advanced

Course Description:

This course presents a comprehensive summary of chemical, miscible, and thermal enhanced oil recovery processes. The topics covered include fractional flow theory, Cyclic Steam Stimulation (CSS), Steam Assisted Gravity Drainage (SAGD), and some other EOR methods (including the newly introduced hybrid processes).

Course Contents:

- **Enhanced Oil Recovery Fundamentals**
  - Overview.
  - Different EOR processes.
  - Fundamental science and engineering behind EOR applications.
- **Phase Behavior Fundamentals**
  - Fluid sampling, testing, and characterization.
  - Phase behavior fundamentals.
  - EOR simulation process and workflow.
  - Examples and problems.
- **Fractional Flow Theory**
  - Laboratory displacement tests.
  - Relative permeability curve trends.
  - Polymer flooding and patterns.
  - Alkaline and surfactant flooding.
- **Minimum Miscibility Pressure**
  - Minimum Miscibility Pressure (MMP) measurements and correlations.
  - Mechanisms of miscible displacement.
  - Use of ternary diagrams CO2 flooding properties, design and case studies.
- **Thermal Recovery Processes**
  - Cyclic Steam Stimulation (CSS).
  - Steam Flood and Steam Assisted Gravity Drainage (SAGD).
  - SAGD alternatives & Fire Flood and In-Situ Combustion.
- **Newly developed recovery processes**

Integrated Reservoir Modeling and Simulation

Course Code: 0516 **Course Level:** Advanced

Course Description:

This course concentrates on the technical skills required to develop a realistic reservoir description. Starting with collecting information and assessing the need for additional data, the course will cover all the topics from structural and geological modeling, estimation of reservoir petrophysical properties using geostatistical tools, upscaling to dynamic simulation model and finally, proper history matching and future predictions in the presence of uncertainties. This course is important to reservoir modelers involved in any phase of the description work. This is intended to expose various geoscientists and engineers to the entire process of integrated reservoir description and the geostatistical tools that can be used to achieve the goals.

Course Contents:

- Integrated Reservoir Modelling processes and decision gates.
- Introduction to data analysis.
- Building a project roadmap.
- Modelling Frame work events.
- Project Management Concepts.
- Correlation framework, structural model building and QC.
- Property modeling and volumetrics.
- Facies/rock type modeling.
- Construction of simulator input model.
- History matching.
- Uncertainties Management.
- Experimental Design.
- Model Forecasting.
- Implications of development concepts.
- Petroleum Economics indicators.
- Selection of the development plan.
- Defining the development plan.

Reservoir Engineering of Unconventional Reservoirs

Course Code: 0517 **Course Level:** Advanced

Course Description:

This course in unconventional reservoir management is aimed at all petro-technical professionals who have little experience with these resource types and wish to quickly learn some key elements and issues associated with the exploitation of unconventional reservoirs.

The course is built around the role of the reservoir engineer and, hence, concerns itself with the integration and use of information to make well rate and recoverable volumes estimates, making decisions on desirable data collection. Attendees should leave this course with an improved understanding of unconventional reservoir exploitation.

Course Contents:

- Key events and technologies that sparked unconventional development.
- Essential geologic characteristics.
- Hydrocarbon processing.
- Reservoir Management and the role of the reservoir engineer.
- Unconventional reservoirs: quality recognition and development life-stages.
- A review of the fundamentals of volumetrics in unconventional reservoirs.
- Rate and recoverable volumes prediction: before and after development.
- Pressure transient testing: appropriate methods, design and analysis.
- Unique tests and techniques.
- Critical log and core analysis.
- Life-of-field surveillance planning.
- **Solving common unconventional reservoir management problems:**
  - setting initial spacing
  - valuing and planning infill drilling
  - development drilling sequence
- Reservoir simulation versus non-simulation tools.
- Uncertainty issues.

Rate Transient Analysis

Course Code: 0518 **Course Level:** Advanced

Course Description:

Rate Transient Analysis, or RTA, is the natural complement to Pressure Transient Analysis (PTA) when one has pressure and rate data. RTA can be used to increase the area of investigation when compared to using PTA alone. Advancements in RTA have progressed partly due to the development of permanent downhole pressure gauges. Users are now able to obtain answers that were previously only available from PTA. The advantage is that information is available at no extra cost as there is no deferred production. RTA started in the 1920s on a purely empirical basis, and as a financial tool, however, it has now evolved to a modern methodology that shares a lot of analysis and modeling tools with PTA. The long-term production can be modeled and forecasting is based on real models as opposed to an empirical function.

Field examples are used to illustrate each concept. By the end of the course the attendee will perform analyses and develop interpretations. In addition, the attendee will have sufficient foundations for developing further experience in rate transient and production analysis.

Course Contents:

- Characterize reservoir (permeability, skin, fracture half-length).
- Diagnose changing skin or permeability conditions.
- Monitor well performance in competitive drainage situations.
- Track productivity to ensure proper production allocation.
- Create analytical and numerical production models (single-zone vertical to multi-frac horizontal wells).
- Determine stimulated reservoir volume, optimal well spacing and EUR/well for unconventional reservoirs.
- Prove “tight gas” for government tax credits.

Enhanced Oil Recovery - Thermal Injection

Course Code: 0519 **Course Level:** Advanced

Course Description:

It is well known that primary and secondary production schemes in fields containing heavy oil (< 20 °API) generally result in recoverable reserves of 15% or less. Reserves additions via new discoveries have been declining steadily in the last decades, and the increase of recovery factors from mature oilfields in known basins will be critical to meeting growing market demand. Oilfields containing heavy (and extra heavy) oils or bitumen that have low recovery by conventional means, provide significant scope for increasing ultimate recovery using thermal means.

During this course, the instructors plan to: (1) spend most of the time discussing the practical aspects of whole variety of thermal EOR processes, including utilization of reservoir simulation, (2) discuss economics of thermal EOR methods, and (3) give the course attendees some practical and useful problems to work on.

Course Contents:

- Thermal effects on rock and fluid properties.
- Types of thermal oil recovery (TOR).
- Thermal EOR (TEOR) screening and economics.
- Steam TEOR – Analytical methods.
- Data input into thermal simulators.
- Reservoir simulation of steam injection thermal projects.
- Steam additives.
- In-situ combustion TEOR.
- Reservoir Simulation of In-Situ combustion.
- In-Situ oil upgrading.
- Thermal well design and thermal well drilling.
- Surface facilities for thermal EOR projects.
- Thermal EOR project implementation & Thermal EOR operations/HSE.
- Thermal EOR project management and surveillance.

Enhanced Oil Recovery - Chemical Injection

Course Code: 0520 **Course Level:** Advanced

Course Description:

In general, one-third to one-half of the original oil-in-place may remain in a reservoir as it reaches its economic limit. The primary reasons are heterogeneity of the reservoir, unfavorable fluid properties, inefficient displacement process, oil price and production cost considerations. The secondary reasons, however, are, inappropriate development, inefficient reservoir management practices, and escalating costs of remedial interventions/corrective measures and producing operations. This course covers the chemical recovery improvement possibilities that present themselves at all stages in the reservoir life cycle. It thereby enables one to timely select the most beneficial method and set realistic expectations on production behavior changes and recovery improvement. The impacts of the selected method on personnel training, technology transfer, and facility modification are also covered. It is light on theoretical equations, but it scrutinizes these to comprehend importance of significant parameters.

