The Course Progression Matrix below shows how the Petrophysics courses in this section are structured within each topic, from Basic to Specialized. On either side of the Petrophysics section, you will see courses in associated disciplines for cross-training. These matrices are ideal for building training plans for early-career staff or finding the right course to build upon existing knowledge and experience.

Foundations of Petrophysics - FPP on page 1 and Well Log Interpretation - WLI on page 2 are essential as foundation Petrophysics courses. We are also happy to offer two newer courses, Mudlogging – MDLG on page 2 and Nuclear Magnetic Resonance Petrophysics – NMRP on page 3.

The following instructors have been selected and approved by the PetroSkills Curriculum Network:

- **Foundation Petrophysics courses**: Dr. Amr ElewA, Dr. AhmeD BadruzAmAn,
- **Advanced Petrophysics courses**: Dr. Carl SonderGeld, Dr. John Spivey, Dr. E. C. Thomas, Dr. Jack Thomas,
- **Mudlogging courses**: Mr. David Patrick Murphy, Mr. Bob Lippincott, Mr. James Garcher,
- **Nuclear Magnetic Resonance Petrophysics**: Mr. Robert E. Provencher, Mr. Steve Saad, Mr. Robert Skopac, Dr. John Sheeder.

**COURSE CONTENT**

- **Foundations of Petrophysics (FPP)**: Understand the fundamentals of petrophysics, reservoir characterization, and basic petrophysical analyses.
- **Well Log Interpretation (WLI)**: Learn to interpret well logs to understand reservoir properties.
- **Mudlogging (MDLG)**: Gain knowledge of mudlogging processes and techniques.
- **Nuclear Magnetic Resonance Petrophysics (NMRP)**: Study the principles and applications of NMR in reservoir characterization.

**YOU WILL LEARN HOW TO**

- Understand and apply basic theory and techniques in petrophysics.
- Calibrate porosity and permeability values for reservoir characterization.
- Apply basic open hole logging, borehole seismic, and LWD/MWD techniques.
- Analyze and integrate petrophysical data for reservoir quality assessments.
- Select and apply petrophysical tool combinations for specific applications.
- Assess the impact of petrophysical analyses on reservoir and engineering well data.

**DESIGNED FOR**

Geoscientists and engineers with less than twelve months’ experience using petrophysical data and other technical staff at all experience levels wanting a fundamental background in the petrophysics discipline.

**VIRTUAL DELIVERY $4325**

**PETROSKILLS.COM/FPP-BLENDED**

**2018-19 Schedule and Tuition (USD)**

- **HOUSTON, US**:
  - 1-5 OCT 2018: $4225
  - 16-22 MAR 2019: $4320
  - 26-30 NOV 2018: $4525
- **KUALA LUMPUR, MYS**:
  - 26-30 NOV 2018: $5050
- **LONDON, UK**:
  - 2-6 DEC 2018: $5050

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Well Log Interpretation – WLI

FOUNDATION 5-Day

The most universal, comprehensive, and concise descriptive documents on oil and gas wells are logs. They impact the work of almost every oilfield group from geologists to routetabous to bankers. Familiarity with the purposes and optimum applications of well logs is essential for people forgetting their careers in the oil business. The instructor uses a novel approach to help participants develop a good grounding in understanding and applying well logging techniques. General principles of physics are presented to explain the functioning of modern logging tools. Whenever possible, the physics of logging measurements is related to everyday tools and applications. Participants develop an appreciation for the constraints and limitations of operating in the borehole environment. A number of actual log examples are related to basic principles in the description of reservoir properties such as porosity, mineralogy, formation factor, saturation, and hydrocarbon type for essentially clean reservoirs. Cross-plotting and reconnaissance techniques quickly and efficiently discriminate between water, oil, and gas. Participants gain realistic experience by working in teams on a comprehensive log interpretation exercise.

DESIGNED FOR
Petrophysicists, geologists, geophysicists, engineers, technicians, or anyone interested in a solid understanding of the principles of borehole geophysics.

YOU WILL LEARN HOW TO
• Identify reservoirs
• Determine mineralogy, porosity, and saturation in various lithogies
• Recognize the importance of electrical properties of earth materials
• Highlight oil mobility
• Interpret pressure profiles
• Understand optimum tools and logging programs
• Apply quick-look methods of formation evaluation

 COURSE CONTENT
Logging objectives • Invasion profile • Challenge of borehole geophysics • Passive electrical properties of earth materials • Resistivity measuring tools, normal, induction, laterolog • Reservoir/non-reservoir discrimination • Multi-sensitivity logs, GR, SGR, Pe • Depth measurements and control • Borehole calipers • Porosity-mineralogy logs, density, neutron, sonic • Porosity determination in clean formations • Formation resistivity factor • Conductivity of shales • Porosity log crossplots and mineralogy identification • Partially saturated rock properties and Archie Equation • Linear movable oil plot • Reconnaissance techniques, Rea, FPA, logarithmic scaler • Porosity-resistivity crossplots • Permeability relationships • Nuclear magnetic resonance • Use of pressure measurements • Computerized log evaluation • Sidewall coring • Recommended logging programs

Coring and Core Analysis – CCA

FOUNDATION 5-Day

LAB VISIT
More than three-quarters of current additions to the world’s reserves come from better management of existing reserves. Core-based measurements offer the most tangible and direct means of determining critical reservoir parameters. Core analysis can play a vital role in field equity or unitization and is often considered to be the ground truth to which other measurements are compared (e.g., wireline logging). Using a multidisciplinary approach, participants are taken through the steps necessary to obtain reliable core analysis data and solve formation evaluation problems.

Throughout the course, participants are given hands-on problems and practical laboratory and field examples, which reinforce the instruction.

*Laboratory visit with core analysis measurement demos (where feasible).

DESIGNED FOR
Petrophysicists, reservoir engineers, exploration and development geologists, core and log analysts, geophysicists, drilling and completion engineers, and oil company research and development staff.

YOU WILL LEARN HOW TO
• Design coring programs and maximize core recovery
• Preserve core to minimize rock alteration
• Take and analyze sidewall cores
• Use cores to estimate porosity, permeability, and fluid saturation (basic core analysis)
• Understand special core analysis (e.g., wettability, relative permeability, capillary pressure, and reservoir fluid distribution for reservoir engineering and petrophysical evaluation)
• Prevent/spot errors in core analysis vendor reports (quality control)
• Select samples for special core studies
• Correlate core and log data

 COURSE CONTENT
Coring and core analysis objectives • Core handling, website procedures, and preservation methods • Sidewall coring and analysis • Organizing effective laboratory programs • Porosity, permeability, and fluid saturation • Unconventional Reservoir Analytical Protocol • Quality control in core analysis • Petrography and mineralogy • Special core analysis sample selection and statistical data analysis • Core-log correlation (includes nmr log calibration, acoustic, nuclear, and electrical properties) • Introduction to rock mechanics • Wettability, relative permeability, capillary pressure, and reservoir fluid distribution • Data integration in reservoir simulation • Final problem: design of coring and core analysis program

Mudlogging – MDLG

FOUNDATION 5-Day

Mud logging, also known as surface logging, is the creation of a detailed record of a borehole by examining the bits of rock or sediment brought to the surface by the circulating drilling medium (most commonly mud). Mud logging is usually performed by a third-party mud logging company. This provides well owners and producers with information about the lithology and fluid content of the borehole while drilling. Historically it is the earliest type of well log.

DESIGNED FOR
New hire geologists and geophysicists; and reservoir, petroleum, and drilling engineers.

