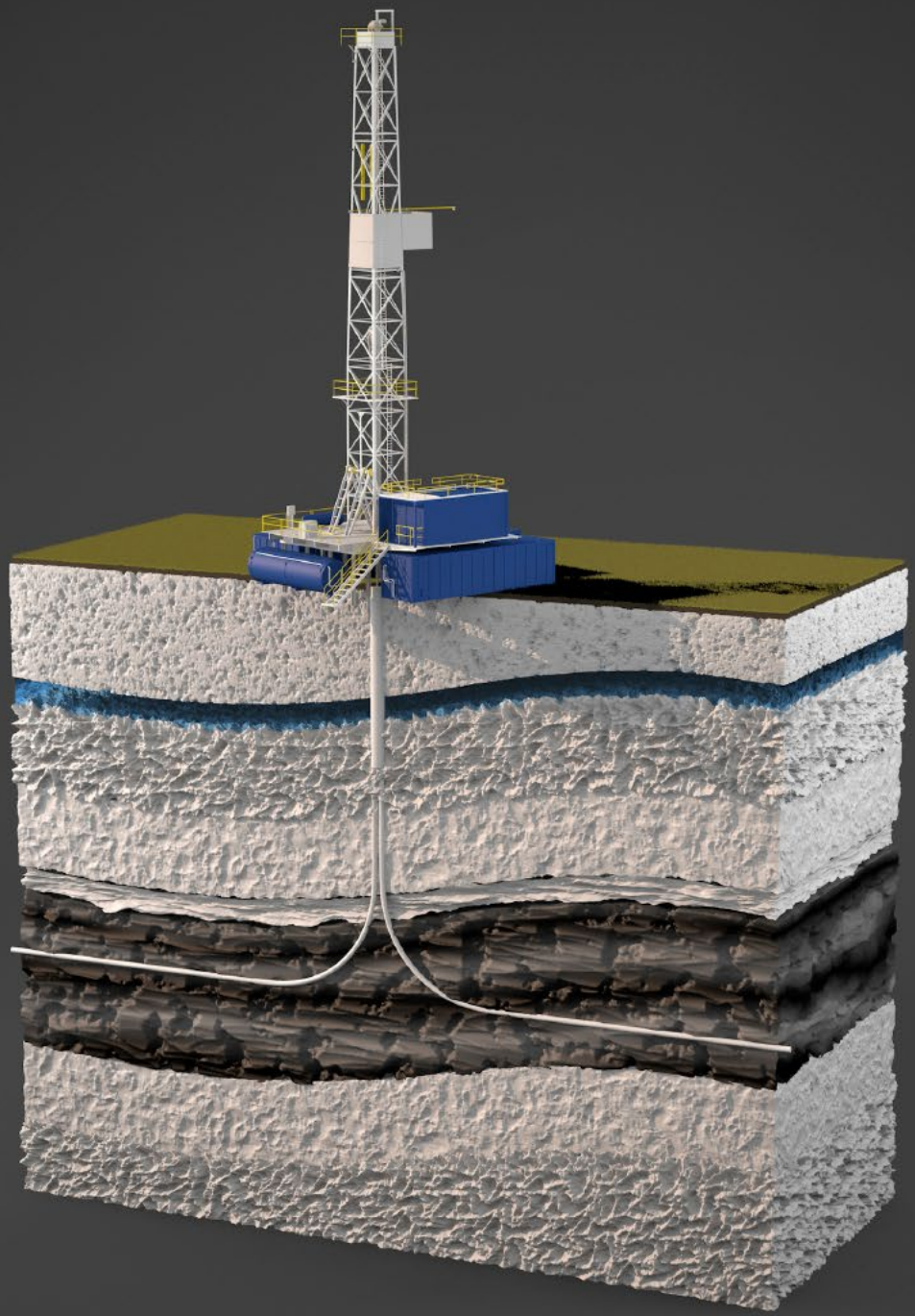
PetroSkills®

2016 Unconventional Resources Training Guide



OGCI® John M. Campbell RDC

Unconventional Resources

Course Progression Matrix

Challenges with developing unconventional resources are driving industry to implement more efficient work flows 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.