Course Contents:

- Enhanced Oil Recovery (EOR) methods.
- Chemical EOR methods.
- Polymer flooding - polymers and their properties.
- Heterogeneity, areal and vertical sweep efficiencies.
- Residual oil saturation.
- Laboratory screening.
- Polymer flood field design and example field results.
- Overview of reservoir simulators for polymer flooding.
- Surfactant/polymer (SP) methods.
- Surfactant-brine-oil phase behavior.
- Capillary desaturation and oil mobilization.
- Alkaline/Surfactant/Polymer (ASP) methods.
- Effect of alkali on phase behavior.
- Performance Control/Water Shutoff Methods.
- Overview of conformance control options.
- Gel properties.

Gas Injection Applications

Course Code: 0521 **Course Level:** Advanced

Course Description:

Gas flooding is the injection of hydrocarbon or nonhydrocarbon components into oil reservoirs that have typically been waterflooded to residual oil. Injected components are usually gases at atmospheric temperature and pressure and may include mixtures of hydrocarbons from methane to propane, and carbon dioxide, nitrogen, and even hydrogen sulfide. The key to successful gas flooding is to contact as much of the reservoir with the gas as possible and to recover contacted oil. Injected gases must be designed to be miscible with the oil so that oil previously trapped by capillary forces is transferred into a more mobile phase that flows easily to the production well.

This course gives a comprehensive understanding of immiscible gas and compositionally enhanced recovery processes and the important variables that influence the gas flooding process. The course contains both theoretical and practical material so that an engineer can apply learned knowledge to his/her unique reservoir. The course discusses process optimization to reduce production costs while maximizing oil recovery and income.

Course Contents:

- Reservoir fluids.
- EOS modelling and characterization.
- Multi-phase fluid distribution in the reservoir.
- Multi-phase flow in porous media.
- Flow regimes and sweep.
- Immiscible gas/water flood mechanisms.
- First contact miscibility mechanisms.
- Multi-contact miscibility mechanisms.
- Reservoir simulation, WAG design, and performance forecasting.
- Performance and monitoring of field projects.

Fracture Reservoir Management

Course Code: 0522 **Course Level:** Advanced

Course Description:

In the last decade, the petroleum industry became more and more aware of the determining role that fractures and faults play in the oil field production. The main reasons include improved fracture detection from efficient logging tools and from advanced interpretation of high-quality seismic data. Moreover, the increasing number of mature fields, that have not met expected production targets due to difficulties such as breakthroughs, raises suspicions as for the presence of fractures.

Course Contents:

- Introduction to fractured reservoirs and their development consequences.
- General Geomechanics with focus on fracture formation.
- Experiment demonstration of fracture formation.
- Fractured reservoir type classification and associated field development strategies.
- Case history: prediction of open fracture location and orientation for field development planning.
- Virtual field trip along natural fracture systems.
- Fracture detection: borehole image tools.
- Fracture detection: seismic methods.
- Basement fractures and prediction of their location, orientation and depth.
- Sealing fractures: prediction of location and orientation.
- In-situ stress determination, relevance for field development planning.
- Flow Fundamentals.
- Waterflooding in carbonate reservoirs.
- Enhanced Oil Recovery Screening.
- Fractured Reservoir Simulation.
- Surveillance Practices.
- Economics and Risk Analysis.

6 PRODUCTION

Foundations of Completions and Workovers Design

Course Code: 0601 **Course Level:** Foundation

Course Description:

Well completions is always an interesting and puzzling stage in well life, where creativity and innovation play a vigorous role to turn a successful well-designed dry-hole into a functioning well. This course covers all the aspects about the art of well completion engineering, where the teaching level starts from scratch describing the basis of design and selection of each single equipment that finally forms the well completion shape, and then explaining all the duties of the well completion engineer, and the required cooperation with production and drilling engineers.

By the end of this course, attendees will have knowledge of selecting the appropriate method for the operation and perform the task in a safe and efficient manner.

Course Contents:

- Determine production impact of selection of the drill-in fluid, completion fluid and fluid loss control systems with the objective to avoid or minimize formation damage due to solids or filtrate/fluid invasion.
- Tubing performance, heat transfer and sizing.
- Select and design the most appropriate reservoir penetration option.
- Define well functional specifications (evaluation of drainage options, location, trajectory, inflow/outflow, completion type, etc.
- Assess key uncertainties impacting sub-surface production system development (pressure/temperature/H2S/CO2/sand prediction).
- Understand different sand face completions, pros and cons (open hole, cased hole, cemented liner, slotted liner, standalone screen, gravel pack, frac pack).
- Calculate different completion designs related skin, non-darcy skin, partial penetration skin, deviation skin.
- Understand reservoir deliverability and inflow performance relationship.

Foundations of Artificial Lift Technology

Course Code: 0602 **Course Level:** Foundation

Course Description:

This course blends lecture, hands-on exercises, and seminar teaching styles to enhance learning. Participants work with software that allows them to design and analyze artificial lift methods, which should improve performance and result in higher production rates and/or reduced operating costs. Participants learn how to design and troubleshoot rod pumping, continuous gas lift, and electric submersible pump systems. Other methods such as PCP, plunger lift, jet pump, hydraulic pump, and intermittent gas lift will also be addressed. Participants gain experience in solving problems by hand and also by using advanced computer programs. Troubleshooting is an important part of artificial lift operations and several typical surveillance problems are solved.

Course Contents:

- Overview of artificial lift technology.
- Criteria for selecting the appropriate lift option that suits operating conditions.
- Reservoir performance: inflow and outflow relationships.
- Artificial lift screening.
- Introduction to rod-pumping, gas lift, and ESP systems.
- Rod-pump design: pumping unit, rods, pump, prime movers, gas anchor, pump-off controls.
- Gas lift design: mandrels, valves, injection gas requirements, temperature, chokes, spacing, equilibrium curve, continuous flow design.
- ESP design: pump performance curves, pump intake curves, typical problems, installation, troubleshooting.
- Optimize the performance of the lift option.
- Troubleshoot any problem occurring in the artificial lift.
- Best practices for installation and maintenance.
- Economic analysis.

Foundations of Production Logging and Reservoir Monitoring Techniques

Course Code: 0603 **Course Level:** Foundation

Course Description:

This course teaches participants the use and limitations of a variety of production logging tools including spinner, temperature, noise, fluid injections and other tools. Participants will learn what results these tools yield, the interpretation assumptions that are integral to their designs, and how quality is affected by the acquisition process. You will also learn the fundamentals of production log interpretation with hands-on examples and an in-class workshop on interpreting single and two-phase flow using production logs.

Course Contents:

- Downhole environment.
- Inflow performance and productivity index for oil and gas wells.
- Outflow performance: matching inflow with outflow to optimize well productivity.
- Understand different deployment techniques.
- Tool conveyance using tractors and coiled tubing.
- Typical PLT string and physical principles of measurement.
- Depth control in cased hole wells using GR and CCL.
- Well completions applied to vertical, deviated, horizontal, and multi-laterals & Pressure control system for rigless operation.
- Reservoir Fluids: fluid properties: GOR, bubble point pressure, phase diagram & Justifying acquiring production logs.
- Reservoir drive mechanisms and associated production problems.
- Flow Regimes in vertical and deviated wells and slippage velocities.
- Defining slippage velocities and using charts to obtain slippage velocities of oil and gas.
- Various techniques of measuring different phases using spinners, oxygen activation, phase velocity logging and gas bubble velocity.
- Measurements of three phase holdups.
- Single phase, two-phase and three-phase production log interpretations.

