Developing an exceptional workforce in a low price environment

Using blended learning and leveraging technology to maximize results.

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Basic Drilling, Completion and Workover Operations – BDC

DESIGNED FOR
Technical, field, service, support and supervisory personnel desiring to gain an introductory overview of these topics and how they interrelate. Excellent for cross-training of other technical disciplines such as reservoir and surface facility engineers plus geoscientists, and anyone who interacts with drilling, completion or workover design engineers such as technical supervisors and technical service personnel. This is not a fundamental course for training engineers seeking a career in drilling or workovers (for these, P01 is recommended).

YOU WILL LEARN
• How drilling, completing and reworking a well affects its ability to produce
• What can be done within open-hole and cased wells, as a part of reservoir management
• How drilling practices can damage or stimulate producing wells

ABOUT THE COURSE
This course gives a technical overview of the science and art of drilling operations, completion practices and post-completion wellbore enhancement or remedial workover techniques (well intervention). It develops an understanding of the WHAT, WHY, and HOW of each of these areas of engineering practice. Reservoir Engineers will learn what can be done within open-hole and cased wells as they execute reservoir management. Drilling and completion personnel will learn how the producing reservoir can be damaged or stimulated by what they do. The participants learn to visualize what is happening “downhole”, discover what can be accomplished and gain an appreciation for what others can do while drilling and completing practices can alter reservoir interpretation and performance. The participant will become conversant with specific technical terminology and aware of practical applications, which should enhance communication and interaction between disciplines.

COURSE CONTENT
• Overview of workover techniques – stimulation application; formation and sand control; Scale & corrosion; Paraffin & asphaltenes; Re-completions; Re-wracks; Sidetracking • Sidetracking • Deepening
• Coiled tubing
• Overview of the completion process – zonal isolation; tubing, packers and completion equipment; Safety & flow control devices; Open hole completions; Basic completion types • Perforating • Open & cased hole logging • Formation damage & treatment
• Completion fluids • Multiple completions
• Overview of the drilling process – language of drilling; reservoir rock and fluid properties; Pigs & rig equipment • Drilling string components & design • Bits • Drilling fluids & hydraulics • Rig operation • MWD
• Well control • Hole problems & stuck pipe • and more

2015 Schedule and Tuition / 5 Days

Bakersfield, U.S. 26-30 OCT US$3,900
Calgary, Canada 14-18 SEP US$3,900+GST
Dallas, U.S. 6-10 JUL US$3,900
Denver, U.S. 11-15 MAY US$3,900
Houston, U.S. 1-5 JUN US$3,900
2-6 NOV US$3,900
7-11 DEC US$3,900
Kuala Lumpur, Malaysia 25-29 NOV US$4,570
London, U.K. 17-21 AUG US$4,570+VAT
27 APR-1 MAY US$3,900

Evaluating and Developing Shale Resources – SRE

DESIGNED FOR
Reservoir, production and completion engineers who desire a thorough overview of emerging concepts, technologies and processes related to shale gas and shale oil resource development.

YOU WILL LEARN HOW TO
• Describe the resource potential and economic importance of shale gas and shale oil resources
• Describe the similarities/differences between shale gas, tight gas and coalbed methane
• Recognize and describe shale play differences and critical reservoir properties to identify the “sweet spots”
• Estimate Gas and Oil in place for resource plays
• Recognize the advantages/disadvantages of different resource evaluation techniques
• Apply drilling, completion and stimulation technology to shale gas and shale oil formations
• Evaluate and forecast individual well and reservoir performance
• Determine how to estimate well reserves in both PDP (proved developed producing) and PUD (proved undeveloped) categories

ABOUT THE COURSE
This course will cover current practices for evaluating, drilling and completing these challenging reservoirs. Discussion will include a focus on the limitations of many of the current tools and technologies. Field examples from the Barnett, Marcellus, Eagle Ford, Haynesville, Woodford, Bakken and other shale plays in North America are utilized to illustrate the technical challenges associated with evaluation and development. Information and opportunities for international shale plays will be described. The participant should leave the course with a foundational understanding of value-adding shale gas resource practices and an insight into determining the critical reservoir parameters used to predict a potential commercial resource play.

One personal computer is provided, at additional cost, for each two participants.

COURSE CONTENT
Reservoir Characterization and Evaluation: geological setting; rock properties; petrophysical considerations • Drilling: vertical vs. horizontal wells; pilot holes; fluids; MWD and LWD; wellbore sizes and lateral; drilling challenges; mechanical considerations • Drilling Completion: cased vs. open hole; perforation schemes; stimulation design and considerations; case histories • Drilling Field trials and pilots: strategies for implementing a pilot program to optimize well drilling, completion, stimulation and producing alternatives using microseismic, fiber optics, production logs and other resources • Drilling Production Forecasting and Reserve Calculations: volumetrics; performance analysis; simulation; resource development; decline curve analysis; handling uncertainty in estimates

2015 Schedule and Tuition / 5 Days

Brisbane, Australia 17-21 AUG US$4,670+GST*
Houston, U.S. 11-15 MAY US$4,040*
17-21 AUG US$4,100*
21-25 SEP US$4,040*
Pittsburgh, U.S. 13-17 JUL US$4,000*
Denver, U.S. 9-13 NOV US$4,000*
29-33 OCT US$4,670+VAT*
London, U.K. 7-11 DEC US$4,000*
San Antonio, U.S. 19-23 APR US$4,570+VAT*
19-23 OCT US$4,040*
5-9 OCT US$4,670+VAT

Carbonate Reservoirs – PCR

DESIGNED 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 the carbonate depositional system important to carbonate reservoir development
• Understand how sequence stratigraphy can be applied to carbonates and mixed carbonate-siliciclastic systems
• Understand the geologic and engineering characteristics of carbonate pore systems
• Recognize the nature of carbonate porosity modification by diagenesis and the role of sea level and climate in porosity modification and gross reservoir heterogeneity
• Develop viable exploration and exploitation strategies in a carbonate terrain by working with actual subsurface data sets

ABOUT THE COURSE
This rigorous workshop is a must for geologists, geophysicists, exploration and production managers and engineers dealing with exploration for and exploitation of carbonate reservoirs. The course starts with a comprehensive overview of the basic characteristics of the carbonate depositional system important to carbonate reservoir development. The application of sequence stratigraphic concepts to carbonates as a predictive tool in exploration for and modeling of carbonate reservoirs will be covered. The engineering and geologic aspects of carbonate pore systems will be explored. A geologic-based porosity classification useful in exploration will be developed and compared with an engineering-based porosity classification useful for detailed reservoir characterization and reservoir simulation. Carbonate porosity modification and evolution will be discussed in a sea level driven sequence stratigraphic framework. Problems of reservoir heterogeneity and carbonate reservoir modeling will be discussed. Case histories from around the world will be utilized throughout to illustrate important concepts. A major component of the workshop is a series of practical exercises utilizing actual subsurface data sets that include geophysical logs, core data, biostratigraphic data and seismic. These exercises will give the participant hands on experience in developing viable exploration and exploitation strategies for carbonate terrains.

COURSE CONTENT
The basic nature of carbonate sediments and sedimentation • The efficiency of the carbonate factory and its influence on cyclic and platform development • Carbonate platform types • Carbonate facies models • Basic concepts of sequence stratigraphy including eustasy, relative sea level, accommodation model, and sequence stratigraphy as a predictive tool • Relationship of stratigraphic patterns to changes in subsidence rates as driven by regional and earth scale tectonic processes • Sequence stratigraphic models including the ramp, the rimmed shelf, the escarpment margin, the isolated platform and the mixed carbonate-siliciclastic shelf • The characteristics of carbonate pore systems and theologic and engineering classifications including petrophysics and rock fabric • Sea level, diagenesis, porosity evolution and its distribution at the time of burial • The fate of early formed porosity during burial in a hydrodynamic framework • Carbonate reservoir modeling • Case histories from the Americas, Africa, Europe and Asia • Exercises from the US and Europe based on actual data sets • Exploration and exploitation strategies in carbonate terrains

2015 Schedule and Tuition / 5 Days

Dubai, U.A.E. 19-23 APR US$5,090
Houston, U.S. 19-23 OCT US$4,040*
London, U.K. 5-9 OCT US$4,670+VAT
Geochemistry: Tools for Effective Exploration and Development – MGT

**DESIGNED FOR**
Exploration and development geologists, geophysicists, geochemists, petroleum engineers, managers, and technical personnel. No background in geochemistry is needed.

**YOU WILL LEARN HOW TO**
- Characterize exploration risk in conventional and unconventional petroleum systems by assessing regional variations in organic facies, source maturity, source volumes, petroleum systems, well logs, and gas-to-oil ratios, and the risk of oil biodegradation.
- Integrate geochemical, geological and engineering data to identify reservoir compartments, allocate commingled production, identify completion problems, and monitor field progression to optimize field development.
- Recognize pitfalls in geochemical interpretations.
- Use geochemical tools, including Total Organic Carbon (TOC), Rock-Eval pyrolysis, vitrinite reflectance, geochemical logs, gas chromatography, stable isotope ratios, biological markers (biomarkers), mud gas isotopes, and mud gas compositions.
- Determine if hydrocarbon "stray" gases found in an aquifer are, or are not, related to petroleum drilling activities in a given area.
- Design geochemical studies and collect samples.

**ABOUT THE COURSE**
Undiscovered reserves in prolific, mature basins and bypassed petroleum in developed fields are key targets for increasing reserves at minimal cost. Geochemical tools can dramatically improve discovery and development success by identifying and characterizing these targets in both conventional and unconventional systems. Course participants learn to interpret geochemical logs, map organic facies variations, identify petroleum systems using multivariate data, and predict vertical and lateral variations in oil quality and gas-to-oil ratios. The course teaches how to integrate geochemical, geological and engineering data to identify reservoir compartments, allocate commingled production, identify completion problems, and monitor field progression. The course also explains how to optimize development by predicting vertical and lateral variations in API gravity and viscosity. Attendees learn interpretive guidelines to evaluate geochemical data. Interpretation pitfalls are illustrated using exercises. Sample collection techniques are discussed. No background in geochemistry is needed.