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

Mr. Peter Aird
Mr. Jeff Aldrich
Dr. Rosalind Archer
Dr. Omar Barkat
Dr. Zaki Bassiouni
Mr. Larry Britt
Mr. Richard Carden
Dr. Iskander Diyashev
Mr. Eric Foster
Mr. Paul Gardner
Mr. Mason Gomez
Mr. Tom Harting
Dr. Greg Hazlett
Mr. Ron Hinn
Mr. Aaron Horn
Mr. Timothy Hower
Mr. Alfred Jennings
Mr. Stephen Jewell
Mr. Jack Jones
Dr. Satish Kalra
Dr. Mohan Kelkar
Mr. Aaron Klein
Mr. Larry Lens
Mr. Bob Lippincott
Mr. Alain Louis
Dr. Heloise Lynn
Dr. Ken Mahrer
Mr. Steve McKeever
Mr. Steve Metcalf
Mr. David Patrick Murphy
Mr. Bob Nichol
Mr. William Ott
Mr. Roberto Peveraro
Mr. Bill Powell
Mr. Gerry Ross
Mr. Steve Sadoskas
Dr. Helmy Sayyouh
Dr. Subhash Shah
Dr. Robert Skopec
Dr. George Slater
Dr. Carl Sondergeld
Dr. John Spivey
Mr. Marc Summers
Dr. E.C. Thomas
Dr. Jack Thomas
Mr. Bob Westermark
Mr. Larry Wolfson
Dr. Ding Zhu

	Geophysics	Geology	Petrophysics	Reservoir Engineering	Well Construction / Drilling	Production and Completions Engineering
SPECIALIZED	Use of Full Azimuth Seismic and Microseismic for Unconventional Plays (Page 6)		Applied Rock Mechanics (Page 5)	Horizontal and Multilateral Wells: Analysis and Design (Page 6) Coalbed Methane Reservoirs: Advanced Analysis Techniques (Page 5)		Horizontal and Multilateral Wells: Completions and Stimulation (Page 6) Advanced Hydraulic Fracturing (Page 5)
INTERMEDIATE			Petrophysics of Unconventional Reservoirs (Page 4)	Reservoir Management for Unconventional Reservoirs (Page 4)	Directional, Horizontal, and Multilateral Drilling (Page 3)	Hydraulic Fracturing Applications (Page 4) Surface Water Management in Unconventional Resource Plays (Page 5) Gas Production Engineering (Page 4)
FOUNDATION			Foundations of Petrophysics (Page 2)	Well Test Design and Analysis (Page 3)	Well Design and Engineering (Page 3)	Unconventional Resources Completion and Stimulation (Page 3)
			Evaluating and Developing Shale Resources (Page 2)			
BASIC			Basic Petroleum Engineering Practices (Page 2)			
			Basic Petroleum Technology (Page 2)			

Basic Petroleum Engineering Practices – BE

BASIC

This course is a basic introduction to most aspects of the Petroleum Engineering discipline, which includes Reservoir, Production, and Drilling Engineering as well as related topics. This course lays the groundwork for further specialized training in advanced courses for oil company and service company personnel. The course focuses on the field and application approach and includes classroom exercises, fundamental engineering problems, and basic field exercises. Basic Petroleum Engineering Practices will set the foundation for technical professionals with regards to technology and its engineering applications. The course starts out with a brief introduction of the history and current state of the oil and gas industry. Next, reservoir fluids, petroleum geology, and petroleum reservoirs are discussed. Then, various facets of exploration technology, drilling engineering and operations, well completion technology, and production technology are covered before finishing with surface processing of produced fluids.

DESIGNED FOR

Engineers, engineering trainees, technical managers and assistants, technicians, geologists, geophysicists, chemists, physicists, service company personnel, sales representatives, and data processing personnel.

YOU WILL LEARN

- Basic petroleum geology
- Reservoir fluid and rock properties
- Fundamentals of reservoir fluid flow
- Oil and gas reservoir classification, definition, delineation, and development
- Unconventional resources
- Fundamentals of drilling, well completion, and production operations
- Basics of casing design and primary cementing
- Primary and enhanced recovery mechanisms
- Surface operations

COURSE CONTENT

Reservoir fluid properties • Petroleum geology • Reservoir properties and evaluation • Unconventional resources • Exploration technology • Drilling engineering • Well completion, stimulation, and workover • Well testing and formation damage • Production operations • Recovery methods • Surface processing

2016 Schedule and Tuition / 5 Days

ABERDEEN, UK	6-10 JUN	US$4570+VAT
DENVER, US	1-5 AUG	US$3950
DUBAI, UAE	8-12 MAY	US$4990
HOUSTON, US	28 MAR-1 APR	US$3940
	27 JUN-1 JUL	US$3940
	29 AUG-2 SEP	US$3940
	12-16 DEC	US$3940
KUALA LUMPUR, MY	15-19 AUG	US$4735
LONDON, UK	19-23 SEP	US$4570+VAT