YOU WILL LEARN HOW TO
• Make well to well correlation
• Understand mud logging equipment
• Calculate the lag time and advanced volumes calculations
• Describe the formation cuttings
• Integrate the cuttings evaluation with the drilling parameters
• Interpret all the acquired geological and engineering data at the rig site
• Evaluate the hydrocarbon potential of the formation
• Design mud drilling mud theology and hydraulics
• Handle, process and describe cuttings
• Evaluate different types of pressure
• Handle formation pressure to minimize borehole risks

 COURSE CONTENT
Introduction • Petrology geology • Rig types and their components • Drilling and completing a well • Sampling and cuttings analysis • Volume calculations • Advanced sample evaluation • Formation pressures • Borehole problems

Petrophysics of Unconventional Reservoirs – PUR

INTERMEDIATE 3-Day

Petrophysics is central to the integration of a wide spectrum of related geoscience and engineering disciplines. However, students should also be familiar with at least two or more of the following topics: horizontal well drilling, wireline logging and log analysis, coring and core analysis, petrophysics, geophysics, geochemistry, formation testing, rock mechanics, hydraulic fracturing, and petroleum economics.

DESIGNED FOR
Geoscientists involved with the evaluation and exploitation of unconventional reservoirs including tight gas sands, shale gas, and coalbed methane.

YOU WILL LEARN HOW TO
• Interpret petrophysical data gathering from unconventional reservoirs from both core and log data
• Assess TOC and maturity indicators
• Evaluate measurement provided by service companies
• Gauge gas-in-place and reserves in unconventional reservoirs
• Recognize consequences and magnitudes of shale anisotropy
• Interpret NMR and capillary pressure measurements made on shale
• Interpret microstructural imaging of shale

 COURSE CONTENT
Overview of unconventional reservoirs • Geochemistry of unconventional rocks • Special coring and core analysis techniques for unconventional • Wireline logging of unconventional reservoirs • Assessment of formation organic content (TOC) and maturity • Gas-in-place and reserve and flow potential estimates • Geomechanics and fracturing

2018-19 Schedule and Tuition (USD)

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2018-19 Schedule and Tuition (USD)

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|-------------|---------------|
| LONDON, UK  | 9-13 SEP 2019 | $4325 |
| LONDON, US  | 30 SEP-4 OCT 2019 | $4325 |

2018-19 Schedule and Tuition (USD)

| HOUSTON, US | 7-11 JUL 2019 | $4415 |
|-------------|---------------|
| LONDON, UK  | 9-13 SEP 2019 | $4325 |
| LONDON, US  | 30 SEP-4 OCT 2019 | $4325 |
Capillarity in Rocks
– CIR

INTERMEDIATE 3-Day

The course provides detailed knowledge of how capillarity affects hydrocarbon distribution in a reservoir rock, and how the magnitude of capillary forces can be used to deduce valuable information about rock properties including pore throat sizes, pore network geometry, porosity, and permeability.

DESIGNED FOR Geoscientists, petrophysicists, reservoir engineers, and research and development staff who want to gain fundamental insight into the capillary properties and hydrocarbon distribution in reservoir rocks.

YOU WILL LEARN HOW TO
• Identify clay-rich and carbonate rock types based on petrophysical properties
• Determine key reservoir rock parameters needed for a more accurate reservoir evaluation
• Use cuttings, sidewall cores, and cores to determine reservoir parameters
• Design an integrated interpretation
• Calculate Vclay
• Calculate porosity using porosity logs in complex lithologies
• Determine what percentage of porosity contributes to production
• Calculate Sw using different methods
• Determine pay and pay classes
• Tie rock and well log information to production performance

INTRODUCTION TO NMR

OBJECTIVES OF INTEGRATION
• Key rock properties for formation evaluation and production
• Petrophysical rock type
• Texture, porosity, and permeability
• Clay impact
• Summary of basic logging tools
• Subsurface rock sampling
• Use of subsurface pressure data and evaluation
• Relative permeability
• Capillary pressure application to pay determination
• Basic methodology for an integrated interpretation
• Rock typing
• Catalog approach
• Clastic and carbonate rock types
• Important reservoir rock parameters
• Cementation and saturations
• Saturated porosities

INTERMEDIATE 5-Day

This course provides the background necessary to address the more complex reservoir evaluation and productivity challenges within exploration, field appraisal, and field development. The key fundamentals of rock properties, logging tools, and engineering data required to solve these problems are reviewed. The concepts are illustrated with a series of real-world examples that become increasingly complex as knowledge is gained in the class. Emphasis is placed on solving problems in a workshop format.

DESIGNED FOR
Petrophysicists, petroleum reservoir engineers, geologists, and geophysicists who have a basic understanding of petrophysics, geology, and engineering and need a more advanced understanding of how to integrate the different data sets together to more completely understand reservoir performance. It is recommended that participants have a basic knowledge of logging fundamentals. The basics of logging will be reviewed in the class.

YOU WILL LEARN HOW TO
• Create a synthetic capillary pressure curve and estimate the air permeability from a petrophysical analysis
• Obtain values for interphase tension
• Convert mercury capillary pressure curves to hydrocarbon/water capillary pressure curves
• Determine saturation-height distribution in a single-pore system rock or in a multi-pore system rock
• Determine irreducible water saturation
• Estimate the length of a transition zone
• Determine clay-bound water using Klein-Hill-Shirley method
• Compare/contrast capillary pressure data with NMR data
• Determine the maximum column of hydrocarbon that a specific sealing layer can sustain without leaking

COURSE CONTENT
Capillary pressure applications in reservoir characterization
• Rock properties from mercury/air capillary pressure data
• Capillary pressure data representation
• Capillary forces in reservoir rocks; their measurement
• Capillary pressure data fitting methods
• Representing a large number of capillary curves (averaging)
• Permeability from capillary pressure curves and petrophysics
• Saturation-height functions
• Surface phenomena, capillarity, wettability, and interphase tension
• The competition between capillary and gravity forces
• Relationships between initial and residual saturations
• Interpretation of single and multiple pore system rocks
• Clay-bound water
• Capillary pressure vs. NMR: Seal capacity

Nuclear Magnetic Resonance (NMR)
Petrophysics
– NMRP

INTERMEDIATE 4-Day

NMR today is a must-have technology for many companies because of the value-added to formation-evaluation. Some of the applications include: Matrix-independent, ‘sourceless’ porosity, low-resistivity/low-conductivity, fresh-water reservoirs, and carbonates. NMR completes the formation-evaluation story for many companies now using the technology regularly because it either validates conventional log and test data or it independently provides an answer unavailable from other sources. Certainly, in many instances, the absence NMR data too frequently leaves the formation-evaluation story incomplete and uncertain. This four-day, PetroSkills NMR Petrophysics course will provide geoscientists and engineers with a basic to intermediate skill-level for using NMR data in reservoir characterization workflows. Course design is a balance between information transfer, discussion, training, and practical exercise. The expectation is that participants will return to their jobs with the skill-set shown below.

DESIGNED FOR
Geoscientists and engineers interested in learning how NMR technology fits within the reservoir characterization/reservoir modelling workflow and how to use the data to best advantage.