**COURSE CONTENT**
Assessing source rock quality, maturity, and petroleum-generating potential • Correlation: oil-to-oil, oil-to-source rock, gas-to-source rock • Applications of mud gas data • Geochemical log interpretation • Classification of reservoir quality • Geologic and engineering data integration • Geochemical and geophysical correlation • Source rock analysis • Geochemical studies and sample collection • Geochemical interpretations • Geochemical data integration in field development.

**YOU WILL LEARN**
- Use of geochemistry
- Geochemical requirements
- Geochemical correlation and geostatistical correlation
- Geochemistry tools
- Setup of a geostatistical project: surveys, typologies and levels
- Geostar wells in a variety of facies and geologic settings
- Sand
- Shale
- Carbonate
- Clay
- To understand variations of data quality
- Interpretation of faults, bed thickness variations, depositional changes, folding, erosional surfaces and turbidities
- Relationship to well plan
- Creation and use of a derived typology
- Use of grids as interpretation aids
- How to identify changes in well path from a plan
- Creation of a horizontal cross-section from correlation.

**ABOUT THE COURSE**
After providing an introduction to horizontal drilling, the fundamentals of correlation, an overview of LWD tool development and technology, the course will concentrate on the process of geosteering and all the necessary constraints and requirements associated with the technology. Relying heavily on geology in order to understand variations in the subsurface, the course will guide the participant through geosteering the curve, landing and then drilling the lateral. Employing specialized software techniques, this process will be repeated many times through different facies common to horizontal drilling today. Encountering a wide variety of geologic variations, the participant will be presented with techniques to both identify these changes and resolve their affect on the wellbore in order to ensure proper well placement within the target zone.

**COURSE CONTENT**
- History of LWD development
- Modern tool types
- Standard techniques in well log correlation and its relationship to geosteering
- Identification of data quality and mitigating factors
- Requirements necessary to steer a well
- Directional terminology
- Introduction to Total Hole Deviation as a geosteering tool
- Special geosteering techniques:
  1. Derived log
  2. Azimuthal Gamma Ray
  3. Additional LWD curves for identification of "sweet spots"
  4. Drilling plans
  5. Grids
  6. Projected surfaces
  7. Other LWD curves: gas, resistivity, other
- Geosteering to 15 wells

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2015 Schedule and Tuition / 5 Days

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<thead>
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<th>Location</th>
<th>Dates</th>
<th>Tuition</th>
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<td>9-13 NOV</td>
<td>US$4,000</td>
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<tr>
<td>HOUSTON, U.S.</td>
<td>27 APR-1 MAY</td>
<td>US$4,040</td>
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<tr>
<td>LONDON, U.K.</td>
<td>30 NOV-4 DEC</td>
<td>US$4,040</td>
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<td>5-9 OCT</td>
<td>US$4,670 + VAT</td>
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2015 Schedule and Tuition / 5 Days

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<th>Location</th>
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<td>DENVER, U.S.</td>
<td>8-12 JUN</td>
<td>US$4,040*</td>
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<tr>
<td>DUBAI, U.A.E.</td>
<td>4-8 OCT</td>
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<td>HOUSTON, U.S.</td>
<td>13-17 APR</td>
<td>US$4,040*</td>
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<tr>
<td>OKLAHOMA CITY, U.S.</td>
<td>7-11 DEC</td>
<td>US$4,040*</td>
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*plus computer charge

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UF Projected...

2015 Schedule and Tuition / 5 Days

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<td>ABU DHABI, U.A.E.</td>
<td>30 AUG-3 SEP</td>
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<td>KUALA LUMPUR, MALAYSIA</td>
<td>14-18 NOV</td>
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<tr>
<td>LONDON, U.K.</td>
<td>13-17 APR</td>
<td>US$4,670 + VAT</td>
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All classes available at your location. Contact us today.
North Sea Petroleum Geology: Integrated Classroom, Core Store and Field Analogue Course on Reservoir Depositions
– NSPG

**DESIGNED FOR**
Geologists, geophysicists, petrophysicists, reservoir engineers, drillers, anyone involved in subsurface reservoir characterization in the North Sea area.

**YOU WILL LEARN**
• About the petroleum systems, play styles and history of oil and gas exploration and production in the North Sea
• About the structural evolution of the North Sea and its impact on hydrocarbon generation
• How to recognize fluvial, aeolian, paralic, and marine clastic and carbonate reservoirs at core, on wire line and on seismic
• Related field geology as an overview of reservoir style in the North Sea area

**ABOUT THE COURSE**
The course is a G&G focused course and keeps to the subject areas of regional geology, structural evolution, depositional environments, play types and specific field case studies for the taught component. An overview of each (clastic) depositional environment is given, followed by related field or reservoir case studies. After the first three days of classroom overview and case study lectures, we go to the core store to examine seven wells: students have the chance to briefly describe sections from each well, to add to their understanding of the environments. Three days in the field in Northumberland we can then investigate most to the environments studied.

**COURSE CONTENT**
Overview of the Geology of the North Sea; fluvial deposystems • Aeolian and deltaic deposystems • Marine Reservoirs • Core store and field trip preparation • Field Trip – Tweed Basin • Field Trip – Northumberland Basin

**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

**YOU WILL LEARN HOW TO**
Interpret clastic depositional environments using data from cores, cuttings and wireline logs (including FMI)

**YOU WILL LEARN**
• 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

**ABOUT THE COURSE**
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 prediction 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 both onland and gas fields in 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.

**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 • Deep-water systems • Incised sequences • Shelf margins and linked downslope systems • Characteristic log patterns • Flow units • Prediction 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

2015 Schedule and Tuition / 5 Days
ABERDEEN, U.K. † 13-19 SEP US$6,780+VAT
† includes field trip

2015 Schedule and Tuition / 5 Days
ABERDEEN, U.K. † 14-18 DEC US$4,670+VAT
CALGARY, CANADA 5-9 OCT US$4,000+GST
DENVER, U.S. 13-17 JUL US$4,000
DUBAI, U.A.E. 22-26 NOV US$5,090
KUALA LUMPUR, MALAYSIA 18-22 MAY US$4,670
LONDON, U.K. 20-24 APR US$4,670+VAT

**DESIGNED FOR**
Geologists, geophysicists, petrophysicists, reservoir and production engineers, exploration-production managers, all team members involved in reservoir characterization, 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

**YOU WILL LEARN**
• 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

**ABOUT THE COURSE**
Sequence stratigraphy, based on sedimentary response to changes in relative sea level gives the explorationist and the development geoscientist a powerful new predictive tool for regional basin analysis, shelf to basin correlation and reservoir heterogeneity. Perhaps most importantly, sequence stratigraphy gives the geoscientist a superior framework for the integration of geologic, geophysical and engineering data and expertise. We will develop the basic concepts of sequence stratigraphy such as the integration of eustasy and tectonic subsidence which gives rise to the basic cycle hierarchy that can be observed in the geologic record. Using these basic concepts we will build a general predictive stratigraphic model emphasizing the petroleum system and particularly stressing shelf to basin correlation. The particular strength of this seminar is the application of these basic principles to actual subsurface data sets gathered into a series of well-founded exercises. In recent courses the data sets included Mioocene delta complexes in Venezuela Cretaceous incised valleys in the US, Paleozoic mixed carbonate clastic basin floor fans and low stand prograding complexes in the US and Jurassic basin floor and slope fans in France.

**COURSE CONTENT**
Historical framework • Seismic geometries • Unconformities • Relative sea level • Eustasy • Parasequences and their stacking patterns • Parasequences as a correlation tool • Relationship of stratigraphic patterns to changes in subsidence rates as driven by regional and earth scale tectonic processes • Cycle hierarchy • World-wide cycle chart and its application • The sequence stratigraphic model • LST sequence boundaries, diagenesis related to unconformities, incised valleys, slope fans, basin floor fans and prograding complexes illustrated by slide presentation and individual exercises • TST incised valley fill, two phase sedimentation pattern, source rock and reservoir seal illustrated by slide presentation and individual exercises • HST alluvial, deltaic, shoreline complexes and shelf sands illustrated by slide presentation and individual exercises • Exploration and production scaled case histories and strategies

Download the entire PetroSkills course schedule at petroskills.com/aapg

### Structural Styles in Petroleum Exploration

**FOUNDATION**

**DESIGNED FOR**
Exploration geologists, geophysicists, engineers, and geoscience managers.

**YOU WILL LEARN HOW TO**
- Recognize all the different hydrocarbon-bearing structural styles in map and cross-section
- Distinguish the characteristics of each structural style on seismic reflection profiles
- Recognize the arrangement of structural styles and traps within structural families
- Apply mechanical-stratigraphic concepts to understand and predict trap geometry
- Use restoration and balance to validate an interpretation and show the structural evolution

**ABOUT THE COURSE**
Even with the best of data, the correct interpretation of a subsurface structure usually requires recognition of the fundamental characteristics of the displacement in which it occurs and the range of trap styles to be expected. This course provides an overview of all hydrocarbon-bearing structural styles and their associated trap types. The processes that produce the structures and control their styles are interpreted in terms of basic rock-mechanical principles. Classic outcrops, physical models, 2-D and 3-D seismic, and mature-field log-based interpretations from around the world provide analog examples for practical interpretation. Participants will learn the major structural trap geometries and the structural concepts for predicting the geometry where data are absent, misleading, or conflicting. The principles of section balancing and restoration are covered as tools for validating interpretations and for documenting structural evolution. Practical interpretation skills are developed in numerous exercises, most of which use seismic data.