Workover Operations

Course Code: 0604 **Course Level:** Foundation

Course Description:

This course emphasizes the role of engineers and field operators in planning and executing the workover operations to maintain and increase field production and add to profitability and recoverable reserves. It also emphasizes the significance of the team concept as a factor in optimizing operations success. The course is highlighted with open discussions and problem solving shared by the instructor and participants.

By the end of this course, attendees will have an understanding of the industry's advanced technologies in designing and executing workover jobs in their respective operations. They will have knowledge of selecting the appropriate method for the particular operation and perform the task in a safe and efficient manner.

Course Contents:

- Understand different criteria to work over a well.
- Identify the value of work over based on costs and reserves, and calculate the commerciality of work over.
- Identify the different risks during work over.
- Understand well control requirements during work over.
- Review completion integrity and interpretation of cement and casing evaluation logs.
- Understand recommended practices for coiled tubing fishing operations.
- Understand recommended practices for cement squeeze jobs.
- Understand recommended practices for running different types of completions (tubing, gravel pack, screens)
- Write a program for running standard tubing completion and Cr13%.
- Running gravel pack completions.
- Running multizone completions.
- Open and cased hole operations.
- Artificial lift systems & Fishing Operations.

Slickline Operations

Course Code: 0605 **Course Level:** Foundation

Course Description:

Slickline service is a mobile oil and gas service that offers an array of downhole tools to aid in the manipulation of oil and gas wells. Oil and gas owners sub-contract slickline service for a variety of services from routine oil well servicing to emergency well control.

Today, slickline service is an integral part of oil and gas servicing. The scope of slickline work continues to expand with the development of new technologies and procedures. Slickline operations course introduces the techniques and technologies involved in working with slickline and braided wireline. The course covers wireline jars and jarring operations, surface equipment, basic wireline tools, and applications specific to gas lift operations.

Course Contents:

- Understand and describe the surface equipment of slick line services.
- Describe a typical Wireline rig up.
- Understand the different objectives of slickline operations.
- Understand the theory of measurement of weight and depth Indicators.
- Understand well control equipment and operations.
- Describe a typical string of wireline gauging.
- Calculate the required weight to enter the well.
- Understand operation mechanics of different running and pulling tools for locks, standing valves.
- Review the well trajectory to identify if roller bars are required.
- Understand running, setting, equalizing, and pulling procedures.
- Understand the theory of gas lift operation.
- Understand the theory of SCSSV's operation.
- Understand the operations of shifting tools for SSD.
- Understand running and retrieval of gas lift valves.
- Understand fishing operations and top wire calculations.

Coiled Tubing Operations

Course Code: 0606 **Course Level:** Foundation

Course Description:

Coiled tubing is one of the most common technologies used for well intervention throughout the oil industry. Its advantages and versatility make the use of the technology possible during drilling, completion, and production phases of oil and gas wells.

This course provides a comprehensive overview of surface and pressure control equipment, as well as bottomhole assembly components used in a wide variety of coiled tubing applications, progressing from basic to complex interventions. Participants will learn how to estimate the operating limits and life of a coiled tubing string, how to do proper string management, and how to prepare appropriate checklists for job planning, equipment mobilization and rig up.

A brief discussion about nitrogen use and how to calculate required volumes is included, as well as extensive coverage of emergency responses and contingencies to deal with a wide variety of situations and scenarios.

Course Contents:

- Understand coiled tubing surface equipment.
- Understand how CT pipe is manufactured.
- Understand the different objectives of running coiled tubing.
- Describe a typical rig up for coiled tubing.
- Describe the function of every surface equipment of CT.
- Understand the value of CT in matrix stimulation.
- Understand conditions that favor logging using CT.
- Understand the Different downhole tools and criteria to use milling or Jetting.
- Operational limits and life estimation (fatigue) considering corrosion.
- Design fill clean out removal program.
- Design scale removal program.
- Design Nitrogen Lifting program for loaded up well.

Practical Perforation

Course Code: 0607 **Course Level:** Foundation

Course Description:

The course is a comprehensive overview of perforating technologies and applications related to different types of formations and well completions. Discussing the best practices for perforating, the course delivers state-of- the-art in selection of charges, deployment of guns and techniques of perforation, decreasing damage and optimizing production.

Course Contents:

- Understand the objective of perforations.
- Understand the difference between TCP and through tubing perforations.
- Understand different objectives of perforation for different completion techniques (frac, gravel pack, cased perforated).
- Understand components of perforating gun.
- Understand components of explosive charge.
- Understand different types of charges and applications.
- Understand safety issues of perforation.
- Describe shaped charge components.
- Describe API charge tests.
- Understand common practices in maintaining charges and explosives.
- Understand the different conveyance techniques (wireline, coiled tubing and TCP).
- Understand value of underbalance, extreme overbalance and proppelants.
- Understand different firing heads, detonators, and accessories.
- Use industry models to identify best charge for specific application.
- Select charge for gravel pack applications.
- Design required underbalance to minimize perforation damage.
- Evaluate the value of dynamic underbalance over static underbalance.
- Make up quality control check list for perforation operation.
- Identify low order detonation.

Foundations of Hydraulic Fracturing

Course Code: 0608 **Course Level:** Intermediate

Course Description:

The course reviews basic concepts of hydraulic fracturing and broad applications of the technique. Fracturing technology benefits and limitations in all types of sandstone and carbonate reservoirs are explained. It considers the critical components of the fracturing process, and expands on the steps and data input requirements to effectively select stimulation candidates, plan, design, and implement hydraulic fracturing treatments. The use of modeling as an important tool to design and analyze treatments, how it can be effectively used in practical applications, and its limitations are discussed. In addition to the technical presentation, the course contains many practical exercises and class problems based on case histories.

Course Contents:

- Introduction to fracturing process and mechanics.
- Prediction of well productivity using analytical deliverability models for hydraulically fractured wells.
- General operation technique and design for hydraulic fracturing.
- Fracturing fluid additives and proppants.
- Basic principles of rock mechanics (principal stresses, rock properties).
- Effect of hydraulic fracture on well deliverability and different frac design techniques and objectives.
- Factors involved in field implementation.
- Acid vs. proppant fracturing.
- Frac pack concepts.
- Water-fracking concepts.
- Horizontal well fracturing.
- QA/QC of fracturing treatments.
- Methods to evaluate fracturing treatment success.
- Understand different sources of skin, effect on productivity and different remedial actions.

Production Systems Optimization

Course Code: 0609 **Course Level:** Intermediate

Course Description:

A production system is the system that transports reservoir fluids from the subsurface to the surface and separates it into oil, gas, and water. From there, the oil and gas streams are treated and prepared for sale or transport from the field. Any water produced will also be treated and prepared for disposal or reinjection into the reservoir. The basic elements of a production system are reservoir, perforations, production packer, production casing, tubing, wellhead, choke, flowline, separator, and tank.

This course will provide participants with the knowledge of integrated subsurface-surface production optimization. During this course, participants will also learn about nodal analysis and the identification of major pressure losses from the reservoir to separator. The use of specialized software to identify constraints and to propose recommendations to optimize the field will also be covered.

Course Contents:

- Typical oil and gas production system.
- Different PVT Models.
- Different IPR Models.
- Effect of different Reservoir parameters on IPR.
- Vertical Lift Performance.
- Different system Constraints.
  - coning, equipment capacity and rating, sanding, production chemistry
- Artificial lift optimization based on well model.
- Calculate operating envelope for the well based on all constraints.
- Understand different constraints of surface facilities.
- Calculate skin due to different sand face completions.
- Use network modeling to optimize and maximize production.
- Identify bottlenecks in the system and propose solutions.
- Optimize artificial lift at field scale.