YOU WILL LEARN HOW TO
• Understand how NMR works for petrophysical applications
• Understand the language of NMR technology (mimenonics)
• Use NMR data for core and log applications
• Understand how NMR fits into predictive rock type classification
• Plan core and log acquisition programs
• Identify data quality indicators and what they mean
• Use core data for log calibration
• Use conductor delineable to produce an interpretation
• Fit NMR data with conventional log data
• Process raw data

COURSE CONTENT
Basics of NMR technology
• NMR Core Analysis
• Rock typing from NMR core data and its relationship to logs
• Pore geometry and what it means for the interpretation of NMR data
• NMR logs
• Job planning
• Log quality control
• Working with NMR data (various exercises throughout the course)

Shaly Sand Petrophysics
– APS

INTERMEDIATE 5-Day

This course tackles the important and nontrivial problem of practical formation evaluation in shaly sand provinces. The presence of clay minerals and shale laminations strongly affects the physical properties of the reservoir rock and induce significant effects on the response of most logging tools; these perturbations often result in low resistivity/low contrast pay zones that can be significant hydrocarbon producers but are often overlooked. A properly designed analytical program (cores and logs) for the evaluation of shaly sands can add significant reserves in existing fields and can allow for the rapid identification of potential by-passed pay zones in exploration wells. The course is practical and participants are given laboratory and field problems to emphasize the instruction. At the end of the course, the participants will be able to identify and evaluate pay intervals in shaly sands.

DESIGNED FOR
Petrophysicists, geologists, geophysicists, engineers, and explorationists involved in all phases of reservoir evaluation in shaly sand provinces.

YOU WILL LEARN HOW TO
• Determine the nature, volume, and distribution of clay minerals and shales in shaly sands and their impact on the analyses of cores and logs
• Integrate petrophysical, core, and log data to significantly improve reservoir evaluation in shaly sands and other rock types containing significant amounts of microporosity
• Bring order out of chaos on porosity-permeability cross-plots using rock typing
• Evaluate effective and total porosity, fluid saturations, and producibility of shaly sands using time-tested specific methods
• Evaluate the strengths and weaknesses of advanced logging tools for characterization of shaly sands

COURSE CONTENT
Review of log interpretation techniques in clean formations
• Core analyses and applications of specific core tests
• Petrophysical analysis (thin section, X-ray diffraction SEM/EDS) for shaly sand evaluation
• The nature of clay minerals and shale laminations and how they are distributed in shaly sands
• Influence of clay minerals and shale laminations on petrophysical properties
• Occurrence of clay minerals and shale laminations in reservoir rocks and relation to depositional environment and diagenesis
• Integration of petrophysical, core, and log data for evaluation of shaly sands
• Effects of clay minerals and shale laminations on log responses in shaly sands; various methods of shale content evaluation
• Models for porosity and saturation determination: total and effective porosity; and Archie, Waxman-Smits, Dual Water and Juhras saturation methods
• Prediction of permeability and productivity from logs in shaly sands: identification of bypassed pay
• Use of advanced logs (NMR, BHI, Dipmeters) integration with core data for purposes of evaluation

2018-2019 Schedule and Tuition (USD)

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**INTERMEDIATE 5-Day FIELD TRIP**

Dippers are micro-resistivity logs that detect the orientations of bed boundaries and borehole elongations. Borehole-imaging logs provide video, density, gamma-ray, acoustic, and/or electrical images of the borehole face. Dippers and borehole images can be run in water-based or oil-based mud; on wireline or LWD. They are used structurally to detect, orient, and quantify natural and induced fractures, faults, fold axes, unconformities, and in situ stress. Stratiographically, dippers and borehole images are used to identify paleocurrent directions, bounding surfaces, facies, thin beds, net-sand, and secondary porosity. The key objective of dipmeter and borehole-imaging interpretation is to describe structural and stratigraphic features encountered by a wellbore, commonly in the absence of core. This course provides numerous hands-on exercises and case studies that emphasize sedimentologic, stratigraphic, and structural applications of these widely run, but generally understudied logging tools.

**DESIGNED FOR**
- Petrophysicists, geologists, geophysicists, and team members involved in reservoir characterization.

**YOU WILL LEARN HOW TO**
- Interpret dippers and borehole-imaging logs and understand the physical principles behind them
- Detect and quantify faults and fracturing, determine in situ stress orientations, improve horizontal well placement, provide input into flow simulations
- Determine paleocurrent orientations, define stratigraphic compartments, quantify wavy porosity, detect thin beds, analyze depositional characteristics, interpret image facies
- Apply image data in reservoir characterization

**COURSE CONTENT**
Applications and types of dippers and borehole images • Data acquisition and processing • Quality control and artifacts • Generalization and use of stereonets and rose diagrams • Quantitative analysis using cumulative dip plots, vector plots, and SCAT plots • In situ stress from borehole breakout and drilling induced fractures • Horizontal wells • Identification and classification of fractures, faults, sub-seismic scale faults, micro-faults, and unconformities • Fracture spacing and wellbore bias correction • Thin bed analysis and net-sand counts • Carbonate porosity and facies interpretation • Sedimentology from borehole images: burrows, cross beds, scoured surfaces, slumps • Determination of paleocurrent directions • Interpretation of borehole images in various depositional settings • Application of image data in geocellular modeling and reservoir characterization • Integration of image data with core, mapping, seismic, petrophysical, and production data

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**Applied Rock Mechanics — ARM**

**SPECIALIZED 3-Day**

Understanding the stress, strain, and failure mechanics of rocks and their response to earth stresses can lead to enormous economic benefits in all phases of petroleum reservoir development. Over the last ten years, rock mechanics has emerged as a critical technology capable of lowering financial risk in drilling and well completions, qualifying exploration and development opportunities, and improving hydrocarbon productivity. Rock mechanics is a vital decision-making tool for high-angle and horizontal drilling, unconventional reservoirs, deepwater drilling, massive hydraulic fracturing, and completing poorly cemented formations. Borehole instability, casing shear, subsidence, stuck pipe, and sand control issues cost the petroleum industry many billions of dollars annually. New theory and experimental methods as well as straightforward computer modeling techniques have provided insight into developing prospects in complex geological basins and harsh drilling environments. In Applied Rock Mechanics, students are provided with basic theory, laboratory demonstrations, hands-on exercises, and computer modeling demonstrations. In addition to a comprehensive manual, software is provided for the student to perform wellbore stability calculations. The practical application of rock mechanics is emphasized. Applied Rock Mechanics is designed to familiarize engineers and geoscientists with the necessary tools for immediate field application.

**DESIGNED FOR**
- Petrophysicists, drilling engineers, completion engineers, exploration and development geologists, reservoir engineers, core and log analysts, geophysicists, and oil company research and development staff.

**YOU WILL LEARN HOW TO**
- Determine the stress, strain, and failure mechanics of rocks
- Apply rock mechanics concepts and generate economic benefits in all phases of reservoir development

**COURSE CONTENT**
Introduction to rock mechanics and geomechanical principles • Basic mechanics • Rock mechanical properties • Pressure, stresses, and loads • Geomechanics and structural geology • Wellbore and field measurement of in-situ (earth) stresses • Overview of common rock mechanics tests (lab demonstrations) • Stress orientation techniques • Elastic properties and viscoelastic models of rock behavior • Borehole stability • Sand control • Fracture mechanics • Unconventional reservoir applications • Reservoir engineering applications • Wireline log predicted mechanical properties • Data integration

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**Cased Hole Formation Evaluation — CH**

**SPECIALIZED 4-Day**

This course teaches skills necessary to practice the art and science in accurately determining remaining hydrocarbons using modern dual-detector and emerging multi-detector pulsed neutron (PN) tools. The latter can compute multiple petrophysical parameters simultaneously and delineate gas better, especially in low porosity, but add to data and interpretation complexity. The course discusses measurement-to-interpretation techniques used by various players and thus offers an insight into their effectiveness in conditions of increasing wellbore and formation complexities. The user will gain a better understanding of why tools from different service companies, often recording similar raw data in near-identical conditions, may differ significantly in their predictions. The course will help users of the technology make targeted tool choices, plan logging jobs, and perform in-house interpretation if needed.

**DESIGNED FOR**
- Geologists, formation evaluations specialists, completion engineers, and production engineers, and managers who may be making technology- and tool-choice decisions.