**COURSE CONTENT**
Comparative structural geology • Structural families and styles • Mechanical principles governing fold and fault geometry • Predicting structure from stratigraphy • Folding vs. faulting • Palaeoseismic restoration of cross sections • Structural validation criteria • Sequential restoration and growth history • Regional arches and domes • Compaction and stratigraphical solution • Wrench faults: simple, convergent, and divergent • Conjugate and domino-style strike-slip regimes • Thin-skinned fold-thrust belts • Fault-related folds • Duplexes • Basement-involved contraction • Vertical and rotational block uplifts • Inversion: dip-slip to strike-slip • Thin-skinned extension • Basement-involved extension • Half-grabens and full grabens • Faultwall uplift • Pre-inversion normal faults • Ramp-flat and listric-fault related structures • Rotated block with keystone graben style • Structural validation criteria • Selecting the best balancing and restoration technique • Featural-slip restoration and predications • Vertical and oblique simple shear • Rigid-block restoration • Area-depth technique for section validation, depth to detachment, bed-length changes and fault prediction • Effect of detachment-zone thickness • Transition from horizontal to vertical displacement • Extensional drape folds • Trishear models of drape folds • Sequential restoration of growth structures • Fracturing in extensional structures

**EXAMPLES**
The instructors of this course are happy to accept examples from your company for analysis in the class as one of the demonstration exercises. Please contact PetroSkills for a list of the information and support data required, as well as the necessary lead-time.

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### Analysis of Structural Traps in Extensional Settings – ESS

**INTERMEDIATE**

**DESIGNED FOR**
Exploration and development geologists, geophysicists, engineers, and managers responsible for the interpretation and drilling of extensional structures.

**YOU WILL LEARN HOW TO**
- Distinguish the characteristics of extensional and transtensional deformation for both basement-involved and thin-skinned styles
- Apply mechanical-stratigraphic principles governing the formation and evolution of extensional structures and apply restoration and balancing techniques
- Predict structural geometry from sparse or inconsistent data using kinematic models
- Recognize typical extensional and transtensional petroleum-trapping geometries

**ABOUT THE COURSE**
Extensional structures provide some of the world's largest known oil reservoirs and remain one of the major frontier plays for the future. With both onshore and, particularly, in deepwater offshore, 3-D seismic has revolutionized structural mapping. However, the most realistic geologic interpretation of these structures is only as good as our ability to recognize and exploit the fundamental characteristics of the forms that are possible. This course presents outcrop, subsurface, seismic sections, and model analogs that will provide the starting point for structural interpretation in a wide range of extensional environments. Interpretations are validated by restoration. The comparison to balanced models, this course covers the latest restoration techniques and the use of predictive kinematic models appropriate for rifted and other extensional and transtensional areas.

**COURSE CONTENT**
Extensional structural styles and their plate, tectonic habitats • Models for riftting and passive continental margin evolution • Transpressive structures • Detached and basement-involved styles • Map patterns • Half-grabens and full grabens • Faultwall uplift • Pre-inversion normal faults • Ramp-flat and listric-fault related structures • Rotated block with keystone graben style • Structural validation criteria • Selecting the best balancing and restoration technique • Featural-slip restoration and predications • Vertical and oblique simple shear • Rigid-block restoration • Area-depth technique for section validation, depth to detachment, bed-length changes and fault prediction • Effect of detachment-zone thickness • Transition from horizontal to vertical displacement • Extensional drape folds • Trishear models of drape folds • Sequential restoration of growth structures • Fracturing in extensional structures

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### Basin Analysis Workshop: An Integrated Approach – BA

**INTERMEDIATE**

**DESIGNED FOR**
Geoscientists who require a practical familiarity with the application of a variety of state-of-the-art conventional and unconventional tools of hydrocarbon evaluation to sedimentary basins.

**YOU WILL LEARN HOW TO**
- Systematically assess the evolution of a basin’s petroleum system critically through space and time through a non-linear parallel approach integrating geology, geophysics, and geochemistry
- Deconstruct a basin through space and time and build predictive basin models useful in exploration
- Evaluate the geomechanical fundamentals controlling a basin’s burial history through tectonic subsidence analysis
- Determine the thermal history of a basin and its importance upon source maturity dynamics
- Relate organic source quantity and quality to sedimentary processes and environments
- Delinate migration pathways through space and time
- Characterize the essentials of reservoir and seal quality
- Construct and analyze Petroleum events chart
- Geovalidate the model
- Rank and quantify petroleum system risk deterministically and stochastically using Monte Carlo methods
- Construct and analyze a decision tree
- Classify basins for optimizing exploration & development

**ABOUT THE COURSE**
Basin analysis demands an integrated approach from explorationists. It can be both inappropriate and misleading to suggest that the tectonic-thermal-sedimentaryologic evolution of any one basin is an established fact, or even that all basins submit to the same simple and equivocal models. This course provides the theory, methods, and practice for participants to develop and optimize their individual basin evaluation and modeling modus operandi. Case histories from throughout the world, utilizing geologic, geophysical, and geochemical data, are incorporated as practical problems for workshop analysis and significant group discussion. In addition, participants construct and interpret their own geohistory subsidence curves using BASINMOD®, the industries standard computer software for basin modeling.

One personal computer is provided, at additional cost, for each two participants.

**COURSE CONTENT**
Introduction to the Petroleum System and Petroleum System Criticals • Geomechanical Fundamentals of Basin Formation • Burial History Curve • Tectonic Subsidence Analysis • Geothermics: Steady State and Rifting • Organic Geochemistry: Quantity, Quality, and Maturity • Migration Pathways • Reservoir-Traps-Seals and Analog • Critical Points • Basin Classification • Quantifying Uncertainty, Minimizing Risk, and Making Decisions • Synthesis

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**2015 Schedule and Tuition / 5 Days**

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† includes field trip

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**2015 Schedule and Tuition / 5 Days**

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*plus computer charge

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</tr>
<tr>
<td>SINGAPORE</td>
<td>17-21 AUG</td>
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All classes available at your location. Contact us today.
**Deep-water Turbidite Depositional Systems and Reservoirs – DWT**

**INTERMEDIATE**

**DEIGNED FOR**
Geologists, geophysicists, engineers, and managers responsible for the interpretation and drilling of deep-water turbidite reservoirs and related exploration.

**YOU WILL LEARN HOW TO**
• Predict reservoir size, shape, trend and quality
• Interpreting turbidite depositional environments using data from cores, thin sections, wireline logs, and well data
• Prepare predictive facies maps
• Apply modern stratigraphic concepts to turbidite reservoirs

**COURSE CONTENT**
Review of turbidite settings, processes, models and examples of turbidite reservoirs from fields around the world. Hands-on lab exercises will include scanning and petrographic microscopy of turbidite samples, and the interpretation of large-scale turbidite reservoirs. The seven-day sessions will be combined field and classroom based sessions. There will be four days in the classroom with lecture material and oil field exercises on exploration and production, and three days in the field examining spectacular deep-water sections of either the Annot Sandstone Formation (Nice) or Ross Sandstone Formation (Kilkenny). For Nice session, a field trip to the famous Kilkee Turbidite Formation (Kilkenny) will be available and participants will receive instruction on interpretation, especially where sea floor data can be used as a proxy of sand distribution in reservoirs. Criteria for identification and interpretation of injected sandstones will be discussed, including explanation of their mechanisms of formation, and the understanding of their influence on reservoir characteristics.

**ABOUT THE COURSE**
This course is an introduction to the fundamental geology of deep-water turbidite deposition and reservoirs. The course includes short courses in turbidite systems at outcrop, turbidite basins at depth, and modern examples of turbidite reservoirs. The process of iteration of data types including analog data that was collected expressly to illustrate successful application of various techniques. Participants learn the importance of modifying development plans as a field becomes more mature and more data is available. Techniques for mature field rejuvenation are discussed, and case histories are used to illustrate successful application of various techniques.

**YOU WILL LEARN HOW TO**
• Use economic techniques to evaluate different development plans
• Predict reservoir size, shape, trend and quality
• Prepare predictive facies maps

**COURSE CONTENT**
Geologic characteristics that impact field development • Appraisal: Determining recoverable hydrocarbons • Reservoir fluid properties and saturation • Influence of capillary pressure on hydrocarbon distribution and fluid contacts • Reserve and resource evaluation • Volumetric reserve estimation and calculation • Stratigraphic influence on field production • Depositional and diagenetic controls on reservoir rock, barriers, and hydrocarbon distribution • Describing reservoir rock to understand reservoir behavior in carbonate and clastic rocks • Determining if hydrocarbons can be recovered from a given field, what is pay? • The impact of drive mechanism: aquifer characterization, distribution, and mapping • Seismic applications in appraisal and development • Development drilling: How to optimize hydrocarbon recovery • Economic impact on field development • Subdividing the reservoir into working units • Reservoir pore space configurations and mapping • Building a static reservoir model using deterministic and stochastic techniques • Key factors affecting the development of Fractured Reservoirs • Steps in building a geologic reservoir model • Impact on barriers of field development • and more.

**2015 Schedule and Tuition / 5 Days**

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**Compressional and Transpressional Structural Styles – CPST**

**INTERMEDIATE**

**DEIGNED FOR**
Geologists, geophysicists, engineers, and managers responsible for the interpretation and drilling of compressive and transpressive structures.

