Developing an exceptional workforce in a low price environment
Using blended learning and leveraging technology to maximize results. Download this Executive Brief..... page 1

NEW COURSE!  Creative new technologies and practices to meet evolving requirements
Seismic Acquisition Technology in a Regulatory Era – SATR ................................................................. page 2

Ensure your understanding of the geophysical data that drives decision making
Basic Geophysics – BGP .......................................................... page 2

Understand the seismic system – its limitations and pitfalls
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Better Seismic with AVO – Embrace the technology, and understand the applications
AVO, Inversion, and Attributes: Principles and Applications – AVO .................................................... page 3
Deep industry experience and competency building expertise make PetroSkills the right choice for developing an exceptional workforce.

Industry-validated Competency Maps form the framework for all PetroSkills solutions, define benchmarks for competency, and outline the knowledge and skills required for major disciplines. Driven by these standards, our learning resources encompass the full spectrum of industry knowledge and skills needed to create comprehensive workforce solutions. Our broad industry know-how includes instructors and subject matter experts averaging 35 years of real-world experience in a range of technical subjects. This extensive knowledge combined with advanced web technology helps our clients develop, support, and manage workforce competency and compliance.

To discuss your workforce development and competency assurance goals please email solutions@petroskills.com.
### CHALLENGE:
Developing an Exceptional Workforce in a Low Price Environment

Get your copy of this Executive Brief:
**Developing an Exceptional Workforce: Doing More with Less**

- How can leveraging multiple technologies cut the time required to reach competency?
- What approach can maximize the effectiveness of face to face training, e-learning, and mentoring activities?
- How can an integrated approach accelerate learning and development?

Get your copy at www.petroskills.com/ebrief/seg

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Seismic Interpretation Video Series - FREE when you register for a course using PROMO CODE 1502
ABOUT THE COURSE

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

2015 Schedule and Tuition / 5 Days

ABERDEEN, U.K. 10-14 AUG US$4,570+VAT
BAXFIERD, U.K. 26-30 OCT US$3,900
CALGARY, CANADA 21-25 SEP US$900+GST
DALLAS, U.S. 7-11 DEC US$3,900
HOUSTON, U.S. 4-8 MAY US$3,840
17-21 AUG US$3,840
12-16 OCT US$3,840
LONDON, U.K. 8-12 JUN US$4,570+VAT
5-9 OCT US$4,570+VAT
PERTH, AUSTRALIA 7-11 SEP US$4,570+GST

Seismic Acquisition Technology in a Regulatory Era

DESIGNED FOR
Geophysicists who work in seismic acquisition. Seismic interpreters, seismic processors, engineers with involvement/interest in seismic surveys, and the full scope of E&P start with interest in seismic acquisition and HSE issues. The course is specifically designed to be useful at multiple levels: broad introduction, and details of the technology.

YOU WILL LEARN
• The concepts behind the full scope of different types of surveys acquired today
• The many interwoven technical and operational factors in successfully designing and executing surveys
• The emphasis on the diversity of technologies used, and on their limitations.
• Commercial, regulatory, and environmental issues, covered in detail and breadth so that participants can undertake an advocacy role in dealing with these increasingly more important issues.
• The many choices and risk factors that come into play while successfully acquiring data of optimal value for E&P.

ABOUT THE COURSE
Around the world we are in an age of increasingly more stringent challenges for seismic acquisition to meet regulatory requirements. Meanwhile, the acquisition of geophysical data has become increasingly more diverse, with a broad range of operational practices and technologies utilized. Regulatory and environmental issues are assuming a key driving role in seismic source design, in source strength, in footprint/impact of surveys, and other ways. To meet evolving requirements, creating new technologies and practices will be needed. There are a number of highlights in current seismic acquisition technology trends:

• There is an ongoing trend to more channels, with evolution towards point source and receivers. There are numerous nodal and cabled recording systems available for various deployments offshore, in Transition Zones, and on the water bottom.
• Volumes have improved low and high frequency outputs, and distortion is much reduced. High productivity VIBroseis surveys utilize various sweep coding techniques for simultaneous sources.
• Ocean Bottom Seismic can be acquired in a number of different ways, with efficient handling of cables and nodes, including operations in very deep water.
• Marine streamer surveys include techniques with dual sensors and varying depths to improve low frequencies, suppress multiples, and operate in difficult sea conditions. Vessel capacity and streamer counts have grown, and data can be re-constructed between streamers with dual sensors.
• Streamer steering and enhanced 4-D repeatability is improved. Wide azimuth multi-vessel geometries, and circular/coil geometries enable imaging of extreme structure.
• Utilization of buried arrays, Permanent Reservoir Monitoring, and 4-D surveys continues to grow. Micro-seismic monitoring of fracking is ongoingly done with downhole and/or surface recording. There is also an growing need to monitor induced seismicity. Fiber optic sensing including Distributed Acoustic Sensing is being deployed.

This course provides the broad technical background for these “highlights”, and for the creative design of surveys to proactively address regulatory and environmental requirements. Participants are encouraged to bring along information and questions regarding any special or unusual requirements. Participants are encouraged to bring along their own data examples for real-time data processing examples. Although mathematics is kept to a minimum, some understanding of 1D and 2D filtering is helpful. Course participants are encouraged to bring their own data examples for individual and group discussions.