**YOU WILL LEARN HOW TO**
- Determine adequacy of PNC capture vs. C/O logging methods for saturation calculation, especially through complicated well bores and in complex formations
- Calculate water and steam saturations from Pulsed Neutron Capture (PNC) Logs
- Correct petrophysical calculations for the influence of salinity
- Distinguish gas/steam from liquids
- Compute oil saturation directly from Carbon/Oxygen technique
- Locate water entry and judge zonal communication
- Judge where specialty methods, such as Log-Inject Log, to estimate remaining oil vs. residual oil saturation, pseudo-density, etc., may not work
- Perform appropriate tool choices
- Perform interpretation QC and plan logging jobs

**COURSE CONTENT**
Basics and application of nuclear logging in general (briefly) and cased-hole logging in particular • Attributes of various modern dual-detector and emerging multi-detector cased-hole logging tools used in the industry • Cased-hole application of pulsed neutron capture (PNC) methods in clean and shaly formations, carbon/oxygen logging in low or variable salinity conditions in water and steam floods where PNC methods do not work, and direct neutron (FNM) methods to Locate oil, water/gas/liquid, or steam/liquid contacts • Compute water, oil and gas/steam saturation (in steam floods), and residual saturation using log-inject-log methods • Application of above in open-hole completions • Differences in saturation interpretation methods across vendors • Oxygen activation to locate water entry • Job planning and best practice parameters for successful monitoring

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**Wireline Formation Testing and Interpretation — WFT**

**SPECIALIZED 5-Day**

Formation testing and sampling tools (FTs) with wireline and while-drilling are widely used in exploration/appraisal and reservoir development projects. Over the past two decades, modern tools, such as MDT, RCT, RTT, and FRT, have emerged to become one of the critical formation evaluation means in drilling projects with high cost/risk and high reward environments. In recent years, FT tools while-drilling provide alternative formations testing at earlier timing, flexible operational sequences in complicated wellbores access to reservoirs. FT pressure data and fluid samples are acquired for predicting hydrocarbon resource sizes and accessing key development uncertainties. This course is designed to satisfy the interdisciplinary needs of geoscientists, petrophysicists, and reservoir engineers with an increasing use of FT data. Practical and hands-on exercises are worked in the class.

**DESIGNED FOR**
- Geoscientists, petrophysicists, wellsite supervisors, reservoir engineers, and geodata technologists for multiphase formation evaluation and development teams engaging in explorations, appraisals, and field development activities.

**YOU WILL LEARN HOW TO**
- Apply formation testing and sampling: technologies, applications, and limitations
- Understand how FTs work; configure tool strings and design/plan a test program
- Perform GAVQC pressures and sampling data in real-time
- Interpret pressure gradient data for fluid densities and contact levels
- Understand reservoir connectivity/continuity and compartmentalization
- Quantify uncertainties of data interpretation results
- Interpret graphical techniques (scatterplot, excess pressures, normalization)
- Design and interpret Mini-DST and VIT data

**COURSE CONTENT**
Why formation testing and sampling • How FT tools work; measurement principles; test types; drawdown mobility; data quality GAVQC • Pressure fluid gradient and contact level interpretation principles • Graphical pressure interpretation techniques: scatter plot for gradient, FLM, and compositional gradient; excess pressure plot for compartmentalization; normalization plot for depleted reservoir • Multiple well pressure trends for reservoir compartmentalization; continuity, and extent • Qualification and quantification of interpretation uncertainty • Mud filtration phenomena • Stress history of reservoir • Regime-crossing and fluid contamination control; sampling principles and fluid sample GAVQC procedures; in-situ fluid PVT analysis • Permeability test; mini-DST and VIT; practical aspects of well productivity and deliverability potential estimates

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**Petrophysics and Wellbore Imaging Logs**

- **2018-19 Schedule and Tuition (USD)**

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† includes field trip
Basic Petroleum Technology – BPT

This course provides the participant with an understanding of basic petroleum technology in the context of the Petroleum Value Chain and Asset Management, from exploration to abandonment. The participant will understand how and when geoscience and engineering professionals use technology to find, then determine and optimize the economic value of an oil and gas field. This enables the participant to maximize their professional and administrative contribution in their organization. Participation first learns the relationship between depositional environments and geological settings. This learning is achieved through guided discussions, videos, animations, and progressive team exercises utilizing ‘Our Reservoir’ and ‘Our Well’ as working models.

YOU WILL LEARN
• The importance of data management principles and concepts
• The role of data in exploration and production
• Data management issues: causes of data issues, and the impact on the business
• The important components of a data management framework
• Why to map issues onto a data management framework

YOU WILL LEARN
• Historical petroleum occurrences and usage
• The objectives and processes of the exploration phase of the E&P asset life cycle
• The objectives, processes, and economic metrics of the appraisal phase of the E&P asset life cycle
• Basic reserves and production value concepts
• The Earth’s structure, continental drift, and plate tectonics role in oil and gas exploration
• Rock types and classification in an oil and gas context
• The relationship between depositional environments and geological settings
• Exploration concepts
• Elements of a successful petroleum system
• Key differences between conventional and unconventional petroleum systems
• Features of structural contour and isopach maps
• The basic reservoir rock properties and the significance of core samples
• The roles involved in exploration
• Rig type classification and selection for onshore and offshore drilling
• and more...

COURSE CONTENT
E&P industry and asset life cycle • Petroleum geology • Hydrocarbon reservoirs • Rock and fluid properties • Surface/subsurface exploration • Drilling operations and well completions • Production operations

Basic Petroleum Technology – BPT

BASIC
5-Day

This course provides the participant with an understanding of basic petroleum technology in the context of the Petroleum Value Chain and Asset Management, from exploration to abandonment. Unconventional shale (tight oil and gas) and conventional oil and gas are covered. The participant will understand how and when geoscience and engineering professionals use technology to find, then determine and optimize the economic value of an oil and gas field. This enables the participant to maximize their professional and administrative contribution in their organization. Participation first learns the relationship between depositional environments and geological settings. This learning is achieved through guided discussions, videos, animations, and progressive team exercises utilizing ‘Our Reservoir’ and ‘Our Well’ as working models.

YOU WILL LEARN
• The E&P Process and how it differs in conventional vs unconventional plays, the role of each technical department and specialist, and the technologies used
• The economic value and properties of reservoir fluids
• Petroleum geology for exploration and production
• About oil and gas reservoirs, both conventional and unconventional, and understand the key differences
• Exploration and appraisal technologies
• Drilling operations for exploration, development and production
• Production – well completions and production technology
• Reservoir recovery mechanisms through primary, secondary, and tertiary recovery
• Surface processing of produced fluids

COURSE CONTENT
World hydrocarbon production and consumption review including reserves, benchmarks, and the impact of shale resources • Reservoir fluid properties • Petroleum geology • The petroleum reservoir, conventional and unconventional • Exploration technologies for conventional and unconventional reservoirs including initial reserve estimation and consequent field development • Drilling and operations • Well completions and workers • Production operations • Reservoir recovery mechanisms • Surface processing

BDC is also available as a self-paced, virtual course which is an enhanced version of the face-to-face public session.

Introduction to Data Management – IDM

BASIC
2-Day

This course provides an overview of data management in E&P, focusing on the subsurface domain. The need to deliver good data management is increasingly being seen as providing competitive advantage across the E&P industry, since wise business decisions depend on sound data and information. Participants will leave this course with an understanding of the core E&P data types, their use in the business, and data management issues and challenges facing companies. You will have the knowledge and tools necessary to participate in developing a structured data management framework, which will deal with these issues in a practical and effective manner to ensure business efficiency and value is realized. This course provides an understanding of essential E&P data management principles and concepts using an interactive classroom format; participants will have the opportunity to learn from presentations, exercises, and interactive discussions. Course instructors are experienced data management practitioners, who have delivered services and projects to many E&P companies, from small independents to super majors.