**YOU WILL LEARN HOW TO**
• Distinguish the characteristics of compressional and transpressional deformation including distinguishing thin-skinned and basement-involved styles
• Identify the fundamental characteristics of the wrench and thrust style
• Identify the characteristics of inversion structures
• Use the area-depth relationship to validate cross sections and predict sub-resolution structures
• Apply mechanical-stratigraphic principles to predict the formation and evolution of structures
• Apply restoration and balancing techniques
• Predict structural geometry from sparse or inconsistent data using kinematic models
• Recognize typical oil-field locations and geometries in compressional and transpressional structures

**ABOUT THE COURSE**
Compressional and transpressional structures provide some of the world’s largest known hydrocarbon reservoirs and remain major frontier plays. 3-D seismic has revolutionized structural mapping, but making the most realistic geologic interpretation of these structures requires an ability to recognize and interpret the fundamental forms. This course presents outcrop, subsurface, seismic sections and model analogs that provide structural interpretation in a wide range of compressional and transpressional environments. Interpreters are validated by restoration and by comparison to balanced models. This course covers the latest restoration techniques and the use of the predictive kinematic models for thrust-fold belts.

**COURSE CONTENT**
Compressional structural styles and their plate-tectonic habitats • Wrench assemblage • Transpressive structures • Detached (thin-skinned) styles including forearc, backarc, collisional, and deep-water thrust-fold belts • Basement-involved styles including compressional drape folds, predictive models for rotated blocks and subthrust plays • Inversion • Structural validation criteria • Selecting the best balancing and restoration technique • Flexural-slip restoration • Area-depth technique for section validation, depth to detachment, bed-length changes and fault prediction • Fault-bend folds • Fault-tip folds • Fault-propagation folds • Detachment folds • Buckle folds and the break-fold model • Duplexes • Triangle zones • Growth folds • Fragmentation in compressional structures • Summary of oil and gas fields

**2015 Schedule and Tuition / 5 Days**

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<td>LONDON, U.K.</td>
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**Development Geology – DG**

**INTERMEDIATE**

**DEIGNED FOR**
Reservoir, development and exploration geologists; geophysicists; petrophysicists; log analysts; petroleum engineers; and experienced technicians.

**YOU WILL LEARN HOW TO**
• Select optimum drill sites for field development
• Use log and rock data to identify reservoir rock, non-reservoir rock and pay
• Determine flow distribution in a field and identify reservoir compartments
• Estimate field reserves through the life of a field
• Characterize carbonate and clastic rocks by productivity
• Construct geologic reservoir models
• Determine field drive mechanism
• Apply seismic analysis to reservoir development
• Determine which depositional characteristics impact reservoir behavior and use this information to optimize development
• Compile a development plan
• Use economic techniques to evaluate different development plans

**ABOUT THE COURSE**
Knowing the controls on reservoir pore space distribution is critical to the appraisal, development, and efficient management of reservoirs. Participants learn, through hands-on exercises, to compile a development plan for a field that emphasizes optimal recovery. Emphasis is placed on the selection of rock, log and test data to distinguish reservoir and non-reservoir rocks, and to determine the lower limit of pay. Structural, stratigraphic, depositional and diagenetic concepts are used to locate drill sites and describe reservoirs. The input required to construct a geologic reservoir models is reviewed. Participants learn the importance of modifying development plans as a field becomes more mature and more data is available. Techniques for mature field rejuvenation are discussed, and case histories are used to illustrate successful application of various techniques.

**COURSE CONTENT**
Geologic characteristics that impact field development • Appraisal: Determining recoverable hydrocarbons • Reservoir fluid properties and saturation • Influence of capillary on hydrocarbon distribution and fluid contacts • Reserve and resource evaluation • Volumetric reserve estimation and calculation • Stratigraphic influence on field production • Depositional and diagenetic controls on reservoir rock, barriers, and hydrocarbon distribution • Describing reservoir rock to understand reservoir behavior in carbonate and clastic rocks • Determining if hydrocarbons can be recovered from a given field, what is pay? • The impact of drive mechanism: aquifer characterization, distribution, and mapping • Seismic applications in appraisal and development • Development drilling: How to optimize hydrocarbon recovery • Economic impact on field development • Subdividing the reservoir into working units • Reservoir pore space configurations and mapping • Building a static reservoir model using deterministic and stochastic techniques • Key factors affecting the development of Fractured Reservoirs • Steps in building a geologic reservoir model • Impact on barriers of field development • and more.

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You will learn how to:

- Use mud gas isotopes to identify and characterize pay zones.
- Use the geochemistry of produced fluids (oil, gas, water) and/or core material to: identify missed pay, assess reservoir compartmentalization, allocate commingled production, identify completion problems (tubing leaks, poor cement jobs, etc.), characterize induced fractures (e.g., fracture height), monitor the progression of fluids (water, gas, or steam); predict vertical and lateral variations in fluid viscosity and gravity; and identify the geological processes which control fluid properties in a given field.
- Use certain key software packages (including, PeakView, ReserView, OilImminder, Excess Pressure calculations, etc.).

About the course:

During field development and production, numerous problems can be solved through integration of geochemical, geological, and engineering data (see bullets above). Geochemical approaches for solving these problems are appealing since:

1) They provide an independent line of evidence that can help resolve ambiguous geological or engineering data. Example: geochemical data can reveal whether small differences in reservoir pressure reflect the presence of a barrier between the sampling points.
2) They are far less expensive than engineering alternatives. Example: geochemical allocation of commingled production costs only 1-5% as much as production logging.
3) They have applicability where other approaches do not. Example: geochemical allocation of commingled production can be performed on highly-deviated or horizontal wells and on wells with electrical subsurface pumps - well types not amenable to production logging. This course explains how geochemistry complements other reservoir management tools. Case studies and exercises illustrate key points. Computer-based exercises illustrate the utility of certain key software packages. Sampling pitfalls and sources of contamination are discussed. The course will NOT cover PVT (Pressure-Volume-Temperature) relationships or equation of state calculation.

One personal computer is provided, at additional cost, for each two participants.

Course content:

Using fluid compositions as "natural tracers" for tracking fluid movement and compartmentalization:

- Understanding processes that cause compositional differences between fluids (e.g., differences in source facies, source maturity, biodegradation, water washing, evaporative fractionation, etc.)
- Integrating geochemical, geological, and engineering data to identify missed pay, characterize reservoir compartmentalization, allocate commingled production, identify well completion problems, predict fluid viscosity/gravity, and monitor floods.
- Basics of oil, water, gas and mud gas compositional analyses.

Designed for:

Development geologists, petroleum engineers, managers, and technical personnel.

You will learn how to:

- Better understand carbonate reservoir heterogeneity and architecture and its effect on permeability
- Better understand fracturing in carbonates, relating fracture density, aperture, and length to facies, lithology and diagenesis
- Recognize controls on carbonate reservoir heterogeneity, from sub-reservoir to reservoir scale
- Better understand carbonate reservoir heterogeneity and the value of 3-D geological model building to better management the development of carbonate reservoirs.

About the course:

This course will review the controls on carbonate reservoir heterogeneity from the pore architecture scale to the geometrical attributes at reservoir-scale and how these parameters can be incorporated and integrated into the development of viable petrophysically-based reservoir models for carbonates. In-class exercises are used to reinforce the potential integration of various data sets to provide students with experience in carbonate reservoir characterization.

Course content:

Importance of understanding the various scales of heterogeneity in carbonate reservoirs:

- Carbonate deposition, diagenesis, mineralogy, rock textures and pore types
- Carbonate rock and carbonate pore system classification
- Carbonate rock properties and core analysis
- Well log response, limitations, and strengths in carbonates
- Determination of lithology, porosity, and permeability
- Fracture identification and distribution
- Porosity/depth relationships in limestone and dolomite reservoirs
- Importance of sequence boundaries to development of pore architecture
- Variations in carbonate pore architecture and its effect on permeability
- Relationship of primary depositional facies, sequence stratigraphic framework and diagenetic history to pore architecture and reservoir quality
- Controls on reservoir heterogeneity, from sub-reservoir to reservoir scale
- Value of analogs for development of petrophysically-based reservoir models
- Value and limitations of 3-D geological models to understand reservoir heterogeneity and architecture

Designed for:

All geoscientists, petroleum engineers, well engineers and technical personnel who in the course of their career will attend or direct subsurface and wellsite operations.

You will learn how to:

- Plan and prepare for a drilling location and for geophysical services
- Identify drilling operations and geological drilling hazards
- Understand and apply logging services
- Understand well testing services
- Understand log interpretations
- Describe drilling cuttings and cores
- Evaluate the impact on the field development plan
- Prepare and compile operations reports

About the course:

At the end of the 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 phase. 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 others 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. Cuttngs, cores, logs and well tests should be analyzed, cross-correlated and compiled to mesh with prognoses and existing data to effectively manage 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.

Course content:

Petroleum geology and its systems:

- Operations geology: prospect to well planning, provision of geological services
- Wellsite geology: geological 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 & fluids: reservoir properties, rock and fluid interaction, permeability, averaging, 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

Note: A basic knowledge of geology and/or petroleum geology is advisable if not required to fully appreciate the course contents.
YOU WILL LEARN HOW TO
• Calculate geological risk and uncertainty in exploration prospects
• Determine prospect volumes
• Assess reserve distribution in a play
• Predict the number and estimated sizes of future fields
• Describe/calibrate risks associated with finding a successful play

ABOUT THE COURSE
Exploration professionals and managers must manage their time and resources carefully in the modern business world. Key to this management process is a full understanding of exploratory opportunities and their potential impact on the organization. Assessment of plays and prospects is an important tool in managing financial and human resources. This fully revised and updated course evolved from an approach created through the work of Dave White into a fully modern approach to defining prospect and play volumes, the uncertainties in defining these volumes and the risk that the accumulation exists. It is a practical course, easy to adapt directly in the workplace. During the course, students learn evaluation techniques applicable in any assessment scheme that an organization might use. The course evaluates other published approaches and contrasts them with the recommended procedures allowing the participants to choose the very best approach to resource evaluation. It is significant to note that this course offers the industry the only quantitative play assessment procedure that is repeatable from play to play and offers measures of the play prospectiveness (size and number of future fields); no other published play assessment offers anything more than qualitative judgments. Important techniques to sum multiple prospective zones and adjacent prospects are developed.