COURSE CONTENT

Land sources, receivers, recording systems, survey design, noise, multi-component, HSE and permitting • Marine sources, streamers, recording, vessels, survey designs, HSE issues • Transition Zone and Ocean Bottom Seismic • Ancillary topics such as navigation, geodesy, mapping, data storage, selected wave propagation topics • and more

2015 Schedule and Tuition / 5 Days

DUBAI, U.A.E. 15-19 NOV US$5,000

Seismic Imaging of Subsurface Geology

DESIGNED FOR
Geophysicists, geophysicists, geologists and exploration team members who use seismic data and need to understand the purpose and implications of the data acquisition and processing steps that lead to the final seismic images and derivative attributes. Also, the course is appropriate to early-career processing geophysicists seeking a rigorous foundation of the principles of data processing and seismic imaging.

YOU WILL LEARN HOW TO
• Assess and determine data processing flows for a variety of acquisition and reservoir scenarios
• Determine the most cost-effective imaging or migration technique given acquisition and structural scenarios
• Recognize various noises and how best to mitigate them
• Assess and appreciate the sensitivity of data processing parameters on final images
• Estimate the vertical and lateral resolution of the processing and attribute products
• Understand and examine data acquisition and processing quality control displays
• Ask appropriate questions during all data processing steps
• Communicate effectively with specialists in seismic data acquisition, processing and interpretation
• Appreciate and evaluate the trade-offs between costs, turn-around time and sophistication of processing and imaging steps

ABOUT THE COURSE
This course is designed for those working with reflection seismic data to understand and appreciate the underlying principles and processes leading to final images and associated attributes. Basic seismic imaging principles and techniques are introduced that set the outl...
Seismic Interpretation

DESIGNED FOR
Geologists, geophysicists, and engineers who want to use seismic data for petroleum exploration and/or production. Familiarity with geological terminology will be helpful.

YOU WILL LEARN HOW TO
• Understand the seismic process, interpret seismic sections, develop a geologic model, and prepare maps
• Relate the subsurface stratigraphy to well data
• Identify different structural styles from seismic data
• Create a basic stratigraphic framework using seismic stratigraphy

ABOUT THE COURSE
Can I observe the reservoir on seismic? How large is the reservoir? Did the well cut a fault? Can seismic help me tie a set of wells? What kind of a structural trap did I drill into? Is the structure valid or a seismic artifact? Are these reflections real or multiples? How can I combine structural and stratigraphic interpretations to develop a structural and depositional history? How does seismic data acquisition and processing impact my interpretation? Will my well encounter hazards such as abnormal pressure or shallow gas? The participant learns to answer these and related questions by gaining an understanding of the seismic system, its limitations and pitfalls, and by interpreting 2-D and 3-D seismic examples of structural and stratigraphic features associated with actively producing hydrocarbon areas.

This course builds the foundation for future work in Seismic Interpretation. Topics reinforced through exercises include refraction, the seismic trace-convolutional model, spatial resolution, migration, tying loops on 2D migrated data, among other topics; along with team exercises.

COURSE CONTENT
• Basics: geological controls on the propagation, reflection, and refraction of seismic waves
• Data acquisition and processing with emphasis on its potential impact on interpretation
• 2-D and 3-D interpretation techniques
• Seismic interpretation of different structural styles: extensional, compressional, strike-slip, inverted, salt and gravity dominated basins
• Seismic velocities
• Sequence stratigraphy and seismic facies analysis
• Acoustic impedance
• DHIS
• AVO

2015 Schedule and Tuition / 5 Days

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<td>KUALA LUMPUR, MALAYSIA</td>
<td>24-26 AUG</td>
<td>US$4,670</td>
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<td>LONDON, U.K.</td>
<td>12-16 OCT</td>
<td>US$4,670+VAT</td>
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You will receive an email receipt with detailed information and directions. We will also send you an email each day with the day’s class schedule and a daily lecture.*

Seismic Velocities and Depth Conversion

DESIGNED FOR
Early to mid-career geoscientists and engineers, especially seismic interpreters, anyone who needs to understand the basic theory and procedures for creating velocity models and converting seismic data from time to depth.

YOU WILL LEARN HOW TO
• Understand the various types of velocities, their calculation, and the validity of their interpolation and extrapolation
• Compare, quality control, smooth, and combine the various velocity types into an integrated velocity model
• Validate model quality by examining the changes in velocity needed to tie the seismic data to depth
• Use the model to convert horizons, faults, and seismic data from time to depth
• Understand at an introductory level, how velocity models are used for other studies such as forward modeling and pore-pressure prediction

ABOUT THE COURSE
Seismic data is acquired in time — the time taken for the sound to travel from the source to reflectors and to return to receivers. However, wells are drilled in depth, not time. Variations in velocity can distort the depth, size, and shape of possible reservoirs. Therefore conversion from time to depth is needed for a clear picture of the prospect and the risks involved. This course will teach you how to use velocity information and structural inputs to build a consistent velocity model. First all input velocity data must be quality controlled and a calibrated velocity model created. Then the model is used to convert time horizons and seismic time data to depth. Both pre-stack and post-stack migrated data are considered. Participants are introduced to some of the velocity problems encountered in depth-migrated data, now more widely available. Participants should have a basic understanding of geophysics such as offered in Basic Geophysics - GBP. Little advanced math (calculus) is used, but algebra and lots of diagrams are applied to explain the needed concepts.