YOU WILL LEARN
• What is data management, why it is important, and the challenges and impact on the business
• What core data types in the E&P industry and its potential value
• How to map issues onto a data management framework

COURSE CONTENT
Data types: definitions • Common data management issues: causes of data issues, data management best practices, business impact • Overview of data management: definition, data lifecycle, importance and value of data management, benefits of good data management, business case aspects and barriers • Data management framework: governance, architecture, security, reference and master data management, data quality management

FOR MORE INFORMATION, VISIT PETROSKILLS.COM/VIRTUAL-BDC

See website for dates and locations.
Basic Petroleum Geology – BG

BASIC 5-Day

What is Basic Petroleum Geology? For all practical purposes it closely resembles the freshman level course that a non-science major at a university would take to satisfy the science requirement. Presentation is oriented toward topics of interest to the petroleum industry. While high school chemistry and physics might help in understanding a very few selected topics, the course is designed for those with no technical training (and those who studiously avoided science in school). Primary objectives of the course are to broaden your geological vocabulary, explain selected geological principles and processes, and describe how certain petroleum reservoirs and source rocks are formed.

DESIGNED FOR

Petroleum industry personnel in need of basic geological training, including engineering, geophysical, technical support, and administrative personnel.

YOU WILL LEARN

• About plate tectonics and petroleum
• About geological time and history
• The fundamentals of rock formation and deformation
• The essentials of various depositional environments and the reservoirs created by them
• The distribution of porosity and permeability in reservoirs produced in different depositional environments
• How rock characteristics are related to modern geological processes and applied to the ancient record
• About petroleum reservoir and source rocks
• Of petroleum origin, migration, and trapping of petroleum
• Recent developments in seismic acquisition, processing, and interpretation
• Time lapse reservoir monitoring (4D seismic surveys)
• Seismic attributes
• Seismic inversion for rock and fluid properties
• Prestack, poststack, time and depth imaging
• Seismic data processing and seismic migration
• Pore pressure prediction
• Seismic velocities as they relate to rock properties and the imaging process
• The wavelet in the seismic data and its limit of resolution
• What causes seismic reflections and how they relate to rock properties including pore filling material
• The nature of seismic data
• What is wave propagation
• Elements of geophysics and exploration
• How geology bears directly on engineering practices

COURSE CONTENT

Minerals and rocks • Plate tectonics • Geological time • Weathering and erosion • Deposition • Diagenesis • Reservoirs • Structural geology and petroleum • Origin, migration, and trapping of petroleum

Basic Geophysics – BGP

BASIC 5-Day

This course is designed to familiarize anyone using seismic data with the nature of the data and what they specifically represent. One of the key goals of the course is to explain the large and confusing amount of jargon that is used by the geophysical community when they use seismic data. The course is supplemented by a large number of case histories that concretely illustrate the principles in the course material. These are updated with every course presentation to keep up with the rapidly developing technology in this field. Each section of the course is supported with a classroom exercise. The course participants are given a thumb drive that contains the case histories, class exercises, and all of the extensive PowerPoint animations used in the classroom.

DESIGNED FOR

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

YOU WILL LEARN

• How seismic data represent subsurface rock parameters including the relative structure, lithology, and pore filling material
• How land and marine seismic data are acquired and processed to produce both two- and three-dimensional seismic images
• The limits of vertical and horizontal resolution inherent in the seismic data
• How seismic data are used to measure reservoir parameters and how data guide reservoir development; this includes a detailed discussion of AVO and other seismic attributes
• The various approaches to seismic imaging and how the velocity model relates to this image
• How new technologies including seismic inversion have helped us define rock properties including pore filling material, pore pressure, water saturation, and fracture orientation
• How to value developments such as time lapse seismic surveys for reservoir monitoring purposes

COURSE CONTENT

• The nature of seismic data
• The wavelet in the seismic data and its limit of resolution
• Seismic velocities as they relate to rock properties and the imaging process
• Pore pressure prediction
• Seismic data processing and seismic migration
• Prestack, poststack, time and depth imaging
• Direct hydrocarbon indicators and AVO
• Seismic inversion for rock and fluid properties
• Seismic attributes
• Time lapse reservoir monitoring (4D seismic surveys)
• Recent developments in seismic acquisition, processing, and interpretation

BGP is also available as a virtual course which is an enhanced version of the face-to-face public session.

23 APR - 19 JUN 2019 $4325
18 JUN - 14 AUG 2019 $4325
10 SEP - 6 NOV 2019 $4325

PETROSKILLS.COM/BLENDED-BGP

2018-19 Schedule and Tuition (USD)

Bakersfield, US
10-14 JUN 2019 $4170
18-22 NOV 2019 $4225

Denver, US
11-15 MAR 2019 $4220
29 APR-3 MAY 2019 $4225

Houston, US
26-30 NOV 2018 $4140
29 APR-3 MAY 2019 $4225
29-30 JUN-2 JUL 2019 $4225
18-22 NOV 2019 $4225

London, UK
17-21 SEP 2018 $4790+VAT
12-16 OCT 2019 $5045+VAT

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Carbonate Reservoirs
- PCR

FOUNDATION 5-Day
This rigorous workshop is a must for geoscientists dealing with exploration for and exploitation of carbonate reservoirs. The seminar emphasizes the complexity of carbonate porosity, its modification and evolution will be discussed in a sea-level driven sequence stratigraphic framework. Case histories and exercises from around the world will be utilized throughout to illustrate important concepts. These exercises and case histories give the participant experience in developing viable exploration and exploitation strategies for carbonate terrains.

In 2013 a new book, Carbonate Reservoirs, was prepared by Drs. Moore and Wade specifically to accompany this course and is furnished to all course participants.

DESIRED FOR
Exploration and development geologists, exploration and development managers, and geophysicists as well as engineers with some geologic background will benefit.

YOU WILL LEARN HOW TO
• Recognize basic characteristics of carbonates important to reservoir development
• Understand how sequence stratigraphy can be applied to carbonates and mixed carbonate-siliciclastic systems
• Understand the complexities of carbonate pore systems
• Recognize the nature of carbonate porosity modification during diagenesis and the role of sea-level and climate in porosity modification and gross reservoir heterogeneity
• Develop viable exploration and exploitation strategies in carbonate terrains by working with subsurface datasets

COURSE CONTENT
Basic nature of carbonates • Carbonate facies models • Basic concepts of sequence stratigraphy • Relationship of stratigraphic patterns to changes in subsidence rates • Sequence stratigraphic models including the ramp, the rimmed shelf, the escarpment margin, the isolated platform, and the mixed carbonate-siliciclastic shelf • Characteristics of carbonate pore systems • Diagenesis, porosity evolution, and porosity distribution at the time of burial • The fate of early-formed porosity during burial • The potential value of dolomitization, burial • The fate of early-formed porosity during evolution, and porosity distribution at the time of carbonate pore systems • Diagenesis, porosity margin, the isolated platform, and the mixed carbonate-siliciclastic patterns to changes in subsidence rates • Stratigraphy • Relationship of stratigraphic patterns to changes in subsidence rates • Sequence stratigraphic models including the ramp, the rimmed shelf, the escarpment margin, the isolated platform, and the mixed carbonate-siliciclastic shelf • Characteristics of carbonate pore systems • Diagenesis, porosity evolution, and porosity distribution at the time of burial • The fate of early-formed porosity during burial • The potential value of dolomitization, burial • The fate of early-formed porosity during evolution, and porosity distribution at the time of carbonate pore systems • Diagenesis, porosity margin, the isolated platform, and the mixed carbonate-siliciclastic

Sandstone Reservoirs
- SR

FOUNDATION 5-Day
This course is essential for geoscientists and engineers involved in the exploration and development of clastic reservoirs. It focuses on methods that can be used to improve the production of reservoir size, shape, trend, and quality through detailed analysis of depositional environments. The sedimentary characteristics of each of the principal clastic depositional systems are presented in detail, using examples from recent environments, outcrops, cores, wireline logs, and test production data from oil and gas fields in various parts of the world (United States, North Sea/Atlantic, Africa, Middle East, Far East, etc.). Practical exercises are taken from each of the principal depositional settings and involve detailed mapping, interpretation of core and log characteristics, and integration of data from FMI logs. Emphasis is placed on the application of fundamental sedimentary principles (modern, ancient, and subsurface) to actual subsurface data so that the participants can immediately use the information in their exploration and development activities.