COURSE CONTENT
Geological controls of oil and gas occurrence • Review of common assessment methods • Applications of volumetric prospect assessments: Techniques, comparative data, and graphs to estimate input factors, such as trap volume, porosity, net/gross saturation, hydrocarbon fill fraction, formation volume factors, and recovery efficiencies • Probability methods: The expression of uncertainty for input factors and results including Monte Carlo techniques • Risk analysis • Hydrocarbon charge assessment: Procedures for estimating possible amounts of oil and gas generated, migrated, and trapped in prospects • Prospect and Play assessment workshops: Projects supplied either by the instructor or by participants, worked by teams and reported to the entire group • Play assessment techniques: Estimating the possible numbers, sizes, and associated risks for potential fields, with useful data on field densities, field-size distributions, oil versus gas relationships, and dependent versus independent risks • Play recognition and mapping: Play classification and subdivision, and play maps that high-grade the most favorable areas with minimal geologic risks • Aggregation of assessment results: Summing, de-risking, and preparing for economic analysis • Limitations, pitfalls, uses, and discovery concepts: The philosophy of judging and using assessment results and the importance of basic geologic concepts

2015 Schedule and Tuition / 5 Days

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<td>14-18 SEP</td>
<td>US$4,870+VAT</td>
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† includes field trip
You will learn:

• How seismic data represents subsurface rock parameters including the relative structure, lithology, and pore filling material
• How land and marine seismic data is acquired and processed to produce both a two and three dimensional seismic image
• The limits of vertical and horizontal resolution inherent in the seismic data
• How seismic data is used to define reservoir parameters and how it relates to 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 technology including seismic inversion has helped us to define rock properties including pore filling material, poro pressure, water saturation, and fracture orientation
• How to value the recent focus on developments such as time lapse seismic surveys for reservoir monitoring purposes

Course Content

The course is designed to familiarize anyone using seismic data with the nature of the data and what it exactly represents. 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 as a communication vehicle. The course is supplemented by a large number of case histories that graphically 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 data disk with several executable programs for parameter calculation and seismic modeling. Potential participants in this course (BGP) should also review the description for the Seismic Imaging of Subsurface Geology course (SSD). The Basic Geophysics course is designed to provide participants with a clear understanding of the nature of the seismic image. Seismic Imaging is a foundation level course that is designed for people who will be involved directly in decisions concerning how seismic data are acquired and processed.

Course Content

The nature of seismic data • What is wave propagation?
• What causes seismic reflections and how they relate to rock properties including pore filling material • The wavelet in the seismic data and its limit of resolution
• Seismic velocities as they relate to rock properties and the imaging process • and more
and seismic attributes as other ways of extracting material from seismic inversion • Spectral decomposition fluid replacement • Rock properties and pore filling effects in the seismic data • Acquisition and processing production zones around the world with various ages and filling material • AVO and how it relates to the typical appearance of hydrocarbons in the data • An inventory of Seismic fundamentals as they relate to defining the COURSE CONTENT each two participants.

One personal computer is provided, at additional cost, for integrating the course material into their everyday work. These technologies. The focus of the course is on both clear and useable understanding of the current state of rock properties and the pore filling material. This course is designed to provide the users and applicationists with a clear and useable understanding of the current state of these technologies. The focus of the course is on both understanding and application. Exercises: Each topic in the course outline is reinforced by an exercise that gives the participants many practical and simple methods of integrating the course material into their everyday work.

One personal computer is provided, at additional cost, for each two participants.

COURSE CONTENT Seismic fundamentals as they relate to defining the appearance of hydrocarbons in the data • An inventory of direct hydrocarbon indicators, including AVO • Risk rating prospects that display AVO anomalies • Understanding rock properties and the effect of pore filling material • AVO and how it relates to the typical production zones around the world with various ages and depths of burial • Various methods of displaying AVO effects in the seismic data • Acquisition and processing considerations to display hydrocarbons as a pore filling material • Various approaches to seismic modeling and fluid replacement • Rock properties and pore filling material from seismic inversion • Spectral decomposition and seismic attributes as other ways of extracting reservoir information from the seismic image

ABOUT THE COURSE The subject of direct hydrocarbon indicators and AVO has rapidly expanded to include AVO inversion, offset AVO inversion, and 4D AVO inversion. A significant part of the course deals with rock physics as it relates to the other topics in the course. Further insight into the seismic data is supplied by looking at seismic attributes. The technology has provided the interpreter with a very new and exciting package of tools that allow us to look at the seismic image as being truly representative of both the rock properties and the pore filling material. This course is intended to provide the users and applicationists with a clear and useable understanding of the current state of these technologies. The focus of the course is on both understanding and application. Exercises: Each topic in the course outline is reinforced by an exercise that gives the participants many practical and simple methods of integrating the course material into their everyday work.

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ABOUT THE COURSE The subject of direct hydrocarbon indicators and AVO has rapidly expanded to include AVO inversion, offset AVO inversion, and 4D AVO inversion. A significant part of the course deals with rock physics as it relates to the other topics in the course. Further insight into the seismic data is supplied by looking at seismic attributes. The technology has provided the interpreter with a very new and exciting package of tools that allow us to look at the seismic image as being truly representative of both the rock properties and the pore filling material. This course is intended to provide the users and applicationists with a clear and useable understanding of the current state of these technologies. The focus of the course is on both understanding and application. Exercises: Each topic in the course outline is reinforced by an exercise that gives the participants many practical and simple methods of integrating the course material into their everyday work.

One personal computer is provided, at additional cost, for each two participants.

COURSE CONTENT Seismic fundamentals as they relate to defining the appearance of hydrocarbons in the data • An inventory of direct hydrocarbon indicators, including AVO • Risk rating prospects that display AVO anomalies • Understanding rock properties and the effect of pore filling material • AVO and how it relates to the typical production zones around the world with various ages and depths of burial • Various methods of displaying AVO effects in the seismic data • Acquisition and processing considerations to display hydrocarbons as a pore filling material • Various approaches to seismic modeling and fluid replacement • Rock properties and pore filling material from seismic inversion • Spectral decomposition and seismic attributes as other ways of extracting reservoir information from the seismic image

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One personal computer is provided, at additional cost, for each two participants.
Advanced Seismic Stratigraphy: A Sequence – Wavelet Analysis Exploration – Exploitation Workshop –ADS

DESIGNED FOR
Geophysicists, geologists, and explorationists who have completed the PetroSkills course, Introduction to Seismic Stratigraphy: An Exploration Workshop: A Basin Scale Regional Workshop, or have comparable training and desire a challenging workshop, which will improve exploration and development skills.

YOU WILL LEARN HOW TO
• Evaluate rock-fluid information from wavelet analysis
• Understand the strengths and weaknesses of Geomalivation using and missing synthetics, seismic inversion, and VSP
• Determine fault mechanical stratigraphy through proper interpretation of fault imaging
• Understand the differences, weaknesses, and strengths of both the “Vail” with the “Galloway” Sequence Paradigms and when to optimally employ them
• Develop sea level curves from microfossil analysis
• Construct detailed seismic facies maps and understand their relationship to Walter’s law
• Classify deltas based upon their seismic characteristics
• Differentiate basin floor fan facies and parasequence sets
• Interpret clastic and carbonate depositional system responses to alloyclic and autocyclic processes and the effects upon reservoir architecture and seal potential
• Interpret parasequence set fairways for exploration
• Geophysically characterize reservoirs for optimizing development

ABOUT THE COURSE
Seismic stratigraphy is a powerful tool for exploration and exploitation, especially when the rock-fluid information within the seismic wavelet (reflection character analysis) is integrated with the lithofacies-stratigraphic information, which is determined from reflection group geometry (sequence analysis). The methods used in this workshop do not rely upon either cosmetic processing or interpretation as an art; instead, practical methods of seismic stratigraphy are employed as a science, based upon firm, tested principles that are applied to a spectrum of tectonic structural styles and depositional environments. This rigorous course is a problem-oriented, hands-on workshop including significant group discussion and presentation. Participants learn how to make seismic modeling—interpretation judgments as a basis for seismic facies and reflection character analysis. Case studies for exploration and development incorporate 2-D and 3-D seismic data with well data selected from around the world.

COURSE CONTENT
• Introduction: Review of Philosophy and Epistemology
• Application of Geophysical Fundamentals (Wave theory, attributes, frequency substitution, and coherence)
• Amplitude Variation with Offset (lithologies, fluids, gases, porosities, and pressures)
• Fault Mechanical Stratigraphy • Vail and Galloway Sequence Theory and Application • High Resolution Sea Level Curve Generation from Micropalaeo • Shallow and Deep Water Siliciclastic Sequences • Seismic Facies and Palaeo-Environmental Analysis • Reservoir scale geophysics using the wavelet • Imaging hydrocarbons
• Geohistory Reconstruction • Optimizing Exploration and Development

2015 Schedule and Tuition / 5 Days

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<td>15-19 JUN</td>
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Coring and Core Analysis – CCA

DESIGNED FOR
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 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/gap errors in core analysis vendor reports (quality control)
• Select samples for special core studies
• Correlate core and log data

ABOUT THE COURSE
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.

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

PRE-REQUISITES
• Geophysical impact on economic uncertainty
• Petrophysical impact on economic uncertainty
• Understanding the strengths and weaknesses of Geomalivation using and misusing synthetics, seismic inversion, and VSP
• Petrophysical impact on economic uncertainty

COURSE CONTENT
Coring and core analysis objectives • Coring hardware and maximizing core recovery • Core-handling, website procedures, and preservation methods • Sidewall coring and analysis • Organizing effective laboratory programs • Porosity, permeability and fluid saturation • Quality control in core analysis • Petrography and mineralogy • Special core analysis sample selection and statistical data analysis • Core-log correlation (includes mmr log calibration, acoustic, nuclear, and electrical properties) • An 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

2015 Schedule and Tuition / 5 Days

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<td>LONDON, U.K.</td>
<td>28-SEP-2 OCT</td>
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Foundations of Petrophysics – FPP

DESIGNED FOR
Geoscientists and engineers with less than two years experience using petrophysical data, and other technical staff at all experience levels wanting a fundamental background in the petrophysics discipline.