Basic Petroleum Technology – BPT

BASIC

This course presents a non-technical, practical understanding of petroleum industry technology in an interesting and effective manner. Industry technology basics and terminology are learned by progressing through the E&P asset management cycle from exploration to abandonment. Participants are placed in the position of Reservoir Engineer, and "Our Reservoir" is defined, analyzed and put in production. Participants are then placed in the position of Drilling/Completion Engineer, and the drilling/completion program for "Our Well" is analyzed. Participation results in greater job confidence, enthusiasm and productivity. Basic Petroleum Technology is ideal for staff who need to be able to understand the various aspects of oil and gas operations and speak the language of the oilfield. The first day will give an introduction to the industry and cover reservoir fluids. The next two days will include petroleum geology and reservoirs, and introduce exploration technology. The fourth day will cover drilling engineering, operations, and well completion technology. The course will wrap up with production technology, reservoir development, and surface processing.

DESIGNED FOR

Administrative, support personnel, management, field support, accounting, purchasing, economics, legal, finance, human resources, drafting, land and data processing personnel, as well as investors and royalty owners. Participants involved at the technical level of the industry, particularly engineers, should register for the Basic Petroleum Engineering Practices course.

YOU WILL LEARN

- Terminology of exploration and production (language of the oil field)
- Basic geology as related to oil and gas reservoirs
- Reservoir fluid and rock properties
- Basics of seismic technology
- Reservoir definition and development; production and recovery
- Unconventional reservoirs
- Fundamentals of drilling, well completions and production operations
- Basic concepts of primary and enhanced recovery operations
- Surface operations

COURSE CONTENT

E&P asset management process overview • Reservoir fluid properties • Petroleum geology • The petroleum reservoir • Unconventional reservoirs • Exploration technologies • Drilling technology • Well completions and workovers • Production operations • Reservoir recovery mechanisms • Surface processing

2016 Schedule and Tuition / 5 Days

ABERDEEN, UK	14-18 MAR	US$4570+VAT
HOUSTON, US	8-12 FEB	US$3940
	11-15 JUL	US$3940
	17-21 OCT	US$3940
KUALA LUMPUR, MY	7-11 NOV	US$4735
LONDON, UK	16-20 MAY	US$4570+VAT
	8-12 AUG	US$4570+VAT

Evaluating and Developing Shale Resources – SRE

FOUNDATION

This course will cover current practices for evaluating, drilling, and completing these challenging reservoirs. Discussions and exercises will include a focus on the limitations of many of the current tools and technologies. Information and opportunities for many current and 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 and stimulation parameters used to predict a potential commercial resource play.

DESIGNED FOR

Reservoir, production and completion engineers, petrophysicists, geologists, geophysicists and other professionals who desire a thorough overview of shale resource development.

YOU WILL LEARN HOW TO

- Describe the resource potential and economic importance of shale gas and shale oil
- Describe the similarities/differences between shale gas, tight gas and coalbed methane
- Describe shale play differences and critical reservoir properties to identify "sweet spots"
- Estimate gas and oil in place
- Apply different resource evaluation techniques recognizing the advantages and disadvantages of each technique
- Apply drilling, completion, and stimulation technology to shale gas and shale oil
- 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.

COURSE CONTENT

Current shale plays and their global impact • Organic quality, rock quality and mechanical quality properties; geological setting; rock properties; petrophysical considerations; the role of seismic data in field evaluation • Drilling: vertical vs. horizontal wells; pilot holes; fluids; MWD and LWD; wellbore sizes and lateral; drilling challenges; mechanical considerations • Completions: cased vs. open hole; perforation schemes; stimulation design and considerations; case histories • Field trials and pilots: pilot program to optimize well drilling, completion, understanding Stimulated Rock Volume (SRV) using microseismic, fiber optics, production logs, and other resources • Production forecasting and reserve calculations: volumetrics; performance analysis; simulation; resource development; decline curve analysis; handling uncertainty in estimates • Logistics, pad design, field development, water resources, and the social license

2016 Schedule and Tuition / 5 Days

DENVER, US	7-11 NOV	US$4050*
HOUSTON, US	11-15 APR	US$4040*
	12-16 SEP	US$4040*
SAN ANTONIO, US	5-9 DEC	US$4000*

*plus computer charge

Foundations of Petrophysics – FPP

FOUNDATION

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.