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

COURSE CONTENT
Velocity: definition and comparison of the many types of velocity including average, interval, RMS, stacking, migration, P-wave, and S-wave • Velocity Inputs: accuracy and regional extent of each, including check shots, VSPs, sonic logs, time/depth functions, well picks and pseudo velocities, seismic velocities, and horizons for structural control • Synthetic Seismograms: creation, upscaling, and tie to seismic • Advanced synthetic including synthetic gather creation, Zoeppritz equations, AVA, and AVO • Matching synthetics or VSPs to seismic data • Seismic Velocities: semblance, picking, multiples • Migration and Migration Velocities: introduction to pre- and post-stack algorithms, tomography, and iterative velocity analysis • Velocity Model Building: workflows to integrate stacking velocities, time/depth curves, well picks associated with seismic horizons (pseudo-velocities), and structure from horizons

2015 Schedule and Tuition / 5 Days

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<td>LONDON, U.K.</td>
<td>18-22 MAY</td>
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AVO, Inversion, and Attributes: Principles and Applications

DESIGNED FOR
Geophysicists, geologists, explorationists, seismic interpreters, technical support personnel, seismic data processors, exploration, production, and acquisition technology professionals who need a clear understanding of the details of implementation and application of this technology.

YOU WILL LEARN HOW TO
• Clearly understand how hydrocarbons affect the seismic image
• Use direct hydrocarbon indicators and AVO in the assessment of projects
• Understand the limits of seismic resolution
• Integrate these technologies into an interpretation project
• Better understand the nature of the seismic image as it relates to hydrocarbons
• Utilize the information available in the literature from experts in this rapidly developing part of seismic imaging

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 useful 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 • A tour 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

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

2015 Schedule and Tuition / 5 Days

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<td>LONDON, U.K.</td>
<td>15-19 JUN</td>
<td>US$4,770+VAT*</td>
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*plus computer charge
Introduction to Seismic Stratigraphy: A Basin Scale Regional Exploration Workshop – ISS

**Designed For**
Geophysicists, geologists, explorationists, and managers who are interested in an introduction or review of the theory and application of contemporary seismic stratigraphic techniques to exploration.

**You Will Learn How To**
- Apply geophysical fundamentals to uncovering the geological information embedded within seismic data.
- Understand the premises behind the “Vail” Sequence paradigm.
- Construct and interpret chronostatigraphic charts, sea level curves, and seismic facies maps.
- Interpret clastic and carbonate depositional system responses to allocyclic and autocyclic processes and the effects upon reservoir architecture and seal potential.
- Systematically reconstruct a basin’s Geohistory which provides the critical foundation for its petroleum system analysis and effective exploration.

**About the Course**
One of the most revolutionary, most effective, yet most under-utilized tools introduced into exploration this century is the concept of seismic stratigraphy. It is not a tool exclusive to geophysicists; nor is it a tool only for geologists. Seismic stratigraphic techniques are based upon an integration of firm, well-established geological and geophysical fundamentals. When properly applied, seismic stratigraphy provides a powerful foundation for geohistory analysis, helping describe a basin’s evolution and the resulting effects upon its spatial and temporal variation in hydrocarbon potential. Seismic stratigraphy chronostratigraphically constrains both the “Vail” and the “Galloway” Sequence Paradigms both the “Vail” with the “Galloway” Sequence Paradigms, and constrains the sedimentological and fault-mechanical stratigraphy of a basin. Furthermore, it can provide a predictive model extrapolated beyond the borehole as a result of potential reservoirs and seals, their sedimentary environments of deposition, and in some cases, even their paragenesis. In this rigorous workshop, participants will learn the basics of seismic stratigraphy and how it can be applied to exploration efforts by working in teams on projects selected from diverse settings around the world. Areas for the projects include borehole-constrained seismic data selected from diverse settings around the world. Areas for the projects include borehole-constrained seismic data drawn from such regions as the Alaska North Slope, Gulf of Mexico, Red Sea, Southeast Asia, South America and Western Africa.

**Course Content**
- Introduction: Philosophy and History
- Geophysical Fundamentals
- Introduction to Fault Interpretation
- Chronostatigraphy
- Sea Level Curves
- Vail Sequence Theory
- Sea Level Curves, Accommodation Space, and Cycle Orders
- Vail Sequence Theory and Sequence Hierarchy
- Seismic Facies
- Paleoenvironmental Analysis
- Geohistory Reconstruction
- Optimizing Exploration

**2015 Schedule and Tuition / 5 Days**

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<td>Houston, U.S.</td>
<td>2-6 Nov</td>
<td>US$4,140</td>
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<td>Kuala Lumpur, Malaysia</td>
<td>27-31 Jul</td>
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<td>London, U.K.</td>
<td>8-12 Jun</td>
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<td>Oklahoma City, U.S.</td>
<td>26-30 Oct</td>
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3D Seismic Attributes for Reservoir Characterization – SARC

**Designed For**
Seismic interpreters, processors, stratigraphers and structural geologists, reservoir engineers, and students of geophysics.

**You Will Learn How To**
- Use attributes to enhance subtle faults and folds, as lithologic indicators, and quality control the choice of processing parameters.
- Evaluate and exploit attribute expressions for different depositional environments to better characterize reservoirs by adopting appropriate workflows and multi-attribute tools.
- Identify geological features highlighted by attributes, limitations to seismic processing through attributes that may result in smeared attribute images from multi-azimuth and multi-offset data, limits of attribute analysis on data that have been poorly imaged and good and bad color display practices.

**About the Course**
The primary objective of this course is to gain an intuitive understanding of the kinds of seismic features that can be identified by 3D seismic attributes, the sensitivity of seismic attributes to seismic acquisition and processing, and of how ‘independent’ seismic attributes can be coupled through geology. We will also discuss alternative workflows using seismic attributes for reservoir characterization as implemented by modern commercial software and practiced by interpretation service companies. Participant discussion centered around case studies, attribute recipes for particular objectives, reservoir workflows and seismic attribute jeopardy exercises will be the main focus of the course.