Sand Production Management

Course Code: 0610 **Course Level:** Intermediate

Course Description:

Sand causes a wide variety of costly problems when oil and gas are produced from unconsolidated reservoirs. The costliest problem is usually loss of production resulting from formation damage caused by poorly planned and/or executed sand control applications.

This course will identify the parameters that must be considered when selecting the sand control technique to be used. Examples, problems, and case histories will be examined to illustrate key points. Sand control failures will be used to illustrate the types of problems that can lead to early well failures. The course will also teach how to perform quality control checks during sand control application to help ensure successful wells.

Because Sand Control in horizontal wells often proves to be short-lived when incorrectly applied, examples and class problems will focus on correctly choosing successful completion techniques for horizontal wells. Several new promising sand control technologies have been introduced in the last few years.

Course Contents:

- Understand production problems related to sand production.
- Introduce different sand management and control techniques.
- Understand effect of different sand control techniques on well deliverability.
- Understand different sand detection techniques.
- Perform sand prediction calculations using tensile failure model and recommend suitable draw down to prevent sand production.
- Use drag model to evaluate if sand can flow to the surface.
- Use locally calibrated erosional model to evaluate effect of sand on erosion and identify the operational envelope for sand free production.
- Calculate the skin due to different sand control completions.
- Design well bore cleanup program for gravel pack placement.

Flow Assurance from Pore to Process

Course Code: 0611 **Course Level:** Intermediate

Course Description:

Flow assurance is a critical component in the design and operation of onshore and offshore production facilities. This is particularly true as the industry goes to deeper water, longer tiebacks, deeper wells, and higher temperature and pressure reservoirs. Although gas hydrate issues dominate the thermohydraulic design, waxes, asphaltenes, emulsions, scale, corrosion, erosion, solids transport, slugging, and operability are all important issues which require considerable effort. The participant will be presented with sufficient theory/correlation information to be able to understand the basis for the applications.

This intensive course has considerable time devoted to application and design exercises to ensure the practical applications are learned.

Course Contents:

- Understand different parameters affecting fluid flow and heat transfer in wellbore and pipelines.
- Understand basic chemistry behind different flow hindrance Elements.
- Understand chemical techniques to identify wax, asphaltenes and scales.
- Understand different chemicals for prevention.
- Predict scale formation envelope using different models.
- Predict hydrate formation using empirical models and Campell method.
- Predict asphaltene and wax formation using EOS models.
- Apply recovery estimation techniques for different natural drive mechanisms and understand the limitations.
- Calculate amount of hydrate inhibitor required and understand different dehydration techniques.
- Understand different Lab testing for scale inhibitor selection.
- Understand basic design of scale inhibition.
- Calculate operating envelope for well and pipeline to avoid scale, asphaltenes, wax and hydrate.

Well Head and X-Trees Systems and Maintenance

Course Code: 0612 **Course Level:** Intermediate

Course Description:

Upon the completion of this course, participants will learn more about x-mas trees, wellhead equipment, mechanical barriers, safety valves and wellhead control systems. This course also discusses well integrity and HSE risks associated with perforation of oil and gas wells, including fishing, stimulation, fracturing, well testing and wire-line operations.

Attendees will develop a better understanding of wellhead operating procedures, well handovers and working under safe conditions.

Course Contents:

- **Wellhead Equipment**
  - X-mas Tree and Choke Valves.
  - Tubing Hanger - Production Packers - Landing Nipples – Sliding Sleeve Devices (SSDs) – Gas Lift Valves
- **Well Completion**
  - Single – Multiple - Deviated - Horizontal.
- **Barriers Principles and Well Safety**
  - Hydraulic Barriers.
  - Mechanical Barriers including Subsurface Control Valves and Packers.
  - Setting and Testing of Mechanical Barriers.
- **Flanging of the Wellhead**
  - Casing Head Housing.
  - Tubing Spool Hanger- Valves and Actuators.
- **Preparing for Well Workover**
  - Well Handover.
- Wellhead Safety Valves and Control System.
- Wellhead and X-mas Tree Maintenance.
- Operating Procedures to Work under Safe Conditions

Water Production Management

Course Code: 0613 **Course Level:** Intermediate

Course Description:

This course provides an overview of the main water handling systems typically encountered in oil and gas upstream production operations, both onshore and offshore. The chemistry of the main water-related problems of mineral scales, corrosion, bacteria, and oily water will be reviewed both from theoretical and practical points of view. Produced water treatment equipment and typical water quality specifications will also be reviewed, as well as water injection and disposal systems. An exercise will be given to identify typical system problems and to apply the knowledge you gained to propose solutions.**Course Contents:**

- Understand effect of water production on well and field performance.
- Identify different problematic sources of water.
- Understand the basic diagnostic tool principles.
- Understand available mechanical and chemical water conformance techniques.
- Understand principle and application of mechanical conformance and chemical conformance techniques.
- Prepare and analyze diagnostic plots, analyze for reservoir channeling, coning and flow behind pipe.
- Analyze PLT, RFT, pulsed neutron data and include correlation with offsets and time lapse technique to define the problem and suggest solution.
- Choke back analysis for water coning, and define wellhead and rate parameters required to stop coning.
- Perform perforation offset calculations to avoid coning.
- Combine logs and update model and use them for candidate selection and ranking.
- Perform risk analysis for different remedial treatments and justify the best treatment.
- Design a program for chemical conformance for different problems (coning, lateral water movement, channel behind casing).

Formation Damage and Mitigations

Course Code: 0614 **Course Level:** Intermediate

Course Description:

Formation damage seems to be inevitable and it is costing your company money! Whether formation damage can be prevented, removed economically, or must be accepted as the price for drilling and producing a well depends upon many factors.

Concerns for formation damage have been with our industry since the early days. These concerns become more prevalent as we embark on more challenging reservoirs utilizing even more challenging drilling, completion, and production methods. Additional concerns relate to the common lost production or injectivity following workovers in these challenging environments.

Course Contents:

- Understand the possible damage mechanisms during drilling, completion, production and depletion.
- Understand the effect of formation damage on reservoir permeability and deliverability.
- Understand the production chemistry of formation oil and water.
- Understand the composition and structure of different clay components and how this affects their physical properties.
- Understand the different minerologies and their sensitivity to fluid chemistry.
- Use XRD to identify possible rock instabilities.
- Estimate critical draw down required to cause fines migration.
- Use predicting tools to evaluate scale, asphaltene and wax formation in formation pore throats.
- Design bean-up procedure for formation with fines migration potential.
- Design drilling and completion fluid to minimize formation damage.
- Calculate the operating envelop to avoid scale and hydrocarbon deposits.
- Review completion program and identify possible formation damage issues.

Gas Lift Design and Troubleshooting

Course Code: 0615 **Course Level:** Intermediate

Course Description:

Gas lift is one of the most widely used artificial lift techniques. Participants will investigate the impact of tubing sizing, gas lift valve selection, gas lift mandrel spacing, gas lift valve design, casing pressure, surface choke size, gas volume, and other parameters on well design and operation. Participants will practice mandrel spacing design and gas lift valve design, surveillance, and optimization at the well and field level using actual field data including the use of software programs.

After attending this course, participants will be able to identify, diagnose, analyze, and solve gas lift problems. Up to date computer programs will be used/demonstrated during the course. The class includes pictures and videos of most important equipment components while being applied, for further participant understanding.