YOU WILL LEARN HOW TO
• Understand and apply at a basic level the theory and operation of major petrophysical tools
• Calibrate porosity and permeability values from core and log sources for improved saturation calculations
• Apply basic cased-hole logging, borehole seismic, image, and LWD/MWD
• Analyze and integrate log, core, geoscience, and engineering well data for well and field development projects
• Select petrophysical tool combinations for specific applications
• Assess the impact of petrophysical analyses on technical uncertainty estimates of reservoirs

ABOUT THE COURSE
Petrophysics is fundamental to all aspects of the petroleum business. Principles, applications, and integration of petrophysical information for reservoir description will be discussed in depth. Through a combination of class discussion and exercises/ workshops, participants will learn how to conduct competent quick-look evaluations. Using data from open hole logs, logging-while-drilling, and core data you will evaluate porosity, permeability, and saturation in a variety of reservoirs. Knowing how to integrate petrophysical information with other data sources will improve participants’ ability to assess technical risk when examining hydrocarbon opportunities. This course is ideal for providing technical staff with a fundamental background of petrophysics. The first day gives an introduction and covers mudlogging, data acquisition, and quicklook. The second and third days cover core and core analysis, and evaluation. Day four introduces special tools and integration, including image logs, NMR, pressures, shear, seismic, and integration of petrophysics. The course wraps up with integration and cased hole logging.

COURSE CONTENT
• Fundamental concepts of petrophysics • Depositional systems and petrophysical rock parameters • Nature of porosity and permeability • Basic rock properties; theory and quicklook techniques • Mudlogging • Core analysis, acquisition, interpretation, and quality checks • Theory and basics of resistivity, radioactivity, acoustic tools • LWD/MWD versus open hole logging • Determination of rock types using core and logs • Cased hole logging • Petrophysical impact on economic uncertainty • Evolving petrophysical technologies

2015 Schedule and Tuition / 5 Days

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<td>LONDON, U.K.</td>
<td>28-SEP-2 OCT</td>
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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 lithologies
- Recognize the importance of electrical properties of earth materials
- Highlight oil mobility
- Interpret pressure profiles
- Develop optimum tools and logging programs
- Apply quickbook methods of formation evaluation

ABOUT THE COURSE
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 Rosbottaw to bankers. Familiarity with the purposes and optimum applications of well logs is therefore essential for people forging 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 developed to explain the functioning of modern logging tools. Wherever possible, the physics of logging measurements is related to everyday tools and appliances. 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 (the eyes of the part-time log interpreter), quickly and efficiently discriminate between water, oil, and gas. Error minimization techniques, applicable only to computerized log analysis, produce optimal results. Participants gain realistic experience by working in teams on a comprehensive log interpretation exercise.

COURSE CONTENT
- Logging objectives
- Invasion profile
- Challenge of borehole geophysics
- Passive electrical properties of earth materials
- Resistance measuring tools, normal, induction, laterolog
- Reservoir/non-reservoir discrimination
- Matrix-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 crosstips and mineralogy identification
- Partially saturated rock properties and Archie Equation
- Linear movable oil plot
- and more

2015 Schedule and Tuition / 5 Days

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<td>LONDON, U.K.</td>
<td>11-15 MAY</td>
<td>US$4,670+VAT</td>
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<td>23-27 NOV</td>
<td>US$4,670+VAT</td>
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<td>21-25 SEP</td>
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- Apply quickbook methods of formation evaluation
- Recognize the importance of electrical properties of earth materials
- Highlight oil mobility
- Interpret pressure profiles
- Develop optimum tools and logging programs
- Apply quickbook methods of formation evaluation

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

COURSE CONTENT
- Objectives of integration
- Key rock properties for formation evaluation
- Impact of depositional environment and rock properties
- 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 saturation components
- CEC - fluid sensitivity
- Review of production profiles
- Overview of pressure transient analysis
- Calculation of VClay/Vshale calibration of core and logs
- Calculation of porosity using porosity Logs in complex lithologies
- What is effective porosity?
- Calculation of SW using different methods
- Determining pay and pay classes

2015 Schedule and Tuition / 3 Days

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<td>MIDLAND, U.S.</td>
<td>14-16 DEC</td>
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- Monitor fracture treatments
- Design an integrated interpretation
- 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

2015 Schedule and Tuition / 3 Days

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- Apply quickbook methods of formation evaluation
- Recognize the importance of electrical properties of earth materials
- Highlight oil mobility
- Interpret pressure profiles
- Develop optimum tools and logging programs
- Apply quickbook methods of formation evaluation

ABOUT THE COURSE
Petrophysics is central to the integration of a wide spectrum of related geoscience and engineering disciplines. The evaluation and exploitation of unconventional reservoirs will be covered through a combination of lectures, discussions, exercises and selected case studies. Participants should also be familiar with at least two or more of the following topics: horizontal well drilling, mud logging, wireline logging & log analysis, coring & core analysis, petrophysics, geophysics, geochemistry, formation testing, rock mechanics, hydraulic fracturing and petroleum economics.

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

Download the entire PetroSkills course schedule at petroskills.com/aapg
You will learn how to:

- Interpret dipmeters and borehole-imaging logs and understand the physical principles behind them
- Detect and quantify faults and fractures, determine in-situ stress orientations, improve horizontal well placement, provide input into flow simulations
- Determine palaeocurrent orientations, define stratigraphic compartments, quantifyubby porosity, detect thin beds, apply image data in reservoir characterization

About the course:

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 induces 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.

Course content:

- Dipmeters and borehole imaging provide video, density, gamma-ray, acoustic and/or electrical images of the borehole face. Dipmeters 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, induced, and healed fractures, faults, fold axes, unconformities, and in situ stress. Stratigraphically, dipmeters and borehole images are used to identify paleo-current directions, bounding surfaces, facies, thin beds, net-sand, and secondary porosity. The key objective of dipmeter and borehole-image 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 underutilized logging tools.

About the course:

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, 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.

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, plastic, and viscous models of rock behavior
**UNCONVENTIONAL KNOW HOW**

PetroSkills delivers the knowledge and skills required for unconventional resource plays.

Challenges with developing unconventional resources are driving industry to implement more efficient workflows and more cost-effective formation evaluation solutions, which in turn force optimization at every step. PetroSkills continues to lead the way in delivering knowledge and skills for these ever-evolving requirements, constantly expanding our unconventional program to deliver the know-how required for unconventional resource plays.

PetroSkills courses for Unconventional Resources are designed to ensure that industry professionals achieve maximum competency for shales, tight sands, and coalbed methane plays. In addition to the programs shown here, PetroSkills course offerings across the board recognize that unconventional resources are now part of the resource set for all industry professionals.

**PETROSKILLS UNCONVENTIONAL RESOURCE COURSES:**

- Advanced Hydraulic Fracturing
- Applied Rock Mechanics
- Basic Petroleum Engineering Practices
- Basic Petroleum Technology
- Coalbed Methane
- Directional, Horizontal, and Multilateral Drilling
- Evaluating and Developing Shale Resources
- Foundations of Petrophysics
- Fundamentals of Pump and Compressor Systems
- Gas Conditioning and Processing
- Gas Production Engineering
- Geosteering
- Horizontal and Multilateral Wells: Analysis and Design
- Horizontal and Multilateral Wells: Completions and Stimulation
- Hydraulic Fracturing Applications
- Instrumentation, Controls and Electrical Systems for Facilities Engineers
- Introduction to Oil and Gas Production Facilities
- Onshore Gas Gathering Systems: Design & Operations
- Onshore Pipeline Facilities - Design, Construction and Operations
- Overview of Gas Processing - Technical
- Piping Systems - Mechanical Design and Specification
- Petrophysics of Unconventional Reservoirs
- Process Safety Engineering
- Reservoir Management for Unconventional Reservoirs
- Surface Water Management in Unconventional Resource Plays
- Unconventional Resources: Completion and Stimulation
- Use of Full Azimuth Seismic and Microseismic for Unconventional Plays
- Well Test Design and Analysis
- Well Design and Engineering

For more information on these programs, see www.petroskills.com/unconventional/aapg or email us at unconventional@petroskills.com +1.918.828.2500 or 1.800.821.5933 (toll free North America)

**2015 Schedule and Tuition / 5 Days**

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<td>10-14 AUG</td>
<td>US$3,900</td>
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<td>DUBLIN, U.S.</td>
<td>1-5 JUN</td>
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<td>HOUSTON, U.S.</td>
<td>4-8 MAY</td>
<td>US$3,940</td>
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<td>LONDON, U.K.</td>
<td>13-17 JUL</td>
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<tr>
<td>KUALA LUMPUR, MALAYSIA</td>
<td>17-21 AUS</td>
<td>US$4,570</td>
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<td>LONDON, U.K.</td>
<td>27-31 JUL</td>
<td>US$4,570+VAT</td>
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<tr>
<td>LONDON, U.K.</td>
<td>19-23 OCT</td>
<td>US$4,570+VAT</td>
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Reservoir Engineering for Other Disciplines

**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 HOW TO**
- Utilize the tools and techniques of the reservoir engineer
- Apply the principles of reservoir engineering
- Develop reservoir, well performance and asset management options

**ABOUT THE COURSE**
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 engineer’s 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.

One personal computer is provided, at additional cost, for each two participants.