**Course Content**
Types of attributes • Impact of seismic data quality on seismic attributes • Methods for preconditioning of seismic data • Introduction of various algorithms for attribute computation, their limitations and performance strengths • Attribute expression of structure and stratigraphy in terms of tectonics and diapirism, clastic and carbonate depositional systems and geologic hazards • Multi-attribute analysis tools • Reservoir characterization workflows • Physical demonstration of attributes on real seismic data

**2015 Schedule and Tuition / 5 Days**

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<td>Houston, U.S.</td>
<td>3-7 Aug</td>
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Advanced Seismic Stratigraphy: A 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 Geovalidation using and misusing syntheses, 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 microfaunuleontology
- 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 allocyclic and autocyclic processes and the effects upon reservoir architecture and seal potential
- Interpret parasequence set tie-ways 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 coherency)
- 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 Micropaleo
- Shallow and Deep Water Siliciclastic Sequences
- Seismic Facies and Paleo-Environmental Analysis
- Reservoir scale geophysics using the wavelet imaging hydrocarbons
- Geohistory Reconstruction
- Optimizing Exploration and Development

**2015 Schedule and Tuition / 5 Days**

<table>
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<th>Location</th>
<th>Dates</th>
<th>Tuition</th>
</tr>
</thead>
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<tr>
<td>Calgary, Canada</td>
<td>14-18 Dec</td>
<td>US$4,200+GST</td>
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<tr>
<td>Houston, U.S.</td>
<td>9-13 Nov</td>
<td>US$4,240</td>
</tr>
<tr>
<td>Kuala Lumpur, Malaysia</td>
<td>3-7 Aug</td>
<td>US$5,560</td>
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</tbody>
</table>
ABOUT THE COURSE
The course is designed to enable you to perform professional geophysical work to evaluate fractured reservoirs and/or reservoirs that require hydro-fracturing to produce. The emphasis of the lectures is based upon the participants’ work assignments. The course covers acquisition-design, through processing, interpretation. The skills that you will learn will also involve integrating the support data — well logs, production testing, VSP, core work, with your reflection seismic data. The course is supplemented with case histories and laboratory data measurements that graphically illustrate the principles in the course material. These are updated as appropriate to keep up with the rapidly developing technology in this field. Each section of the course is supported with a classroom exercise. The skills you will learn include the comprehension of the two types of seismic anisotropy that affect seismic data. You will learn how to identify and to employ anisotropy in order to accomplish your reservoir-related goals. Seismic anisotropy is everywhere in the layered sedimentary rocks, but in the past, geophysicists have often ignored it, sometimes because they didn’t collect the data that reveal its presence, and other times because they didn’t understand the benefits that properly recorded and processed anisotropic data provide.

COURSE CONTENT
Fundamentals of seismology • Fundamentals of seismic anisotropy • Fundamentals of 3D wide-azimuth seismic data acquisition, Issues of cost, number of channels, geophones chosen, recording system, fold, etc. Vertical component acquisition; multi-component acquisition. • Fundamentals of seismic data processing: P-P multi-azimuth, P-S multi-azimuth, S-S multi-azimuth. • Requirements for processing sequences, Necessity to comprehend the (chosen) contractor’s definition of “azimuth”, and checks throughout processing to determine if the contractor is adhering to its definition of azimuth. • Fundamentals of seismic data interpretation for fractured reservoir analysis, and in-situ stress evaluation, Commercially available software needed for multi-azimuth and/or multi-component 3D seismic interpretation. • Fundamentals of seismic data modeling for anisotropy. Common (different) assumptions within different modeling packages. • Commercially available support data. Where to find it; what it costs; how to integrate the required support data.

YOU WILL LEARN HOW TO
• Specify what set of geologic and/or engineering questions need to be asked with regard to your reservoir and your play
• Identify what support data is required for the successful fracture characterization – anisotropy survey and project
• Employ azimuthal anisotropy to your benefit

DESIGNED FOR
Geophysicists assigned to evaluate fractured reservoirs, geo-scientists assigned to evaluate reservoirs which must be hydro-fractured to produce, and working interpretation geophysicist and geo-scientists who are assigned to evaluate reservoirs.

YOU WILL LEARN HOW TO
• Specify what geologic and/or engineering questions need to be asked about your reservoir and your play
• Specify the geophysical data that need to be acquired; design acquisition; specify the processing sequence
• Interpret the final processed data & test different interpretations
• Identify the support data required for the successful fracture and in-situ horizontal stress characterization
• Extract engineering benefits and meaning from microseismic data
• Appraise the utilities, capabilities, and limitations of microseismic imaging
• Develop insights and fundamental questions for microseismic projects
• Identify the support data needed to give a complete picture of the results
• Weigh field deployment options
• Assess stimulation designs

ABOUT THE COURSE
For surface seismic, participants will learn to evaluate azimuthal seismic in fractured reservoirs or resource intervals needing hydro-fracturing. The course presents reflection seismic and microseismic acquisition-design, processing, interpretation, and integrating support data – narrow-azimuth seismic, well logs, production tests, VSP’s, core work. For microseismic, participants will learn the strengths, weaknesses, limitations, and benefits of microseismic imaging of hydraulic fractures.