Course Contents:

- Gas lift concepts and data.
- Inflow/Outflow.
- Nodal analysis & Equilibrium curves.
- Gas lift equipment and valve mechanics.
- Valve selection and calibration & Unloading.
- Mandrel spacing and step-by-step complete gas lift design for a well.
- Temperature effects on valves.
- Orifice sizing techniques.
- Lift gas rates for best economics.
- Causes and solutions of instability.
- Gas lift surveillance and measurement.
- Analysis of flowing pressure gradient surveys.
- Analysis of GL surface charts and measurements.
- Gas allocation and field optimization.
- Use of computer programs for gas lift design, troubleshooting, and optimization.

ESP Design and Troubleshooting

Course Code: 0616 **Course Level:** Intermediate

Course Description:

This course will allow the user to become familiar with the ESP system and when it should be used. All components will be described in detail. Design and analysis problems will be done using advanced computer programs. Some films will be shown mostly illustrating installation, operation, and removal of failed equipment, new products, and best practices. Problems will be solved and discussed by participants each day. Discussion is encouraged concerning experiences of successes and failures. Problems addressing solids, gas handling and viscosity are addressed. Best practices are stressed throughout so a long-lasting system can be developed for maximum profit. SCADA controls and VSDs are discussed. The attendee will learn the function of the various components, and the concerns about installation, operation, and removal of failed equipment. The participant will be able to evaluate the design for current and future conditions, analyze an installed system, and many other operational concerns of the ESP system.

Course Contents:

- Introduction to artificial lift and electrical submersible pumping.
- Introduction for reservoir and production considerations.
- Description of all components of the electrical submersible system.
- Installation considerations and cautions.
- Design of ESP system to fit current and future well conditions.
- Operation of a given design.
- Analysis of an ESP system using diagnostics from installed instrumentation and using diagnostic computer programs.
- Removal of failed equipment.
- Controls for ESP systems including variable speed drives.
- ESP instrumentation available in the industry.
- Failure analysis.
- Data keeping.
- Maintenance and monitoring.

Beam Pump Design and Troubleshooting

Course Code: 0617 **Course Level:** Intermediate

Course Description:

This course will allow the user to become familiar with the system and when it should be used. All components will be described in detail. Design and analysis will be done using advanced computer programs. Some films will be shown mostly illustrating either new products or best practices. Problems will be solved by the class members each day. Comparisons with other systems to select the best system for a given well, whether it may be beam pumping or another method of lift, will be made. Problems of solids, gas handling, and viscosity are addressed. Best practices are stressed throughout so a long-lasting system can be developed for maximum profit. New material will also be presented on Beam Pumps in horizontal wells, rod protection in horizontal wells, placement of pump, deviation surveys, and performance of gas separators.

Course Contents:

- Overview of artificial lift.
- Reservoir considerations.
- Design and analysis of the beam pump system.
- Prime mover.
- Belts.
- Sheaves.
- Gear box.
- Polished rod.
- Wellhead/stuffing box.
- Rods.
- Pump.
- Tubing.
- Artificial lift efficiency.
- Heavy oil considerations.
- Gas separation/handling.
- Best practices for operation.
- Component design.
- System analysis.
- Pump off controllers.

Advanced Completions and Workover Design

Course Code: 0618 **Course Level:** Advanced

Course Description:

Completions and Workovers course provides an integrated introduction to many facets of completion and intervention technology. The material progresses through each of the major design, diagnostic, and intervention technologies concluding with some common remedial measures and well abandonment techniques. The course focuses on the practical aspects of each of the technologies, using design examples - successes and failures - to illustrate the key points of the design and associated risks/uncertainties.

By the end of this course, attendees will understand the industry's advanced technologies in designing and executing Intervention jobs in their respective operations.

Course Contents:

- Define well operating conditions and evaluate impact on selection of completion materials.
- Identify key sub-surface uncertainties which impact on surface production system development.
- Perform tubing stress analysis and identify problems and solutions.
- Select well head, tubing size and grading, upper completion accessories, SSSV, design packer and artificial lift equipment .
- Define load cases and operating conditions for the well.
- Evaluate Impact of completion design on well life intervention.
- Understand recommended practices in special completions.
- Recommend when to install artificial lift, perform economic analysis, and provide high level steer of which lift method to consider and when.
- Evaluate alternative completions – smart wells, multilaterals, horizontal open hole gravel packs (OHGPs), stacked wells, selectives, etc.
- Recommend flow assurance/enhancement in wells.

Horizontal and Multilateral Wells Design

Course Code: 0619 **Course Level:** Advanced

Course Description:

Successful multilateral and horizontal wells require new considerations, interdisciplinary planning, and special techniques. This intense course addresses the critical need for a proper understanding of all aspects of horizontal and multilateral design, completion, and stimulation that make these wells unique. It is designed for those planning or working with horizontal and multilateral wells and interested in effective use of the latest technology. Basic understanding of important reservoir characteristics, hole stability, formation damage, crucial zonal isolation, and hydraulic fracturing are just some of the critical issues addressed by this course.

Course Contents:

- Technical and economic benefits of advanced well systems.
- Reservoir characteristics for horizontal and multilateral well applications.
- Well performance prediction.
- Wellbore stability of horizontal wells.
- Stress field effect on drilling, completion, production, and stimulation.
- Geosteering.
- Multilateral well structure, junctions, and applications.
- Formation damage and its effect on horizontal well performance.
- Well completion and its effect on horizontal and multilateral wells performance.
- Intelligent completion: downhole monitoring and control.
- Well trajectory and completion optimization.
- Reservoir stimulation considerations.
- Horizontal well fracturing.
- Acidizing of horizontal wells.
- Other stimulation methods.
- Optimal design of stimulation.
- Risk identification and assessment.

Advanced Production Logging and Reservoir Monitoring Techniques

Course Code: 0620 **Course Level:** Advanced

Course Description:

This course will focus on extending the level of the foundations course by in-depth evaluations of two-phase and three-phase flow in tubulars. This will concentrate on workshop environments to alleviate the level of exposure to advanced and more complex production systems. Local examples will be reviewed and used as a working basis for such a session. Reservoir saturation monitoring will be presented in detail with a stronger focus on the principles of the tools measurement techniques and accuracies. Carbon/oxygen ratio calibrations will also be analyzed in detail and a workshop on interpretations will also be made on local examples. The course will highlight the applications of this technique to estimate water saturations behind the casing and the salinity of this invading water.

Course Contents:

- Different factors that affect temperature profile.
- Quantitative analysis using full string PLT for two phase flow in slightly deviated well.
- Different slip models for oil / water (Choquette, Nicholas, Brauner) and gas / liquid (Aziz Govier, Dunsand Ros, Petalas Aziz, Kaya - Brill).
- Specialist tools for different applications (gas hold up tools, array hold up tools, array spinner, array density tools).
- Effect of inclination on tool response (spinner, density, GR, capacitance), and effect of inclination from horizontal in horizontal wells.
- Use global optimization to minimize uncertainty and include temperature simulation in the model.
- Quantitative analysis of two and three-phase flow in deviated and horizontal wells (conventional and array tool string).
- Planning for PLT (confirm ability to deploy, spinner selection, stops duration, stabilization requirements, tool selection, multi rate PLT plan, battery requirement for memory log).

Production Operations Management with Multiphase Flow

Course Code: 0621 **Course Level:** Advanced

Course Description:

This course trains the participants to effectively develop and operate an upstream surface production system. Practical applications of surface production practices are emphasized. Initially, participants will work as a team in short hands-on exercises that reinforce the lectures. Later, participants, arranged as a technical team will work on an integrated surface production system team assignment. The result of this project will be presented in the last day of the course. This course program will lay a solid foundation of the skills, knowledge, and self-awareness required to develop further into fully competent production operations professionals.