**COURSE CONTENT**
- Distribution of reservoir properties: Structure, rock properties, porosity, permeability, water saturation, fluid contacts, and pressure
- Rock and fluid properties: Relative permeability, capillary pressure, phase behavior of reservoir fluids, gas properties, oil properties, PVT sampling and PVT laboratory reports
- Volumetric calculation of reservoir fluids in place: Oil in place, gas in place, uncertainty and probabilistic methods and recovery efficiencies
- Material balance methods: Oil reservoir material balance, Havsetal. Oden method, gas material balance, volumetric, compaction, water drive and compartmentalized reservoirs
- Fluid flow/well performance: Radial and linear flow, transient, pseudo steady state, steady state flow regimes, well productivity, aquifer influx
- Immiscible displacement: Fluid displacement process, fractional flow, Buckley-Leveett, Wege, water under-running and gas overriding
- Coning, cusping, horizontal wells: Gas reservoirs, Oil reservoirs
- Reservoir simulation: Why simulate?, various models and types, setting up models and conducting studies

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Capillary in Rocks

**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**
- Select capillary pressure measurement methods
- Closure correct a set of mercury/air capillary pressure data
- Use Thomeer, Leverett-J, and Brooks-Corey methods
- Determine the representation of a set of capillary pressure curves within a zone of interest
- Estimate permeability from a mercury/air capillary pressure curve
- Calculate pore throat sizes from a capillary pressure curve
- Create a synthetic capillary pressure curve and estimate the air permeability from a petrographic analysis
- Obtain values for interphase tension
- Convert mercury/air capillary pressure curves to hydrocarbon/water capillary pressure curves
- Determine saturation-height distribution in a single-pore system rock or in a multiple-pore system rock
- Determine irreducible water saturation
- Estimate the length of a transition zone
- Use Klein-Hill-Shirley method for clay-bound water
- Convert/contrast data with NMR data
- Determine the maximum column of hydrocarbon that a specific “sealing” layer can sustain without leaking

**ABOUT THE COURSE**
This course has been expanded to three days starting in 2008. 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 derive valuable information about reservoir properties including pore throat sizes, pore network geometry, porosity, and permeability. Several in-class exercises reinforce the course learning and provide students with experience using capillary pressure data for reservoir characterization. Exercises will be worked on the computer using spreadsheet software.

One personal computer is provided, at additional cost, for each two participants.

**COURSE CONTENT**
- Capillary pressure applications in reservoir characterization: Rock properties from mercury/air capillary pressure curves.
- 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

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Integrated Reservoir Modeling

**DESIGNED FOR**
Geologists, geophysicists, engineers, petrophysicists or others involved in reservoir modeling.

**YOU WILL LEARN HOW TO**
- Develop the workflow in the reservoir integration process
- Evaluate and quantify uncertainties in various sources of data
- Build a geo-cellular model using geostatistical tools and upscale it to capture essential heterogeneities
- Develop criterion for objective history matching
- Utilize seismic data in different phases of reservoir description and integrate them using geostatistics
- Use various description tools in a judicious manner
- Use public domain software to apply many of the techniques discussed in class

**ABOUT THE COURSE**
As the oil companies define business units and asset teams, it is becoming increasingly important that all the team members understand the workflow in developing integrated reservoir description for that asset. A proper development of reservoir description is helpful in managing daily operations of the asset, as well as long term planning. Integration involves using all the available information about the reservoir to develop better understanding of the reservoir. This process is inherently interdisciplinary and requires understanding of all the disciplines. Although soft skills are important in working in an interdisciplinary team, this course concentrates on the hard 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, up-scaling to simulator 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. The course will develop improved appreciation of the other disciplines’ needs as well as the necessity of the feedback during the integration process.

One personal computer is provided, at additional cost, for each two participants.

**COURSE CONTENT**
- Basic statistical principles
- Spatial modeling
- Structural modeling
- Estimation of properties at well locations
- Conditional simulation
- Facies/rock type modeling
- Petrophysical properties simulation
- Ranking of realizations
- Construction of simulator input model
- History matching
- Future predictions and quantification of uncertainty

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2015 Schedule and Tuition / 5 Days

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<th>Dates</th>
<th>Price</th>
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<td>ABERDEEN, U.K.</td>
<td>22-26 JUN</td>
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<td>7-21 JUL</td>
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<td>18-22 SEP</td>
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<td>LONDON, U.K.</td>
<td>24-28 OCT</td>
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*plus computer charge

2015 Schedule and Tuition / 3 Days

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<td>15-17 OCT</td>
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*plus computer charge
### Oil and Gas Reserves Evaluation – OGR

**DESIGNED FOR**
Geologists, geophysicists, reservoir engineers, reserves managers, bankers, and government officials involved in reserves reporting, reserves auditing, and reserves estimations.

**YOU WILL LEARN HOW TO**
- Correctly interpret and apply the SPE-PRMS reserves definitions and principles
- Interpret and apply the SEC Modernization of Oil and Gas Reporting definitions and guidelines
- Generate compliant reserves estimates and reports using either set of definitions
- Understand and use various traditional engineering and geoscience techniques to satisfy reserves reporting requirements
- Incorporate modern, “reliable technology” into your reserves estimates
- Document your reserves estimations
- Prepare for an SEC, third party, or bank audit of your work
- Successfully defend your estimates during an audit
- Conduct a thorough audit of another party’s reserves report

**ABOUT THE COURSE**
Key objectives of the course are to learn various compliant methods of preparing reserves estimates; learn to estimate and understand the impact of economics on those estimates, and properly classify those reserves using the current reserves definitions. Recent case studies, SEC audit questions, and class problems are used extensively to develop an understanding of those skills and include ethical issues that arise when calculating and reporting reserves.

*One personal computer is provided, at additional cost, for each two participants.*

**COURSE CONTENT**
- Purpose and uses of reserves estimates
- Types of reserves studies
- How to read and understand reserves report
- SPE-PRMS reserves definitions
- SEC reserves definitions
- Compliant reserves estimation methods using analogies, volumetric analysis, performance analysis, and material balance
- Supplemental compliant estimation techniques incorporating probabilistic analysis and simulation
- Economics and reserves
- Special reserves estimation topics
- Reserves reporting in low permeability reservoirs, shale gas reservoirs, CBM, and EOR projects

*La sesión realizada en Buenos Aires estará enseñada en español!*

**2015 Schedule and Tuition / 5 Days**

<table>
<thead>
<tr>
<th>City</th>
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<td>Denver, U.S.</td>
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<td>London, U.K.</td>
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<td>Perth, Australia</td>
<td>22-26 JUN</td>
<td>$5,460+GST*</td>
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*plus computer charge*
The basic principles of accounting
The effect of finance, budgeting, and contractual economic factors in computer spreadsheet analysis
Selecting projects for the budget
Economic analysis depletion, amortization
Budgeting: types, processes, business arrangements between operators, between...
Financing, ownership in the oil and gas industry: probabilistic models, uncertainty in economic analysis
Uncertainty: types of risk, mathematical techniques, operating expenses, capital expenditures, inflation, course.

ABSTRACT
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. This course will provide the fundamentals necessary to enable you to do so. Budgeting and financing, and 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. Participants are invited to submit their own economic problems, if appropriate. Each participant will receive Economics of Worldwide Petroleum Production, written specifically for PetroSkills courses. Employees of PetroSkills member companies are suggested to take the three-day Basic Petroleum Economics course.

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 • Financing, ownership in the oil and gas industry: business arrangements between operators, between mineral owners • Accounting versus cash flow: accounting principles and definitions, differences between accounting cash numbers, depreciation, depletion, amortization • Budgeting: types, processes, selecting of projects for the budget • Economic analysis of operations • Computer economics software • Tips on economic factors in computer spreadsheet analysis

Three day version also available

2015 Schedule and Tuition / 5 Days
DEMER, U.S. 15-19 JUN US$3,900
HOUSTON, U.S. 4-8 MAY US$3,940
13-17 JUL US$3,940
12-16 OCT US$3,940
14-18 DEC US$3,940
KUALA LUMPUR, MALAYSIA 8-12 JUN US$5,570+VAT
12-16 OCT US$5,570+VAT
14-18 DEC US$5,570+VAT
SAN FRANCISCO, U.S. 3-7 AUG US$3,900
16-20 NOV US$3,900
Available from anywhere via PetroFlex delivery

2015 Schedule and Tuition / 5 Days
HOUSTON, U.S. 11-15 MAY US$4,040
10-14 AUG US$4,040
30 NOV-4 DEC US$4,040
KUALA LUMPUR, MALAYSIA 24-28 AUG US$4,670
LONDON, U.K. 20-24 JUL US$4,670+VAT
12-16 OCT US$4,670+VAT

2015 Schedule and Tuition / 2 Days
BAYERSFIELD, U.S. 29-30 APR US$2,340+
HOUSTON, U.S. 6-9 JUL US$2,360+
NEW ORLEANS, U.S. 26-27 OCT US$2,340+
OKLAHOMA CITY, U.S. 19-20 MAY US$2,340+
PERTH, AUSTRALIA 25-26 AUG US$2,740+GST

Expanded Basic Petroleum Economics
BEC
Geomatics: Geodesy and Cartography
GEOM1
Petroleum Risk and Decision Analysis
PRD

DEIGNED FOR
Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production. Due to similarity in content, PetroSkills recommends that participants take this course if they have no previous experience in this subject. For participants with more exposure to the subject, please review the Economics of Worldwide Petroleum Production description as its course content is more advanced than either Basic Petroleum Economics or Expanded Basic Petroleum Economics. Take one or the other, but not both courses.