COURSE CONTENT
Fundamentals of reflection seismology; seismic anisotropy – its causes and its uses • Issues, goals and pitfalls in seismic full-azimuth acquisition • Seismic data processing - non azimuthal and azimuthal • Interpretation of azimuthal interval velocities and azimuthal amplitudes for in-situ stress and natural fractures’ evaluation • Fundamentals of seismic modeling for anisotropy, especially common assumptions in different modeling packages • Microseismic: Opening Statements & Discussion. Historical Background. “Yeehaw Science 101” • Hydraulic fracture technology • In-situ and other studies of hydraulic fracture geometries • Earthquake seismology and hydraulic-fracture-induced microseismicity • The means and the methods of microseismic imaging • Examples I: Results: “The Dots” • Examples II: Interpretation and integration • Pitfalls; Benefits; FAQ’s • Wrap up discussion

TO LEARN MORE and TO REGISTER, visit petroskills.com/satr

PetroSkills®
Seismic Interpretation Video Series - FREE when you register for a course using PROMO CODE 1502
ABOUT THE COURSE

What is Basic Petroleum Geology? For all practical purposes it closely resembles the freshman level course that a non-science major at a university would take to satisfy the science requirement. Presentation is oriented toward topics of interest to the petroleum industry. While high school chemistry and physics might help in understanding a very few selected topics, the course is designed for those with no technical training (and those who studiously avoided science in school). Primary objectives of the course are to broaden your geological vocabulary, explain selected geological principles and processes, and describe how certain petroleum reservoirs and source rocks are formed. If you have had a geology course at the university level and remember most of it, this course is not for you. If you have had a geology course and don’t remember much of it, then consider this course for a refresher. If you are an engineer, geophysicist, petrophysicist, geotechnical engineer, lawyer, or financial analyst dealing with geologists and don’t understand the geological terms or processes, and don’t remember much of it, then consider this course toward topics of interest to the petroleum industry. While you may not be a geologist, geophysicist, petrophysicist, geotech, lawyer, or financial analyst dealing with geologists and don’t understand the geological terms or processes, and don’t remember much of it, then consider this course toward topics of interest to the petroleum industry. While you may not be studying geology, petrophysics, geotechnical engineering, or law at university, you may still be interested in topics related to the petroleum industry.

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 is a predictive tool in exploration for and modeling of carbonate reservoirs will be stressed. The engineering and geologic aspects of carbonate pore systems will be explored. A geologic-based porosity classification useful in exploration will be developed and contrasted 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 agitated. 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 cyclicity 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 carbonate platform types to changes in subsurface 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 their geologic 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 hydrothectonic 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

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<td>KUALA LUMPUR, MALAYSIA</td>
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† includes field trip

2015 Schedule and Tuition / 5 Days

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<td>5-9 OCT</td>
<td>US$4,670+VAT</td>
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Sequence Stratigraphy: An Applied Workshop – SQS

FOUNDERED FOR
Geologists, geophysicists, biostratigraphers and engineers (with some knowledge of geology) needing a fundamental understanding of the principles and applications of sequence stratigraphy.

YOU WILL LEARN HOW TO
• Identify stratigraphic sequences
• Interpret seismic reflection geometries
• Relate sequence stratigraphy to basin architecture, relative sea levels and history
• Build predictive stratigraphic model

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 Miocene delta complexes in Venezuela Cretaceous incised valley 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 • Sedimentary 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, deltatic, shoreline complexes and shelf sands illustrated by slide presentation and individual exercises • Exploration and production scaled case histories and strategies

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 assembly in which it occurs and the range of trap styles to be expected. This course provides an overview of all hydrocarbon-bearing structural assemblages 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 tie-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 • Palinspastic restoration of cross sections • Structural validation criteria • Sequential restoration and growth history • Regional arches and domes • Compaction and stratatal solution • Wrench faults: simple, convergent, and divergent • Conjugate and dome-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-graben and full graben rift systems • Domino-style extension • Diapirs • Salt sheets • Rhoo and counter-regional pseudoextensional fault systems • Plate-tectonic habitats of structural assemblages • Tectonic synthesis and exploration project

ABOUT THE COURSE
Basin analysis demands an integrated approach from explorationists. It can be both inappropriate and misleading to suggest that the tectonic-thermal-sedimentologic 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 own individual basin evaluation and modeling modus operandi. This course provides the tools, methods, and practice for participants to develop and optimize their own 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 BASHMODE®, 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 Analogis • Critical Points • Basin Classification • Quantifying Uncertainty, Minimizing Risk, and Making Decisions • Synthesis

About the course
Seismic Interpretation Video Series - FREE when you register for a course using PROMO CODE 1502
Compressional and Transpressional Structural Styles – CPST

DESIGNED FOR
Geologists, geophysicists, engineers, and managers responsible for the interpretation and drilling of compressional 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 assemblage
• 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 exploit the fundamental forms. This course presents outcrop, subsurface, seismic sections, and model analogs that provide structural interpretation in a wide range of compressional and transtensional environments. Interpretations 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 • Fracturing in compressional structures • Summary of oil and gas fields

2015 Schedule and Tuition / 5 Days
HOUSTON, U.S. 3-7 AUG US$4,140

Development Geology – DG

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

YOU WILL LEARN HOW TO
• Select optimum drillstills for field development
• Use log and rock data to identify reservoir rock, non-reservoir rock and pay
• Determine fluid distribution in a field and identify reservoir compartments
• Estimate field reserves through the life of a field
• Characterize carbonate and clastic rocks by porosity
• 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 drillstills 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 capillarity 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 appraisals 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 on field development • and more

2015 Schedule and Tuition / 5 Days
ABERDEEN, U.K. 29 JUN-3 JUL US$4,770+VAT
DUBAI, U.A.E. 25-29 OCT US$5,190
HOUSTON, U.S. 22-26 JUN US$4,140
KUALA LUMPUR, MALAYSIA 9-13 NOV US$4,140
LONDON, U.K. 27-31 JUL US$4,770+VAT
PERTH, AUSTRALIA 10-14 AUG US$4,770+VAT

Integrated Carbonate Reservoir Characterization – ICR

DESIGNED FOR
Exploration and development geoscientists, petrophysicists, reservoir engineers, geostatistical modelers and research/development staff who want to gain fundamental insight into carbonate reservoir characterization through an integrated geological and petrophysical approach.