Course Contents:

- Applied principles of oil and gas surface operations.
- Characterization of petroleum fluids.
- Two-phase oil and gas systems.
- Two-phase separation operations and selection procedures.
- Oil-gas-water interaction principles and emulsions.
- Three-phase separation operations and selection procedures.
- Upstream crude oil treatment operations and selection procedures.
- Crude oil dehydration, desalting, sweetening, and stabilization.
- Produced water treatment operations and selection procedures.
- Transportation of petroleum fluids.
- Pumps and pumping systems &Pressure vessels requirements.
- Upstream natural gas treatment operations and selection procedures.
- Acid gas treatment , gas dehydration, and removal of other contaminants.
- Compressors and compression systems.
- Production delivery assurance and maintenance.
- Measurements in oil and gas operations.
- Integrated surface production system team project.
- Project final presentation.

Subsea Production and Completion Systems

Course Code: 0622 **Course Level:** Advanced

Course Description:

This class will provide participants with an introduction to subsea production facilities. It will take participants from the conceptual design to the operation of the subsea production facilities. Participants will have the chance to learn about typical system architecture, design drivers, and general requirements for subsea production systems. Equipment design and operations, flow lines, flow assurance, all aspects related to subsea completions, including deepwater and material selection, will all be covered.

Course Contents:

- Concepts and definitions.
- General design requirements.
- Equipment and operations.
- Procedures for operations.
- Maintenance and repair.
- Limitations, barriers, and challenges.
- Major subsea technology.
- Flow assurance.
- Instrumentation, control, and monitoring systems.
- Integrated systems.
- Subsea completions.
- Subsea wellheads.
- Subsea well intervention.
- Production monitoring, control, and optimization technology.
- Data acquisition and data management.

Advanced Well Integrity

Course Code: 0623 **Course Level:** Advanced

Course Description:

Participants in this course will learn how to manage well design, construction, surveillance, and documentation of well integrity for a "life-of-well" philosophy. An emphasis will be placed on how industry standards and guidelines relate to barrier construction, monitoring, and management. The proper understanding of these concepts will equip each participant with the tools to safely and reliably construct and verify the integrity of a well. Specific concepts that will be covered during this course will include barrier concepts such as geology, casing, cementing, and various equipment used in completion. Participants will also learn about corrosion and erosion effects on barriers, effects of loads, pressure, and temperature on barrier integrity, along with barrier inspection and verification. This course will use case studies and projects throughout the week, along with a final presentation by small groups where participants will demonstrate the integrity concepts, methods, importance, and problems.

Course Contents:

- Well barriers and their principles & Well integrity elements and issues.
- Understand different diagnostics for evaluation of well integrity (tubing integrity test, hanger integrity test).
- Understand different surveillance tools for integrity evaluation.
- Understand the principle of MAASP and how to calculate it.
- Interpret the results of tubing, casing and hanger integrity tests and suggest remedial action.
- Interpret data from different integrity surveillance tools.
- Understand well suspension and abandonment regulations.
- Design diagnostic program for different integrity problems and prepare score matrix for integrity risks.
- Prepare a risk assessment for a deviation from standard well integrity policy.
- Well integrity management systems (WIMS) and safety and environmental management systems (SEMS).

Advanced Hydraulic Fracturing

Course Code: 0624 **Course Level:** Advanced

Course Description:

This advanced course is designed for those who have a practical understanding of the applications of hydraulic fracturing and want to deepen their expertise. The course will provide the details and discussion of fracturing concepts usually accepted or assumed in fracturing applications. The strengths and limitations of various approaches to fracturing treatment design will be covered. Attendees should leave the advanced course with a better understanding of the hydraulic fracturing process and how it relates to post-frac well performance.

Course Contents:

- Rock properties and fracture mechanics related to fracturing process.
- Fracturing fluid mechanics.
- Proppant transport.
- Pre-frac injection test analysis.
- Fracture closure.
- Fracture monitoring and fracture measurement.
- Fluid leak-off.
- Design perforation for frac application.
- Fracture growth analysis using G function.
- 2D and 3D frac propagation models.
- PTA and RTA interpretation to evaluate hydraulic frac success.
- Use estimated geometry to predict well deliverability.
- Use net pressure date to understand fracture growth and containment.
- Use 3D model to predict fracture geometry and prepare pumping schedule.
- Use open hole logs (sonic, density, neutron) to confirm height containment.
- Re-fracturing considerations.
- Review of existing fracture modeling software.
- Evaluation of post-frac well performance.

Produced Water Re-Injection

Course Code: 0625 **Course Level:** Advanced

Course Description:

This course is designed to provide participants with an overview on the different types of water treatment methods, for water injection systems either from produced water or seawater as found in today's oil and gas industry. Participants will be provided with the knowledge to enhance their understanding of these reservoirs as well as the process of how seawater may be pumped into the reservoir to maintain pressure and help the oil and gas to flow from the reservoir to a production platform or facility. They will also gain knowledge of the water treatment systems and injection pumps that have been installed on the processing decks of these offshore platforms to send filtered and treated seawater into the reservoirs.

Course Contents:

- Water injection program design and specifications.
- Establish water quality specifications for injection water and determine the best water sources to obtain the required water injection volumes.
- Assessing water compatibility of selected source waters.
- Injection water analysis and treatment methodology.
- Open and closed water treatment systems and technology.
- Surface water treatment and specifications.
- Interpret water compatibility analyses, to determine the least harmful water sources for injection.
- Subsurface water treatment process and requirements.
- Injection well types, configuration, and testing.
- Prediction and control of scaling.
- Understanding the corrosion issues and their control.
- Determine the best technology to treat water.
- Monitoring and maintenance issues in water injection system.
- Determine the most appropriate plant type and technology for treating pre-injected water.

PCP Design and Troubleshooting

Course Code: 0626 **Course Level:** Advanced

Course Description:

Progressing Cavity Pump technology is the fastest evolving artificial lift technology in our industry. PCPs are highly efficient, have a higher tolerance to sand or solids than most other lift methods, and are relatively inexpensive to install and operate. All components of the PCP system will be described and discussed in detail. The key steps taken to ensure correct elastomer selection and rotor fit will be discussed. Design and analysis problems will be performed using standard industry software. Educational movie clips and photos will be used to illustrate key concepts, equipment principles, failure analysis, and new technology. The attendee will learn the function of the various components and the concerns of installation, operation, and removal of failed equipment. The participant will be able to evaluate the design of a system for current and future conditions, analyze an installed system, and many other operational aspects of the PCP system. The class will involve group exercises to facilitate and accelerate the learning process. Problems will be solved and discussed by the class members each day. Discussion is encouraged concerning experiences of successes and failures and consequent best practices.

Course Contents:

- Introduction to artificial lift and progressing cavity pumps.
- Introduction for reservoir and production considerations.
- Description of all components of the PCP.
- Installation considerations and cautions.
- Design of a PCP system to fit current and future well conditions.
- Operation and monitoring of the PCP system, set-up of system protection.
- Diagnosis and troubleshooting of the PCP system.
- Removal of failed equipment and failure analysis.
- PCP instrumentation, automation, and control.
- Data storage and archival & Maintenance and monitoring.