YOU WILL LEARN
• How to evaluate the economic viability of a project
• Cash flow techniques applicable in economic evaluations
• Models to weigh risk and uncertainty
• Techniques to determine expected value
• The effect of finance, budgeting and contractual agreements have on a project
• The basic principles of accounting

ABOUT THE COURSE
Good technical and business decisions are based on competent analysis of project costs, benefits and risks. Over half the problems relate to exploration investment decisions. 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. The complementary Monte Carlo simulation technique is experienced in detail in a hand-calculation exercise. Project modeling fundamentals and basic probability concepts provide the foundation for the calculations. The mathematics is straightforward and mostly involves only common algebra. The emphasis is on practical techniques for immediate application. This is a fast-paced course and recommended for those with strong English listening skills. The course is intended as the prerequisite for the Advanced Decision Analysis with Portfolio and Project Modeling course.

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)

YOU WILL LEARN TO
• Describe the elements of the decision analysis process and the respective roles of management and the analyst
• 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

ABOUT THE COURSE
Use of incorrect geodetic parameters can cause major errors in positions of wells, pipelines and seismic surveys, with significant financial losses and sometimes with HSE risks, as demonstrated by case studies. Awareness of geodetic datums, coordinate reference systems and map projections is provided via interactive demonstrations and hands-on workshop exercises using the online EPSG Geodetic Registry. Students learn how Global Navigation Satellite Systems (GNSS) systems, including GPS work, as well as the resultant accuracies obtainable using different receiver types and data processing techniques. Hands-on GPS exercises show potential errors. "Google Earth" is examined with focus on its strengths and weaknesses for E&P purposes. Lastly, the importance of geospatial metadata is stressed, since often such metadata is implemented at the end of a project. This critical geospatial data component is discussed with recommendations for "best practices" using current industry references.

One personal computer is provided, at additional cost, for each two participants.

COURSE CONTENT
• How much trouble can coordinate errors cause (with case studies) • Key geomatics/geodesy definitions
• Geospatial reference surfaces • Geodetic datums, coordinate reference systems and transformations
• Global navigation satellite systems (GNSS) including GPS • Map projection methods • What is "North" • Effects of different linear units • Vertical datums, geoidal models, vertical CRS and transformations
• Google Earth and associated geospatial data issues
• Geospatial metadata: What is it and how can it be made part of the normal workflow process • Recap and course references

YOU WILL LEARN
• How to identify "bad" geodetic parameters within your project data, and ensure that geodetic parameters provided to you are correct
• The advantages and disadvantages of using various Map Projections
• Application of content to projects in your specific geoscientific software applications
• How to evaluate geospatial metadata in your projects; learn how to generate good geospatial metadata in your own products
• The limitations on "reasonable use" of Google Earth for your own applications
• The accuracy limits of different types of GNSS / GPS receivers and technology
DESIGNED FOR
Geoscience professionals and support staff who are going to be using GIS tools, and E&P project staff who need a basic understanding of GIS in order to manage geospatial projects.

YOU WILL LEARN HOW TO
- Explore the benefits in applying Geographic Information Systems (GIS) to your petroleum workflows.
- Utilise ArcGIS functionality to import spatial and non-spatial databases, integrate, manage and analyse data to produce information for decision making.
- Use industry standard ArcGIS tools, including ArcMap, ArcCatalog, ArcToolbox.
- Focus on learning how to put E&P workflows through ArcGIS.
- Set up an E&P project.
- Join spatial data to a Well database.
- Create a Well Layer from tabular X and Y Coordinates.
- Digitise a Fault map and edit a Play Fairway map.
- Undertake spatial and attribute queries.
- Export data into a number of formats.
- Produce professional Map Layouts.
- Update a Play Fairway and assess potential acreage.

ABOUT THE COURSE
An entry level course that teaches you how to use Esri’s ArcGIS Desktop within oil and gas exploration and production (E&P) activities utilizing petroleum industry spatial data and workflows. This course allows you to explore the benefits in applying Geographic Information Systems (GIS) to your petroleum workflows. You will be introduced to fundamental ArcView functionality that allows geoscientists to import spatial and non-spatial databases, integrate, manage and analyse data to produce information for decision making. No geospatial knowledge is assumed beyond that acquired through the use of geological maps. Although petroleum exploration and production (E&P) sector knowledge is not required, this course is geared towards assisting participants to implement E&P workflows geospatially.

One personal computer is provided, at additional cost, for each participant.

COURSE CONTENT
- Setting up an E&P Project
- Managing E&P Data Layers
- Georeferencing Images
- Joining Spatial Data to a Well Database
- Creating Simple Hyperlinks
- Building Hyperlinks into an Attribute Table
- Digitising a Fault Map
- Editing a Simple Play Fairway
- Spatial Data Queries
- Attribute Query with SQL
- Simple Spatial Data Analysis
- Exporting Attribute Tables
- Producing Map Layouts
- Exporting Map Images
- Updating the Play Fairway
- Assessing Potential Acreage

YOU WILL LEARN HOW TO
- Explore the benefits in applying Geographic Information Systems (GIS) to your petroleum workflows.
- Utilise ArcGIS functionality to import spatial and non-spatial databases, integrate, manage and analyse data to produce information for decision making.
- Use industry standard ArcGIS tools, including ArcMap, ArcCatalog, ArcToolbox.
- Develop the ArcGIS skills required to manage Coordinate Reference Systems.
- Better understand petroleum CRS sector standards.
- Understand the workflows required to undertake datum transformations.
- Work through common problems encountered in oil and gas and develop a strategy for dealing with these issues.

ABOUT THE COURSE
With a view to encouraging good practice within the oil and gas exploration and production (E&P) sector, the emphasis in this course is on developing the ArcGIS Desktop skills you need to successfully manage coordinate reference systems (CRS) issues within ArcView. All spatial data is concerned with location on the surface of the earth and this ‘position’ is governed by the parameters of the CRS employed. If you do not manage coordinate reference systems correctly, your data could be incorrectly located with the potential for costly disasters and mistakes such as; drilling in the wrong location, damage to existing infrastructure, incorrect positioning of geohazards, interpretation and modeling in wrong location and incorrect reserves calculation. One personal computer is provided, at additional cost, for each participant.

COURSE CONTENT
- Properties of Coordinate Reference Systems
- Map Projections and the ArcMap Data Frame
- Exporting and Projecting Vector Data
- Raster Datasets and Coordinate Reference Systems
- Datum Transformations
- The EPSG Geodetic Parameter Dataset

YOU WILL LEARN HOW TO
- Explore the benefits in applying Geographic Information Systems (GIS) to your petroleum workflows.
- Utilise ArcGIS functionality to import spatial and non-spatial databases, integrate, manage and analyse data to produce information for decision making.
- Use industry standard ArcGIS tools, including ArcMap, ArcCatalog, ArcToolbox.
- Focus on learning how to put E&P workflows through ArcGIS.
- Use oil field datasets to build a working GIS.
- Encounter and deal with common data management issues.
- Participate in a strategic decision-making workshop.
- Develop an understanding of GIS management issues.
- Develop strategies for managing spatial data infrastructure.

ABOUT THE COURSE
This course takes you through the development of oil and gas exploration and production (E&P) spatial data infrastructure. Using ArcGIS Desktop tools, you will be guided through the hands-on process of structuring and loading an E&P GIS using a realistic collection of well, surface and subsurface data sources from an operating field. You will also develop an understanding of how to implement metadata in a petroleum focussed spatial data infrastructure. This course focuses on the management of a spatial data infrastructure and is geared towards helping you develop the skills needed to manage data quality and refresh datasets without compromising the integrity of the data store. Participants with GIS expertise but who are new to the oil and gas sector will gain a more thorough understanding of the spatial data management issues.

One personal computer is provided, at additional cost, for each participant.

COURSE CONTENT
- Overview of Building an E&P GIS Spatial Data Infrastructure (SDI)
- Create a Geodatabase
- Well Data
- Licence Data
- Seismic Data
- Raster Data and Raster Catalogs
- Spatial Data Metadata
- Implementing Desktop Access
- Strategic Decisions in E&P GIS Implementation
- GIS in the Oil and Gas Project Lifecycle
- Stakeholders and GIS Fiscal Points
- Managing and E&P GIS Spatial Data CC
- Managing an SDI
- Interfaces with Third Party Systems

Download the entire PetroSkills course schedule at petroskills.com/aapg
Introducing ePetro™
Online Learning for Petroleum Professionals

ePetro is a growing series of online learning libraries covering topics across the value chain. ePetro means that you can start using industry validated content today in your blended learning curricula, instead of building your own content from scratch. Our new ePetro libraries are developed in complement to our ePilot™ online series—800 hours of technical skills and safety training used at over 500 sites worldwide.

• Interactive Learning Activities
• Engaging animations and graphics
• Certified and industry-validated
• Company-specific customizations
• Web-hosted, available 24/7

The Exploration & Production Overview Library

More than 50 hours of e-learning modules designed to provide an understanding of the upstream market segment and the steps involved in the creation and exploitation of oil and gas fields. Topics include:

Introduction to Upstream
• Exploration
• Field Development
• Production Operations
• Field Processing
• Differences in Asset Classes

Exploration Process and Technology
• Basics of Geology/Types of Geology
• Rock Formation/Structures/Tectonics
• Basics of Geophysics and Petrophysics

Drilling & Completions Process and Technology
• Basics on Drilling Processes and Technologies
• Well Planning and Design
• Drilling Applications
  • Deep Water
  • High Pressure, High Temperature (HPHT)
  • Horizontal Drilling
  • Coiled Tubing
• Drilling Operations
  • Drilling Dysfunctions and Troubleshooting
  • Formation Evaluation and Well Testing
• Well Completions

Field Development - Production
• Operations and Field Operations
• Well Surveillance

Just for AAPG readers: Visit www.petroskills.com/epetro/aapg to preview a module of the Exploration & Production Overview Library

Contact PetroSkills to discuss integrating e-learning into a blended learning program. Email solutions@petroskills.com