YOU WILL LEARN HOW TO
• Build on previous experience with carbonate systems to integrate various aspects of carbonate rocks (depositional environment, primary facies and mineralogy, high resolution sequence stratigraphy and various petrophysical characteristics) for improved carbonate reservoir architecture and flow unit characterization
• Apply knowledge of petrophysical, sedimentological petrologic tools to characterize and evaluate carbonate reservoirs
• Recognize and better understand well log responses in carbonate systems and to learn to utilize data from formation evaluation tools to determine reservoir quality (porosity, permeability and lithology)
• See potential stratigraphic variations in carbonate pore architecture and its effect on permeability
• Better understand the relationship of primary depositional facies, sequence stratigraphic framework and diagenetic history to pore architecture and reservoir quality
• 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 geostatistical 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 geostatistical models to understand reservoir heterogeneity and architecture

2015 Schedule and Tuition / 5 Days
DENVER, U.S. 17-21 AUG US$4,100
HOUSTON, U.S. 22-26 JUN US$4,140
LONDON, U.K. 16-20 NOV US$4,770+VAT

All classes available at your location. Contact us today.
Geology is advisable if not required to fully appreciate the course contents.

- Tendering and contracting
- Reporting: geological data, well testing & fluids: reservoir properties, rock and fluid
- Geosteering
- Logging operations: acquisition, tools, drilling problems and well control, directional drilling
- Structural geology: fractures, faults, borehole geology
- Wellsite geology: geological sampling, sample analysis
- Petroliferous play and prospect to well planning, provision of geological services
- 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.

**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

**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
- Understand special core analysis, e.g., wettability, relative permeability, capillary pressure, and reservoir fluid distribution for reservoir engineering and petrophysical evaluation
- Prevent/spot errors in core analysis vendor reports (quality control)
- Select samples for special core studies
- Correlate core and log data

**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 volumetrics, 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.

**YOU WILL LEARN HOW TO**

- Describe/calibrate risks associated with finding a successful play
- Prepare and compile operations reports
- Evaluate the impact on the field development plan
- Describe drilling cuttings and cores
- Evaluate drilling reports
- Understand and apply logging services
- 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

**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 unification and is often considered to be the ground truth to which other measurements are compared. For example, wireline logging. Using a multidisciplinary approach, participants are taken through the steps necessary to obtain reliable core analysis data and solve formation evaluation problems. Throughout the course, participants are given hands-on problems and practical laboratory and field examples, which reinforce the instruction.

- Laboratory visit with core analysis measurement demos

**COURSE CONTENT**

Coring and core analysis objectives
- Coring hardware and maximizing core recovery
- Core-handling, wellsite 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 nmr 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**

**PROMO CODE 1502**

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**2015 Schedule and Tuition / 5 Days**

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<thead>
<tr>
<th>Location</th>
<th>Dates</th>
<th>Tuition</th>
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<tbody>
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<td>24-28 AUG</td>
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<td>KUALA LUMPUR, MALAYSIA</td>
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<td>LONDON, U.K.</td>
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**2015 Schedule and Tuition / 5 Days**

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<tbody>
<tr>
<td>KUALA LUMPUR, MALAYSIA</td>
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<td>LONDON, U.K.</td>
<td>29-3 RED.</td>
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**Seismic Interpretation Video Series** - FREE when you register for a course using PROMO CODE 1502
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

**About the Course**

Petrophysics is a comprehensive and concise description of the principles of borehole geophysics. The course wraps up with integration and logs, NMR, pressures, shear, seismic, and integration of petrophysical tools. The course is designed for petrophysicists, petroleum reservoir engineers, geologists and geophysicists who have a basic understanding of petrophysics, geology and engineering and need a more advanced understanding of how to integrate the different data sets together to more completely understand reservoir performance. It is recommended that participants have a basic knowledge of logging fundamentals. The basic of logging will be reviewed in the class.

**Course Content**

- Logging objectives
- Invasion profiles
- Challenge of borehole geophysics
- Passive electrical properties of earth materials
- Resistivity measuring tools, normal, induction, laterolog
- Reservoir characterization
- Rock properties
- Texture, porosity and permeability
- Porosity-mineralogy logs, density, neutron, sonic
- Porosity determination in clean formations
- Formation resistivity factor
- Conductivity of shales
- Porosity log crosstabs and mineralogy identification
- Partially saturated rock properties and Archie Equation
- Linear movable oil pool
- Reconnection techniques, Rwa, FR/FP, Logarithmic MOP
- and more

**2015 Schedule and Tuition / 5 Days**

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<tr>
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<th>End Date</th>
<th>Tuition</th>
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<td>LONDON, U.K.</td>
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<td>US$4,670 + VAT</td>
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Available from anywhere via PetroFlex delivery
Basic Reservoir Engineering – BR

**DESIGNED FOR**
Geologists, geophysicists, engineers, engineering trainees, technical managers, technical assistants, technicians, chemists, physicists, technical supervisors, service company personnel, sales representatives, data processing personnel, and support staff working with reservoir definition, development and production.

**YOU WILL LEARN**
- The fundamentals of fluid flow in porous media
- How reservoirs are characterized by fluid type and drive mechanisms
- The basis for reservoir fluid distribution
- About oil and gas well performance and pressure buildup analysis
- About oil displacement and optimizing reservoir performance
- The basics of enhanced oil recovery
- How oil and gas in place can be estimated and recovery predicted

**ABOUT THE COURSE**
The intent of Basic Reservoir Engineering is development of a more complete “understanding” of the characteristics of oil and gas reservoirs, from fluid and rock characteristics through reservoir definition, delineation, classification, development plan, and production. Data collection, integration and application directed toward maximizing recovery are stressed. Basic reservoir engineering equations are introduced with emphasis directed to parameter significance and an understanding of the results. For nearly 30 years this has been one of our most popular and successful courses.