7 PROCESS &FACILITIES

Oil and Gas Production Facilities

Course Code: 0701 **Course Level:** Foundation

Course Description:

The course introduces oil and gas production facilities. The main focus of the course is on different production facility types, processes utilized, and primary equipment involved. The course discusses different topics from an overview of the oil and gas industry, hydrocarbon phase behavior characteristics, and different reservoir types, to product specifications and the processes used to meet these. Process safety, downstream processing that may impact the production facility selection and operation, and other facilities considerations are addressed as well.

Course Contents:

- Overview of the oil and gas industry.
- Overview of phase behavior and types of reservoirs.
- Hydrocarbon properties.
- Typical sales specifications.
- Flowlines, piping and gathering systems.
- Production separation.
- Oil processing.
- Water injection systems.
- Gas handling - dehydration and compression.
- Measurement and storage.
- Other facilities considerations - utilities, process safety.
- Midstream facilities - gas processing.
- Midstream facilities - pipelines.
- Midstream facilities - LNG.

Surface Production Operations

Course Code: 0702 **Course Level:** Foundation

Course Description:

This course gives an overview of all typical oilfield processing and treatment equipment. Participants will learn the purpose of each piece of equipment and how it works. The course emphasizes on gaining a basic understanding of the purpose and working method of all types of surface facilities and treating equipment.

Course Contents:

- Properties of fluids at surface.
- Flowlines, piping, gathering systems, solids and liquids limits.
- Oil - water- gas - solids - contaminants.
- Separation and treatment.
- Two and three phase separators, free water knockouts, centrifuges, filters.
- Storage tanks, gun barrels, pressure/vacuum relief, flame arrestors.
- Stabilizers.
- Foams, emulsions, paraffins, Asphaltenes, hydrates, salts.
- Dehydrators.
- Water treaters: SP packs, plate interceptors, gas floatation, coalescers, hydro-cyclones, membranes.
- Acid gas treatment: coatings, closed system, chemicals, solvents, conversion, stress cracking. Valves: all types, regulators.
- Pumps/Compressors: centrifugal, positive displacement, rotary, reciprocating, ejectors.
- Metering: orifice, head, turbine, and others.
- Corrosion/Scales: inhibition and treatment.

Oil Production and Processing Facilities

Course Code: 0703 **Course Level:** Foundation

Course Description:

The course introduces oil production facilities - from the wellhead, to the delivery of a specification crude oil product, to the refinery. The course discusses both onshore and offshore processing facilities. It covers produced water treating and water injection systems. The course also discusses solution gas handling processes and equipment. Practical exercises covering different aspects of Oil Production and Processing Facilities will be discussed throughout the course.

Course Contents:

- Reservoir drive mechanisms.
- Phase envelopes and reservoir fluid classification.
- Well inflow performance.
- Artificial lift.
- Gas, oil, and water - composition and properties.
- Oil gathering systems.
- Gas-liquid separation & Emulsions.
- Oil-water separation & Oil treating.
- Desalting.
- Oil stabilization and sweetening.
- Oil storage and vapor recovery.
- Sand, wax, asphaltenes, and scale.
- Transportation of crude oil.
- Solution gas handling.
- Produced water treatment.
- Water injection systems.

Gas Processing

Course Code: 0704 **Course Level:** Foundation

Course Description:

This course gives an overview of the gas processing industry. It is designed for a broad audience and is an interactive course, utilizing basic technical exercises and terminology to communicate key learning points. This course covers the technology and engineering principles in depth giving the participant basic knowledge of gas processing operations.

Course Contents:

- Natural gas and world energy trends.
- Hydrocarbon components and physical properties.
- The role of gas processing in the natural gas value chain.
- Heat transfer equipment.
- Pumps and compressors.
- Acid gas removal.
- Gas dehydration.
- NGL extraction.
- Fractionation and stabilization.
- LNG.
- Pipelines and storage.
- Sulfur recovery and acid gas injection.

Corrosion Management and Monitoring Techniques in Production and Processing Operations

Course Code: 0705 **Course Level:** Intermediate

Course Description:

This course will cover the main causes of corrosion in upstream oil and gas operations, as well as monitoring and mitigation methods. The various corrosion mechanisms give rise to a number of different forms of corrosion damage, which will all be considered. Participants will estimate the corrosivity of a given environment through analysis of chemical and physical characteristics of the system, review approaches to selecting materials and coatings for corrosion resistance for different conditions and applications (including the use of NACE MR0175/ISO 15156), and be introduced to cathodic protection (CP) surveys, selecting the CP system type, estimating current requirements, and the design principles of simple cathodic protection systems. The participant will learn how to select and utilize corrosion inhibitors for different systems, and how to select and apply corrosion monitoring techniques to create an integrated monitoring program. The course content is based on a field facilities engineering point of view, as opposed to a more narrowly-specialized corrosion engineering or chemistry viewpoint.

Course Contents:

- Fundamentals of corrosion theory.
- Major causes of corrosion (O2, CO2, H2S, microbiologically influenced corrosion).
- Forms of corrosion damage.
- Materials selection.
- Protective coatings and linings.
- Cathodic protection & Corrosion inhibitors.
- Corrosion monitoring and inspection.
- Corrosion in gas processing facilities.
- Corrosion in water injection systems.
- Corrosion management strategy and life-cycle costs.

Fundamentals of Pump and Compressor Systems

Course Code: 0706 **Course Level:** Intermediate

Course Description:

This course provides a comprehensive overview of pumps and compressor systems. It focuses on equipment selection, type, unit, and station configuration, and integration of these units in the process scheme and control strategy in upstream and midstream oil and gas facilities. The material of the course is applicable to field production facilities, pipelines, gas plants, and offshore systems.

Course Contents:

- Types of pumps, compressors, and drivers, and their common applications and range of operations.
- Evaluation and selection of pumps and compressors, and their drivers for long-term efficient operations.
- Unit and station configuration including multiple trains in series and/or parallel operations.
- Integration with upstream and downstream process equipment, local and remote-control systems, and facilities utilities.
- Key auxiliary systems including monitoring equipment, heat exchangers, lube and seal systems, and fuel/power systems.
- Major design, installation, operating, troubleshooting, and maintenance considerations.

Heat Transfer Equipment

Course Code: 0707 **Course Level:** Intermediate

Course Description:

This course reviews the selection, basic design, and operation of heat transfer equipment commonly used in the oil and gas industry, with focus on E&P production facilities. Heat transfer equipment discussed will include shell and tube exchangers, compact heat exchangers, brazed aluminum exchangers, air coolers, and fired equipment (fire-tube and direct-fired).

Course Contents:

- Typical process heating and cooling applications.
- Fluid properties.
- Heat transfer principles.
- Shell and tube exchangers.
- Compact heat exchangers: plate-frame, printed circuit, welded plate.
- Brazed aluminum exchangers.
- Air coolers.
- Fired equipment (furnace type and fire-tube).
- Operating problems.
- Typical instrumentation control schemes.

Introduction to HYSYS in Oil and Gas Processing

Course Code: 0708 **Course Level:** Advanced

Course Description:

This course will focus on teaching participants how to use HYSYS software to model different oil and gas processes for design analysis. This software will also assist in evaluating the performance of existing oil and gas facilities, process equipment, and plants. Participants will complete the preliminary process of flow diagrams, mass and energy balance, and equipment sizing based on HYSYS operations. Participants will also learn how to extend objects that allow custom unit operations, kinetic reactions, and property packages to incorporate into HYSYS simulation.

Course Contents:

- HYSYS overview and applications.
- Fluid and transport properties.
- Oil and gas property simulation using HYSYS.
- Thermodynamic selection.
- Process flow diagrams.
- Material and energy balances.
- Customized reports and applications.
- Oil, gas, and water separators.
- Pumps and compressors.
- Valves, fittings, and pipelines.
- Oil pumping and transportation.
- Gas compression plant.
- Oil stabilization plant.
- NGL extraction by mechanical refrigeration.
- NGL fractionation plant simulation.