DESIRED FOR
Geologists, geophysicists, petrophysicists, reservoir and production engineers, exploration-production managers, all team members involved in reservoir characterization, and technicians working with clastic reservoirs. The course provides a refresher in new concepts in this field for geoscientists at a foundation level.

YOU WILL LEARN HOW TO
• Interpret clastic depositional environments using data from cores, cuttings and wireline logs (including FMI)
• Apply new sequence stratigraphic concepts to clastic reservoirs
• Correlate wells using knowledge of depositional environment
• Predict reservoir size, shape, trend and quality

COURSE CONTENT
Genetic stratigraphic analysis • Depositional architecture • Basins and units • Wireline logs and conventional cores • Seismic and sequence stratigraphy • Recognition of depositional systems • Process-response facies models • Integrated genetic stratigraphy • Analysis of clastic depositional systems • Alluvial fan • Fluvial • Eolian • Deltaic • Shoreline • Shelf • Deepwater systems • Incised sequences • Shelf margins and linked downslope systems • Characteristic log patterns • Flow units • Recognition of reservoir size, shape, trend, quality • How to select optimum well locations • Lateral continuity and quality of seals • Sedimentary controls on porosity, permeability, saturation • Reservoir exploration and production case histories • Exploration and production scaled case histories

Operations Geology
- OG

INTERMEDIATE 5-Day
At the end of this integrated course, participants will be able to contribute effectively to the preparation of planned wells and their concurrent operations during the exploration, appraisal, and development phases. As geoscientists, petroleum engineers, well engineers, and production technologists are increasingly assembled in asset, project, or operational teams they must not only understand each other in technical matters, but should also contribute to each other’s efforts in these aspects: a driller should know why it is important to cut a core or log a particular interval despite potential drilling problems, and geoscientists should understand drilling operations and their inherent hazards and problems. All should be able to understand and prepare daily drilling reports with a full appreciation of the various subjects. Cuttings, cores, logs, and well tests should be analyzed, cross-correlated, and compiled to mesh with prognoses and existing data to effectively manage the impact on the field development plan. Correct procedures in tendering and contracting should be followed to minimize the duration of the operations and to maximize the quality of the operations services provided. Understanding of all operations should greatly improve the effectiveness of the Operations Geologist. Note: A basic knowledge of geology and/or petroleum geology is advisable if not required to fully appreciate the course contents.

DESIRED FOR
All geoscientists, petroleum engineers, well engineers, and technical personnel, who in the course of their career wish to address and build subsurface operations.

YOU WILL LEARN HOW TO
• Plan and prepare for a drilling location and for geological services
• Identify drilling operations and geological drilling hazards
• Understand and apply logging services
• Understand well testing services
• Evaluate drilling reports
• Describe cutting cuttings and cores
• Evaluate the impact on the field development plan
• Prepare and compile operations reports

COURSE CONTENT
Petroleum geology and its systems • Operations geology: prospect to well planning, provision of services to geological wells • Geophysical sampling, sample analysis, and well stratigraphy, cutting, and core description • Structural geology: fractures, faults, borehole geology • Drilling Operations: bits, fluids, casing and cement, drilling problems and well control, directional drilling, geosteering • Logging operations: acquisition, tools, quick look interpretation, MWD/LWD, geosteering • Well testing and fluid: reservoir properties, rock and fluid interaction, permeability, average, data gathering and interpretation • Impact on FDP: case histories • Tendering and contracting • Reporting: geological data, petrophysical data, pressure data • Exercises: cores, cuttings, quick look, pressures, daily drilling report

Production Logging
- RMP

INTERMEDIATE 5-Day
Production logging refers to acquiring a suite of logging measurements in a completed well that is either on injection or production to evaluate the flow performance of the well or the reservoir. Special purpose production logging instruments can evaluate the well completion or look behind the pipe to evaluate the formation and its fluids in the near-wellbore vicinity. Production logs are playing an increasing role in modern reservoir management by providing the only means of directly identifying downhole fluid movement. This course will cover single-phase and multi-phase fluid flow in pipes, the theoretical bases of production logging techniques, production log interpretation, and operational considerations in acquiring production logs. Numerous field examples are used to illustrate the principles of production log interpretation.

DESIRED FOR
Petroleum and drilling engineers and managers, reservoir engineers, subsurface engineers, production engineers/technologists, petrophysicists, log analysts, and anyone interested in understanding production logs and cased-hole surveys.

YOU WILL LEARN HOW TO
• Measure zonal inflows in producing wells using temperature measurements
• Measure multi-phase flow using temperature, spinner (flowmeter), and fluid holdup measurements
• Define injection profiles using temperature, radioactive tracer, and spinner (flowmeter) measurements
• Identify flow behind pipe with temperature, radioactive tracer or noise logs
• Interpret cement bond logs and ultrasonic logs to determine cement quality
• Measure flow inside and outside casing with pulsed neutron tools
• Apply specialty tools (array holdup and spinners and pulsed neutron tools) for flow profiling in high angle/horizontal wells
• Confirm the location of some types of completion components using pulsed neutron measurements
• Design a logging program using the appropriate production logging services for well diagnosis and reservoir surveillance

COURSE CONTENT
Wellbore environment and tool deployment considerations • Depth control issues and natural gamma ray logging • Cement bond logs • Ultrasonic imaging logs • Conventional temperature logs • Conventional spinner (flowmeter) logs • Conventional fluid holdup logs (gamma density, capacitance, differential-pressure) • Radioactive tracer logs • Noise logs • Temperature from fiber optic cables • Pulsed neutron capture logs (including oxygen activation and nonradioactive tracers) • Pulsed neutron spectroscopy logs • Array mini-spinner logs • Array fluid holdup logs (optical, capacitance, and resistance) • Multiphase flow and slip velocity • and more...

2018-19 Schedule and Tuition (USD)

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2018-19 Schedule and Tuition (USD)

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Basic Reservoir Engineering – BR

BASIC 5-Day

This course is designed to help the participants develop a more complete understanding of the characteristics of oil and gas reservoirs, from fluid and rock characteristics through reservoir definition, characterization, classification, development, and production. Data collection, integration, and application directed toward maximizing recovery and Net Present Value are stressed. Basic reservoir engineering equations are introduced with emphasis directed to parameter significance and an understanding of the results.

DESIGNED FOR
Geologists, geophysicists, engineers, engineering trainees, technical managers, technical assistants, technicians, chemists, physicists, technical supervisors, service company representatives, data processing personnel, and support staff working with reservoir engineers and wanting to understand the process of reservoir definition, development, and production, or engineers newly placed in a reservoir engineering position that want a first reservoir engineering course at the Basic level.