As part of the Basic Reservoir Engineering course, there are class exercises designed to be solved by hand with a calculator. For those that prefer to use spreadsheets to do the calculations, participants are welcome to bring their own laptop computer.

**COURSE CONTENT**
Reservoir fluid properties • Coring practices and rock properties • Fundamentals of fluid flow Reservoir fluid distribution • Reservoir classification Reservoir drive mechanisms • Oil and gas well performance • Pressure buildup analysis Oil displacement concepts • Estimation of oil-in-place and gas-in-place • Recovery techniques

**2015 Schedule and Tuition / 5 Days**

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<td>BAKERSFIELD, U.S.</td>
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*plus computer charge

Applied Reservoir Engineering – RE

**DESIGNED FOR**
Engineers or geoscientists who will occupy the position of reservoir engineer, any other technically trained individual that desires a more in-depth foundation in reservoir engineering than is offered in the one-week Basic Reservoir Engineering and Reservoir Engineering for Other Disciplines courses.

**YOU WILL LEARN HOW TO**
- Determine critical properties of reservoir rocks Fluid (oil, water, and gas) PVT relationships
- Calculate hydrocarbons initially in place using several methods
- Assess reservoir performance with dynamic techniques
- Determine the parameters that impact well/reservoir performance over time
- Analyze well tests using standard well testing principles and techniques
- Characterize aquifers
- Determine reservoir drive mechanisms for both Oil and Gas reservoirs
- Apply oil and gas field development planning principles
- Forecast production decline
- Screen reservoirs for the appropriate enhanced oil recovery processes

**ABOUT THE COURSE**
This course represents the core of our reservoir engineering program and the foundation for all future studies in this subject. A ten-day, in-depth study of the subject is presented. Numerous engineering practices are covered ranging from fluid and rock properties to simulation and field development planning. Proficiency in using Microsoft Excel to perform calculations and make graphs is desirable. Reservoir engineering is also presented in the context of a modern, multi-disciplinary team effort using supporting computer technology. An extensive manual and set of references are included. This course has been taught for many years on a worldwide basis. It has been continuously updated and improved by a team of experienced reservoir engineering consultants who spend most of their time working on major reservoir engineering projects and field studies.

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

**COURSE CONTENT**
Asset life cycles, professional roles, hydrocarbon reservoir descriptions. Porosity, permeability, compressibility, capillary pressure, wettability and relative permeability, averaging reservoir property data • Phase behavior of reservoir fluids, gas properties, oil properties, water properties, PVT sampling and understanding PVT laboratory reports • Calculate original hydrocarbons in-place with volumetric methods, build hydrocarbon volume vs depth relationships, and review reserve booking guidelines • and more

**2015 Schedule and Tuition / 10 Days**

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*plus computer charge

Reservoir Engineering for Other Disciplines – REO

**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 engineers’ analysis and interpretations. The course also provides persons who are already well trained in the 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, Havelena Odeh 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 Leverett, Wedge, water under-running and gas overriding • Coning, casing, horizontal wells: Gas reservoirs, Oil reservoirs • Reservoir simulation: Why simulate?, various models and types, setting up models and conducting studies

**2015 Schedule and Tuition / 5 Days**

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<td>12-16 OCT</td>
<td>6,470+VAT</td>
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<td>LONDON, U.K.</td>
<td>18-22 MAY</td>
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<td>THE HAGUE, NETHERLANDS</td>
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*plus computer charge

Seismic Interpretation Video Series - FREE when you register for a course using PROMO CODE 1502
ABOUT THE COURSE

The modern team approach to reservoir characterization describes productive zones more reliably through the integration of disciplines, technology and data. Increase your proven reserves, discover by-passed pay, reduce development time and cost, improve production rates, and rejuvenate old fields through the skills learned in this course. The models developed during the course are based on the application of state-of-the-art technical applications within the framework of a multi-disciplinary team approach.

COURSE CONTENT

defining the business purpose: Clarifying the problem, negotiating deliverables, project management in Microsoft Project format; Data for reservoir characterization: Sources, scale of the data/ extrapolation to other areas, acquisition planning, cross-disciplinary applications/ integration, quality/error minimization, data management.

Geostatistics in reservoir characterization: Applicable techniques, data viability and applicability, multiple working models, ranking of models with multi-source data.

Reservoir models: Sequence stratigraphic, geological, geophysical, reservoir engineering, flow unit, preliminary production, Economics and risk.

Volumetrics, probability of success, financial returns of project.

Organizational structure: Team styles, team communications, Assessment and evaluation: The holistic reservoir characterization model.

ABOUT THE COURSE

This course stresses the production technology required to effectively develop and operate an asset and the role of production engineering in a multi-discipline development project. Practical application of production practices is emphasized. Both theory and actual field examples are presented and studied along with class problems, exercises, and related streaming videos.

Well completion equipment and tools are demonstrated, and participants will work on several exercises to improve understanding of well completion. Nodal analysis problems are set up and viewed and discussed. Participants will work several exercises, including basic sand control gravel pack completions, hydraulic fracturing design, and intelligent well (smart well) completions.

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Maximize team interaction and understand the dynamics between production engineering and other disciplines.