8
PETROLEUM BUSINESS
Success
Solution
Business Strategy
Innovation
Branding
Solution
Marketing
Analysis
Ideas
Success
Management
SOCIAL NETWORK
Jun
Aug
Sep
Oct
Nov
Dec

Basic Petroleum Economics

Course Code: 0801 **Course Level:** Foundateion

Course Description:

The course teaches the participant how to answer the following vital questions for a certain project: What will it cost? What is it worth? Will it earn sufficient profit? Before committing to any project, these questions should be answered, and this course will provide the fundamentals necessary to enable participants to do so. Contractual arrangements, which also significantly impact the economic viability of a project, will be discussed. Participants will practice cash flow techniques for economic evaluations and investigate frequently encountered situations.

Course Contents:

- Forecasting oil production.
- Defining reserves, operating expenses, capital expenditures, inflation, factors effecting oil and gas prices.
- Cash flow techniques.
- Economic criteria: interest rate, hurdle rate, time value of money, selection and ranking criteria.
- Risk and uncertainty: types of risk, mathematical techniques, probabilistic models, uncertainty in economic analysis.
- Tips on economic factors in computer spreadsheet analysis.
- Ethics in economic analyses.

Risk, Uncertainty, and Decision Making in Oil and Gas Projects

Course Code: 0802 **Course Level:** Foundattion

Course Description:

Risks and uncertainties are everywhere in oil and gas projects. Risk and uncertainty impact decision making when choosing projects, how to develop them, and evaluate their economic performance. Improving the quality of decisions is the main goal, not just understanding risk and uncertainty for their own sake. Although probabilistic concepts and tools are commonly used to describe projects under risk and uncertainty, the principles underlying these concepts and tools are not always well understood. Upon completion of this course, participants will become more comfortable with probabilistic thinking and how it can be used to improve decision making.

Course Contents:

▷ **Risk**

- Probability definitions, objective and subjective probabilities, calculation rules, expected value.
- Simple exploration economics.
- Decision trees.
- Value of Information (VOI).

▷ **Uncertainty**

- Deterministic versus probabilistic.
- Describing uncertainty: population, samples, histogram, PDF, CDF.
- Mean, mode, median; variance, standard deviation.
- Random and systematic errors and how to deal with them.
- Winner's curse.

▷ **Monte Carlo and applications**

- Monte Carlo approach.
- Presentation of @RISK™, a Monte Carlo add-in for Excel™.
- Computing uncertainty on STOIIP.
- Prospect evaluation.
- Modeling dependencies between risks.

▷ **Portfolio**

- Probabilistic resources aggregation.
- Efficient frontier.

Project Risk Analysis and Management

Course Code: 0803 **Course Level:** Intermediate

Course Description:

The course will focus on examining and applying qualitative and quantitative risk analysis techniques used in the best practice assessment of uncertainties in a project-based enterprise. Uncertainty is inherent in all projects and particularly in the aspects of technical, financial, schedule, legal, and quality performance. Project risk analysis is an area of expertise focused on the systematic and comprehensive analysis of the uncertainty in projects and project based operations.

Course Contents:

▷ **Introduction and processes**
- Identification and documentation of risks.
- Assess exposure.
- Develop risk responses - mitigation.
- Review documentation.

▷ **Quantitative analysis**
- Contingency.
- Quantitative risk analysis basics.
- Quantitative risk analysis using excel.
- Overview of @Risk for Excel.
- Develop quantitative risk assessments.
- Quantitative risk analysis using @Risk.

▷ **Quantitative schedule analysis**
- Review of critical path analysis.
- Development of schedule.
- Overview of @Risk for a project.
- Sensitivity analysis.
- Review forecasting, monitoring, and control.
- Case Study – P50 and P90 for estimate and schedule.

▷ **Project Strategy**

Economics of Petroleum Exploration

Course Code: 0804 **Course Level:** Intermediate

Course Description:

Participants will learn how to take hydrocarbon volumes and risks and apply a structured decision analysis process to them. The portfolio optimization process will also be discussed to help participants understand how to select exploration projects. The comparison of exploration projects under different fiscal regimes will be presented by considering discounted cash flow and net present value. The basics of decision analysis for exploration will be reviewed using sensitivities, decision trees, expected monetary value, and the value of information.

Course Contents:

▷ **The business of exploration**
- Why companies explore.
- The value chain in the E&P industry.
- Justification for exploration.

▷ **Impact of worldwide fiscal regimes on exploration**
- Overview of worldwide fiscal regimes.
- Impact of fiscal regime on exploration.
- Comparing projects under difference fiscal regimes.

▷ **Project economics**
- The role of project economics.
- Calculating cash flow.
- Economic indicators.
- Net present value.

▷ **Decision analysis**
- Sensitivity analysis.
- Decision trees.
- Expected monetary value.
- Value of Information.

▷ **Portfolio analysis**
- Portfolio analysis.
- Exploration strategies in portfolio management.
- Bringing it all together, from play ranking to EMV.

Fundamentals of International Oil and Gas Law

Course Code: 0805 **Course Level:** Advanced

Course Description:

This course is designed to give participants a basic understanding of the legal fundamentals that make their international transactions work, including the principles that apply to interpreting and enforcing their agreements, the procedures for resolving their disputes, addressing interpretational issues posed by common contract provisions, and avoiding liability under environmental and bribery laws. The course will teach participants to confidently identify potential legal problems, address them before they become serious, and facilitate the smooth interaction between oil and gas professionals, host government representatives, and their lawyers.

Course Contents:

- Law governing international petroleum transactions.
- Interpretation and enforcement of treaties and private contracts.
- Effects of international trade agreements such as the E.U., NAFTA, and OPEC.
- Dispute resolution approaches, including litigation and arbitration.
- Common arbitration provisions.
- Legal defenses available to foreign companies, states, and state-owned entities.
- Basic legal concepts of ownership of mineral rights.
- State-owned entities and privatization.
- Laws bearing on development rights.
- Legal interpretational issues of common contract provisions.
- Transfer and protection of technology and confidential business information.
- Operating agreements and unitized operations.
- Environmental protection laws.
- Criminal and civil liability for oil spills.
- Bribery laws.

International Petroleum Contracts

Course Code: 0806 **Course Level:** Advanced

Course Description:

In this course, participants will learn the philosophy, evolution, and fundamentals of international petroleum contracts and know how each of them works. Participants will take part in negotiating sessions mastering many negotiating techniques. They will use a computerized economic model to assess the value of contract terms which will enable improved planning of negotiating strategies for both sides of the negotiating table.

Concessions and production sharing agreements are two of the contract types to be evaluated. Each participant will receive a copy of the spreadsheets used in the negotiation workshop and a manual, which explains the fundamental principles of E&P contracts, presents examples of economic analysis, and includes a model contract.

Course Contents:

- Types of international petroleum contracts.
- Important principles and terms in all contracts.
- Host governments and contractors contract objectives.
- Specific features of different types of contracts.
- Outline of a typical contract for E&P.
- Contract operating issues.
- Funding petroleum development programs.
- How the contractor is paid.
- Contractor's risk.
- Contract economics.
- Non-financial issues.
- Analysis of contract provisions.
- Model contract.
- Natural gas production under international contracts.
- Negotiations workshop.
- Ethics in international petroleum operations.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