DESIGNED FOR

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

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 open 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

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
- Petrophysical impact on economic uncertainty
- Evolving petrophysical technologies
- Overview of cased hole logging

2016 Schedule and Tuition / 5 Days

CALGARY, CANADA	18-22 APR	US$4000+GST
HOUSTON, US	11-15 APR	US$4040
	20-24 JUN	US$4040
	31 OCT-4 NOV	US$4040
LONDON, UK	7-11 MAR	US$4670+VAT

Unconventional Resources

Well Design and Engineering – WDE

FOUNDATION

Well Design and Engineering integrates all major well design technologies from pre-spud to TD. Participants are actively engaged in every aspect of the technical activities required to deliver a cost-effective well plan while also gaining valuable perspective on how the overall process should be managed in a dynamic team environment. The workshop content is often customized to address technologies and practices that may be specific to a project or operational situation. The single most important goal of the workshop is to draw the linkages between the design topics and to leave the participants with an understanding that each decision has influence on those that follow. Intensity mounts as the course progresses and each design topic builds on those that came before. Design iterations are commonly required, and seemingly unrelated decisions push the teams into situations of uncomfortable operational risk. On the last day, each team presents their completed design before the class and an invited panel of industry professionals. A scientific calculator is required and a laptop computer is strongly recommended.

DESIGNED FOR

Drilling engineers, completion engineers, and drilling supervisors involved with drilling operations and well planning.

YOU WILL LEARN HOW TO

- Understand the responsibilities of a well planner as a designer and project manager
- Review offset analysis and data gathering
- Understand the influence of completion design and production requirements on well design
- Identify trajectory design issues and their influence on torque and drag, wellbore stability, and future intervention
- Develop specific casing design skills including casing point selection; design load case development; burst, collapse and tension calculations; controlling load and safety factor determination and select appropriate size, weight and grade
- Perform cement slurry and displacement volume calculations
- Complete drill string and BHA designs and failure prevention assessment for each hole section, and review for directional well applications
- Understand different bit types and applications, and perform calculations to support bit run economics
- Optimize hydraulics for each hole interval based upon wellbore, fluids and drill string configurations
- Compile risks to well delivery, and develop mitigations and contingency plans
- Develop minimum rig capability specifications to deliver well requirements
- Present and defend a well plan to management

2016 Schedule and Tuition / 10 Days

DUBAI, UAE	16-27 OCT	US$8990
HOUSTON, US	15-26 FEB	US$7430
	6-17 JUN	US$7430
	22 AUG-2 SEP	US$7430
	5-16 DEC	US$7430
KUALA LUMPUR, MY	4-15 APR	US$8660
LONDON, UK	1-12 AUG	US$8530+VAT

Well Test Design and Analysis – WTA

FOUNDATION

This course stresses practical application of well test theory to design and interpret pressure transient tests. An integrated approach to well test interpretation is emphasized throughout the course. Class exercises involving hand calculations and simple spreadsheet applications will reinforce the concepts illustrated by both synthetic data sets and real field examples. Participants will be able to apply the knowledge and skills they gain in this course to their job assignments upon course completion.

DESIGNED FOR

Engineers and geoscientists who want to understand well testing principles and interpretation techniques to design, analyze, report, evaluate results or intelligently participate in the well testing process. Previous experience in production and/or reservoir engineering is recommended. Previous experience in well testing is helpful but is not required.

YOU WILL LEARN HOW TO

- Analyze drawdown and buildup tests in oil and gas wells
- Identify flow regimes using the log-log diagnostic plot
- Describe characteristic pressure behavior for common bounded reservoir geometries
- Identify well test data affected by various wellbore and near-wellbore phenomena
- Design a well test to meet desired objectives
- Estimate average drainage area pressure
- Analyze well tests in hydraulically fractured wells, horizontal wells, and naturally fractured reservoirs

COURSE CONTENT

Introduction to well testing • Radial flow • Log-log type curve analysis • Pressure transient testing for gas wells • Flow regimes and the log-log diagnostic plot • Bounded reservoir behavior • Wellbore and near-wellbore phenomena • Well test interpretation • Well test design • Estimation of average drainage area pressure • Hydraulically fractured wells • Horizontal wells • Naturally fractured reservoirs

2016 Schedule and Tuition / 5 Days

HOUSTON, US	12-16 SEP	US$4065*

plus computer charge

Unconventional Resources Completion and Stimulation – URCS

FOUNDATION

This course will focus on some of the key elements of well completions and stimulation practices as they apply to horizontal wells in tight and unconventional reservoirs. Optimization studies will be shown and used to highlight the importance of lateral length, number of fractures, inter-fracture distance, fracture half-length, and fracture conductivity. These results will be used to discuss the various completion choices such as cased and cemented, open hole with external casing packers, and open hole "pump and pray" techniques. This course also will address key risks to horizontal wells and develop risk mitigation strategies so that project economics can be maximized. In addition, tight and unconventional gas field case studies will be used to illustrate the application of these design, optimization, and risk mitigation strategies for horizontal wells in tight and unconventional gas reservoirs.