YOU WILL LEARN HOW TO

• Apply and integrate production engineering principles within the many technical disciplines

• Solve production technology problems

• Identify and incorporate the role of production engineering and operations in oil and gas exploitation planning and development

• Choose basic well completion equipment design

• Perform system analyses (Nodal Analysis(TM)) evaluations to optimize well tubing design and selection

• Perform basic artificial lift designs

• Distiguish how to acidsides sandstone and carbonate formations and identify the differences in stimulating the two main reservoir lithology types

• Design basic sand control gravel pack completions

• Develop and evaluate well / zone candidate selection to conduct a hydraulic fracturing campaign and how to design and run frac pack well completions

• Choose among the various water shut off mechanical and chemical approaches

• Take advantage of new production technology advances in swellable completions, expandable tubulars and screens, and intelligent well (smart well) completions

• Maximize team interaction and understand the dynamics between production engineering and other disciplines.

YOU WILL LEARN HOW TO

• Help the reservoir characterization team work together more efficiently

• Use data to develop and plan reservoir models

• Help the reservoir characterization team work together more efficiently

• Convert data from one discipline to another

• Extrapolate data from a few discrete points to the entire reservoir

• Calibrate seismic data to the reservoir model

• Minimize development expenditures

• Facilitate management decisions concerning the property, financial requirements, staffing needs and expenditures

• Develop appropriate and accurate financial models useful to company management

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

INTERMEDIATE

DESIGNED FOR

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

YOU WILL LEARN HOW TO

• Develop an integrated multi-disciplinary reservoir model that determines the internal and external geometry of the reservoir, distribution of reservoir properties (static model) and flow within the reservoir (dynamic model)

• Predict local variations within the reservoir

• Explain past reservoir performance

• Predict future reservoir performance of field

• Analyze economic optimization of each property

• Formulate a plan for the development of the field throughout its life

• Convert data from one discipline to another

• Extrapolate data from a few discrete points to the entire reservoir

• Calibrate seismic data to the reservoir model

• Minimize development expenditures

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Volumetrics, probability of success, financial returns of project.

Organizational structure: Team styles, team communications, Assessment and evaluation: The holistic reservoir characterization model.

DESIGNED FOR

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

YOU WILL LEARN HOW TO

• Apply and integrate production engineering principles within the many technical disciplines

• Solve production technology problems

• Identify and incorporate the role of production engineering and operations in oil and gas exploitation planning and development

• Choose basic well completion equipment design

• Perform system analyses (Nodal Analysis(TM)) evaluations to optimize well tubing design and selection

• Perform basic artificial lift designs

• Distiguish how to acidsides sandstone and carbonate formations and identify the differences in stimulating the two main reservoir lithology types

• Design basic sand control gravel pack completions

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• Choose among the various water shut off mechanical and chemical approaches

• Take advantage of new production technology advances in swellable completions, expandable tubulars and screens, and intelligent well (smart well) completions

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Volumetrics, probability of success, financial returns of project.

Organizational structure: Team styles, team communications, Assessment and evaluation: The holistic reservoir characterization model.
Geomatics: Geodesy and Cartography – GEOM1

**DESIgnED FOR**
Geologists, geophysicists, exploration and production managers, reservoir engineers, drilling engineers, data acquisition and data managers and GIS specialists.

**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 geoscience 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

**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 to evaluate the global navigation satellite systems (GNSS) systems, including GPS, as well as the resultant accuracies obtained 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

Basic Petroleum Economics – BEC3

**DESIgnED 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. 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 • How to use economic criteria to choose investments • Models to weigh risk and uncertainty

**ABOUT THE COURSE**
Could you answer the following three questions for your next project?
What will it cost? What is it worth? Will it earn sufficient profit?

Before undertaking any project, these questions should be answered, and this course will provide the fundamentals necessary to enable you to do so. Contractual arrangements, which also significantly impact the economic viability of a project, are covered. Participants practice cash flow techniques for economic evaluations and investigate frequently encountered situations. Each participant will receive Economics of Worldwide Petroleum Production, written specifically for PetroSkills courses.

This course is suggested for employees of PetroSkills member companies. Individuals may wish to participate in either this course or Expanded Basic Petroleum Economics, which is the five-day version which includes expanded material covering finance, accounting, and budgeting.

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

Petroleum Risk and Decision Analysis – PRD

**DESIgnED FOR**
Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

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

**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. This 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 (decision and demonstrations); mitigating risks • Evaluating a multi-pay prospect (team exercise)

**2015 Schedule and Tuition / 3 Days**

<table>
<thead>
<tr>
<th>Location</th>
<th>Dates</th>
<th>Tuition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENVER, U.S.</td>
<td>15-17 JUN</td>
<td>US$2,930</td>
</tr>
<tr>
<td>HOUSTON, U.S.</td>
<td>4-6 MAY</td>
<td>US$2,960</td>
</tr>
<tr>
<td>13-15 JUL</td>
<td>US$2,960</td>
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<tr>
<td>12-14 OCT</td>
<td>US$2,960</td>
<td></td>
</tr>
<tr>
<td>14-16 DEC</td>
<td>US$2,960</td>
<td></td>
</tr>
<tr>
<td>KUALA LUMPUR, MALAYSIA</td>
<td>17-19 AUG</td>
<td>US$3,430</td>
</tr>
<tr>
<td>LONDON, U.K.</td>
<td>8-10 JUN</td>
<td>US$3,430+VAT</td>
</tr>
<tr>
<td>SAN FRANCISCO, U.S.</td>
<td>3-5 AUG</td>
<td>US$2,930</td>
</tr>
<tr>
<td>16-18 NOV</td>
<td>US$2,930</td>
<td></td>
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</tbody>
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