YOU WILL LEARN

• How to collect and analyze the data needed for reservoir engineering tasks
• Fundamentals of fluid flow in porous media
• How reservoirs are characterized by fluid type and drive mechanisms
• The basis for reservoir fluid distribution
• About oil and gas well performance and pressure buildup analysis
• About oil displacement and optimizing reservoir performance
• The basics of enhanced oil recovery
• How oil and gas in place can be estimated and recovery predicted

Reservoir Engineering for Other Disciplines – REO

FOUNDAION 5-Day

This course gives the non-reservoir engineer a better understanding of reservoir engineering practices and limitations. The course is designed to provide a good understanding of reservoir engineering processes, the required data, and the limitations on the engineers’ analysis and interpretations. The course also provides persons who are already well trained in the other upstream petroleum industry technical disciplines with an understanding of the current state-of-the-art practice of reservoir engineering.

DESIGNED FOR
Engineers and geoscientists now working in an asset environment where they need to better understand the practices and limitations of the methods and procedures employed by the reservoir engineers with whom they work. Participants should have three or more years of technical experience in the upstream petroleum industry.

YOU WILL LEARN TO

• Utilize the tools and techniques of the reservoir engineer
• Apply the principles of reservoir engineering
• Develop reservoir, well performance and asset management options

Reservoir Characterization: A Multi-Disciplinary Team Approach – RC

INTERMEDIATE 5-Day

The modern team approach to Reservoir Characterization describes productive zones more reliably through the integration of disciplines, technology, and data. Increase your proven reserves, discover by-passed pay, reduce development time and costs, improve production rates, and rejuvenate old fields through the skills learned in this course.

The course is process-based and focuses upon understanding the applicability of measurements and interpretations from the participant’s discipline to other adjacent disciplines, understanding information from other disciplines, and the uncertainties and risks involved in its gathering/interpretation, awareness of the latest technologies and working principles evolving on the cutting edge of the industry, managing a complex project to solve business problems in the most efficient manner, particularly when working in a difficult environment (multi-disciplinary teams, sponsors and bosses outside your expertise, cross purposes from disciplines) working with both probabilistic and deterministic multiple working hypotheses throughout a hydrocarbon project.

During the course, particular attention will be paid to uncertainties and risks. It will be shown how these can be handled and their impact on the economics of hydrocarbon projects. The instructor is willing to accept examples from your company for analysis in the class as one of the demonstration exercises. It is also possible to design a course specifically for your own company around such a case study. Please contact PetroSkills for a list of the information and support data required, as well as the necessary lead-time.

DESIGNED FOR
Geologists, geophysicists, reservoir engineers, production engineers, petrophysicists, exploration and production managers, team leaders, and research scientists.

YOU WILL LEARN TO

• To develop a business proposal for any Reservoir Characterization project
• To apply the concept of correlation length to understand reservoir continuity
• To define hydraulic flow units in a reservoir
• To assess the economics of oil and gas projects across their entire life cycle
• To carry out the integrated Reservoir Characterization process

COURSE CONTENT
Business value drivers and selection criteria • The scale and resolution of data • Variograms, correlation length • Time, rock, and flow units • Seismic attributes • Upscaling, streamline simulations from disciplines and objectives • Decision trees; value of information • Giving and receiving feedback • The future of Reservoir Characterization
**CROSS-TRAINING**

### Naturally Fractured Reservoirs: Geologic and Engineering Analysis – FR

**SPECIALIZED 5-Day**

This course covers geologic and engineering concepts, methodology, and technology used to characterize, evaluate, and manage naturally-fractured reservoirs. Applications and limitations of geologic and engineering procedures and tools are discussed. Field examples and case studies demonstrate the importance of integrated geologic and engineering studies in developing effective, economical reservoir management strategies for different types of reservoirs.

**DESIGNED FOR**

Engineers and geoscientists interested in a multi-disciplinary approach to evaluating and predicting the overall effect of natural fractures on subsurface fluid-flow and subsequent reservoir performance.

**YOU WILL LEARN HOW TO**

- Detect and predict subsurface natural fracture occurrence and intensity from cores and well logs
- Determine fractured rock properties affecting reservoir performance
- Design and analyze pressure transient tests in naturally-fractured reservoirs
- Evaluate reservoir performance in naturally-fractured reservoirs
- Develop and apply numerical simulation models to fluid-flow in naturally-fractured reservoirs
- Apply coupled geomechanics/fluid-flow behavior to reservoir management strategies in naturally-fractured reservoirs
- Evaluate the impact of natural fractures on hydraulic fracture stimulation

**COURSE CONTENT**

Characterization of natural fractures and fracture systems • Influence of mechanical stratigraphy and structure on fracture development • Detection and prediction of subsurface natural-fracture occurrence and intensity from cores and well logs • Fractured rock properties affecting reservoir performance • Classification of naturally-fractured reservoirs with reservoir examples and potential production problems • Naturally-fractured reservoirs: fluid-flow, well performance and well testing, reservoir performance, numerical simulation • Geomechanics/fluid-flow • Behavior and stimulation of naturally-fractured reservoirs • Effects of natural fractures on reservoir permeability, anisotropy, drainage area, and waterflood sweep efficiency

### Production Technology for Other Disciplines – PTO

**FOUNDATION 5-Day**

PTO is an asset team course, as it introduces a broad array of important daily Production Technology practices. Terminologies, expressions, axioms, and basic calculations regularly utilized by production techs are covered. Emphasis is upon proven technology required to effectively develop and operate an asset in a multidiscipline development environment. Practical application of technology is emphasized. Nodal analysis examples to assess well performance are set up. Well completion equipment and tools are viewed and discussed. Exercises include: basic artificial lift designs, acidizing programs, gravel pack designs, and fracturing programs. Shale gas and oil development challenges are thoroughly explained. Horizontal and multilateral technology is presented.

**DESIGNED FOR**

Exploration and production technical professionals, asset team members, team leaders, line managers, IT department staff who work with data and support production applications, data technicians, executive management, and all support staff who require a more extensive knowledge of production technology and engineering.

**YOU WILL LEARN HOW TO**

- Apply and integrate production technology principles for oilfield project development
- Choose basic well completion equipment configurations
- Perform system analyses (Nodal Analysis™) to optimize well tubing design and selection
- Perform basic artificial lift designs
- Apply the best shale gas and oil extraction technologies
- Understand the chemistry and execution of hydraulic fracturing
- Design sand control gravel pack completions
- Evaluate well candidate selection to conduct a hydraulic fracturing campaign
- Apply new production technology advances for smart well completions
- Maximize asset team interaction and understand the dynamics between production technology and other disciplines

**COURSE CONTENT**

Role and tasks of production technology • Completion design + flow and outflow performance • Artificial lift well completion systems (beam pump, gas-lift, ESP, PCP, plunger lift) • Formation damage and well acidizing • Perforating practices • Sand control • Hydraulic fracturing • Shale gas and oil development • and more...

PTO is also available as a virtual course which is an enhanced version of the face-to-face public session.

### Basic Petroleum Economics – BEC3

**BASIC 3-Day**

Could you answer the following three questions for your next project? What will it cost? What is it worth? Will it earn sufficient profit? Before undertaking any project, these questions should be answered, and this course will provide the fundamentals necessary to enable you to do so. Contractual arrangements, which also significantly impact the economic viability of a project, are covered. Participants practice cash flow techniques for economic evaluations and investigate frequently encountered situations.

**YOU WILL LEARN**

- How to evaluate the economic viability of a project
- Cash flow techniques applicable in economic evaluations
- How to use economic criteria to choose investments
- Models to weigh risk and uncertainty

**COURSE CONTENT**

Forecasting oil production • Defining: “reserves”, operating expenses, capital expenditures, inflation, factors affecting oil and gas prices • Cash flow techniques • Economic criteria: interest, hurdle rate, time value of money, selection, ranking criteria • Risk, uncertainty: types of risk, mathematical techniques, probabilistic models, uncertainty in economic analysis • Tips on economic factors in capital investment

### Petroleum Risk and Decision Analysis – PRD

**FOUNDATION 5-Day**

Good technical and business decisions are based on competent analysis of project costs, benefits and risks. Participants learn the decision analysis process and foundation concepts so they can actively participate in multi-discipline evaluation teams. The focus is on designing and solving decision models. Probability distributions express professional judgments about risks and uncertainties and are carried through the calculations. Decision tree and influence diagrams provide clear communications and the basis for valuing each alternative. Monte Carlo simulation is discussed and experienced in detail in a hand-calculation exercise. Project modeling fundamentals and basic probability concepts provide the foundation for the calculations. Mathematics is straightforward and mostly involves only common algebra. Emphasis is on practical techniques for immediate application.

**DESIGNED FOR**

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

**YOU WILL LEARN HOW TO**

- Describe the elements of the decision analysis process and the respective roles of management and the technical team
- Express and interpret judgments about risks and uncertainties as probability distributions and popular statistics
- Represent discrete risk events in Venn diagrams, probability trees, and joint probability tables
- Solve for expected values with decision trees, payoff tables, and Monte Carlo simulation (hand calculations)
- Craft and solve decision models
- Evaluate investment and design alternatives with decision tree analysis
- Develop and solve decision trees for value of information (VOI) problems

**COURSE CONTENT**

Decision Tree Analysis: decision models, value of information (a key problem type emphasized in the course), flexibility and control, project threats and opportunities • Monte Carlo Simulation: Latin hypercube sampling, portfolio problems, optimization, advantages and limitations • Decision Criteria and Policy: value measures, multiple objectives, HSE, capital constraint, risk aversion • Modeling the Decision: influence diagrams, sensitivity analysis, modeling correlations • Basic Probability and Statistics: four fundamental rules including Bayes’ rule, calibration and eliciting judgments, choosing distribution types, common misconceptions about probability • Expected Value Concept: foundation for decision policy, features, pitfalls to avoid • Implementing Decision Analysis: problem framing, guidelines for good analysis practice, team analyses, computer tools (discussion and demonstrations), mitigating risks • Evaluating a multi-pay prospect (team exercise) • and more...

### 2018-2019 Schedule and Tuition (USD)

**PTO: Houston, US 14-18 Oct 2018 $4325 + VAT**

**BEC3: Kuala Lumpur, MYS 22-24 Jul 2019 $3855**

**PRD: HOUSTON, US 3-7 Dec 2018 $4240**
2018-19 Schedule and Tuition (USD)

HOUSTON, US 5-9 NOV 2018 $4340
4-8 NOV 2019 $4425
KUALA LUMPUR, MYS 3-7 DEC 2018 $5170
17-21 JUNE 2019 $5200
17-27 SEP 2018 $4995+VAT
2-6 SEP 2019 $5135+VAT

*plus computer charge

2018-19 Schedule and Tuition (USD)

DENVER, US 16-20 SEP 2019 $5470
HOUSTON, US 22-26 SEP 2019 $4225
ORLANDO, US 3-7 DEC 2018 $4190
2-6 DEC 2019 $4270

See website for dates and locations.

2018-19 Schedule and Tuition (USD)

HOUSTON, US 9-10 MAY 2019 $2595
LONDON, UK 8-9 NOV 2018 $2915+VAT
Our Participants Say It Best.

**Applied Environmental Management Systems – AEM**

**FOUNDATION**

**NEW**

Since the Rio de Janeiro Earth Summit (UNCED) held in 1992, environmental issues have been drawn to the forefront of organizations’ operations and possibly their reputations. A review of the world’s press often reveals spillages, toxic releases, fires, and other pollution events. There are efficiency opportunities from better use of energy, water and from reducing waste in a systematic way. Participants will receive a template Environmental Management System (EMS) manual for their own use as part of the study materials. This class provides a complete review of the international standard for environmental management, ISO 14001:2015, as well as other environmental management techniques. Over five days, the class works through the PDCA improvement cycle provided by ISO 14001, teaching the tools and techniques of excellent practice. The course includes a week-long practical implementation case study set in the fictional highly-realistic setting of oil products distribution company Melvis Group where the new learning is validated through application. Please see www.melvisgroup.com for more information.

**DESIGNED FOR**

Environmental professionals seeking a deeper knowledge of environmental management systems (EMS) and/or external certification to ISO 14001, H&S managers wanting to broaden their knowledge in a related discipline, project managers, other staff with delegated environmental responsibilities such as those related to energy, waste, or water.

**YOU WILL LEARN HOW TO**

- Successfully design and use the principle elements of an environmental management system in a typical petrochemical organisation
- Identify and integrate key tools associated with Occupational Health and Safety (OH&S) management, including environmental impact assessment, setting and progressing environmental objectives, emergency preparedness, and incident investigation
- Reflect on, shape, and initiate improvements in the environmental (HSE) culture of an organization
- Communicate a powerful improvement message to a team of senior leaders

**COURSE CONTENT**

Content of the organization • Leadership and commitment • Environmental policy • Roles, responsibilities, and authorities • Actions to address risks and opportunities • Objectives and planning to achieve them • Support (competence, awareness, communication, documentation) • Operational control • Emergency preparedness • Performance evaluation (monitoring, internal audit, management review) • Improvement

See website for dates and locations.

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**Applied Occupational Health and Safety Management Systems – HSM**

**FOUNDATION**

**NEW**

Every 15 seconds, somewhere in the world, a worker is killed and over 150 others are injured. Our members’ and clients’ experience is that committed application of an Occupational Health and Safety Management System (OHSMS) can reduce such incidents, while providing a platform for sustained cultural change. We call this ‘predict and prevent’ instead of the unstructured approach of ‘react and remedy.’ Participants will receive a template OH&S-MS manual for their own use as part of the study materials. This class provides a complete review of the new international standard for occupational health and safety management, ISO 45001:2018, as well as an overview of other common OH&S-MS (HSG65, ILO OSH-2001, ILOP HSE-MS) that can be aligned to organizations’ own systems. Over five days, the class works through a Plan, Do, Check, Act improvement cycle teaching the tools and techniques of excellent practice. The course includes a week-long practical implementation case study set in the fictional highly-realistic setting of oil products distribution company Melvis Group where the new learning is validated through application. Please see www.melvisgroup.com for more information.

**DESIGNED FOR**

Health and Safety (H&S) professionals who want to take advantage of the new improvement opportunities presented by ISO 45001 (or seek external certification), project managers, contract managers, members of H&S committees, directors of smaller organisations with limited access to specialist H&S advice.

**YOU WILL LEARN HOW TO**

- Successfully design and use the principle elements of an OH&S-MS in a typical petrochemical organisation
- Identify and integrate key tools associated with OH&S management, including HazID, risk assessment, JSA, PTW, LOTO, active and reactive monitoring
- Reflect on, shape, and initiate improvements in the safety culture of an organization
- Communicate a powerful improvement message to a team of senior leaders

**COURSE CONTENT**

Context of the organization • Leadership and commitment • OH&S policy • Roles, responsibilities, and authorities • Actions to address risks and opportunities • Objectives and planning to achieve them • Support (competence, awareness, communication, documentation) • Operational control • Emergency preparedness • Performance evaluation (monitoring, internal audit, management review) • Improvement

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- Gas Processing
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