DESIGNED FOR

Petroleum and production engineers, completion engineers, stimulation engineers, geologists, managers, technical supervisors, service and support personnel.

YOU WILL LEARN HOW TO

- Use key multi-disciplinary tools for successful completions and stimulations in unconventional resources
- Understand the importance of geo-mechanics and rock mechanics to the success of transverse multiple fractured horizontal wells in unconventional resources
- Understand unconventional resource play completion options and selection processes
- Apply principals and design of well stimulation treatments in unconventional resources
- Employ critical data needs and collection techniques with minimal operational impact

COURSE CONTENT

Geo-mechanics: what makes an unconventional shale reservoir prospective • Introduction to the Completions and Multiple Fracture stimulated horizontal wells • Horizontal well objectives in Unconventional Reservoirs • Basis of fracture design in horizontal wells • Horizontal well stimulation objectives • Completion planning for horizontal wells • Horizontal well risks and risk mitigation strategies • Horizontal well case histories

2016 Schedule and Tuition / 5 Days

DENVER, US	22-26 FEB	US$4050
HOUSTON, US	6-10 JUN	US$4040
	10-14 OCT	US$4040

Directional, Horizontal, and Multilateral Drilling – DHD

INTERMEDIATE

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

DESIGNED FOR

Drilling, production and operations engineers, field supervisors, toolpushers, managers, and technical support personnel.

YOU WILL LEARN HOW TO

- Make survey calculations
- Interpret TVD, polar and rectangular coordinates, and vertical section
- Interpret dogleg severity and the problems associated with dogleg severity
- Plan a two-dimensional directional well
- Plan horizontal wells based on the objectives of the well
- Determine the best multi-lateral completion for an application
- Determine declination and non-magnetic drilling collar selection
- Apply the best survey instrument for the job
- Directionally drill with rotary BHAs, jetting, whipstocks, motor, steerable motors, and rotary steerable systems
- Drill horizontally underbalanced
- Interpret torque and drag and determine what factors will affect the torque and drag
- Determine cementing requirements for directional wells

COURSE CONTENT

Applications for directional drilling • Directional profiles • Extended reach wells • Survey calculations and accuracy • Dogleg severity calculations and problems associated with doglegs • Planning directional and horizontal wells • Horizontal drilling methods and applications • Logging high angle wells • Hole-cleaning • Multi-laterals • Types of survey instruments • Tools used to deflect a wellbore • Torque and drag calculations • Cementing

2016 Schedule and Tuition / 5 Days

HOUSTON, US	7-11 MAR	US$4140
	28 NOV-2 DEC	US$4140

Gas Production Engineering – GPO

INTERMEDIATE

Learn the latest methods for calculating gas well performance from reservoir to sales. Reservoir performance covers the fundamentals of reservoir gas flow and details the best methods for testing wells, according to the time and money available. Reserve calculations and diagnostic testing from production data are covered. The importance of flow regime and non-Darcy flow on test design and interpretation is emphasized for new wells and for the possibility of improving the performance of older wells. Also discussed are performances of tight formations, horizontal wells, fractured wells, and methods for estimating gas reserves. Participants will learn to calculate and determine the effect of each system component on total well performance, which permits optimum sizing of tubing, flowlines, separators, and compressors. Participants receive complimentary software at the end of the course.

DESIGNED FOR

Production, reservoir and facilities engineers, and others involved in gas production, transportation, and storage including field supervisors.

YOU WILL LEARN HOW TO

- Apply proven techniques to field problems to increase profitability
- Calculate gas well performance from the reservoir to the sales line
- Optimize gas well production
- Relate reservoir and well performance to time
- Predict when a well will die due to liquid loading

COURSE CONTENT

Gas properties: real gas behavior equations of state, impurities, mixtures, phase behavior dew point, retrograde behavior, flash calculations; classifying gas reservoirs • Reservoir performance: gas well testing; turbulence and skin effects; perforation effects; tight well analysis; horizontal wells; hydraulically fractured wells • Reserve calculations: P/Z plots, energy plots, water influx, abnormal pressure effects; diagnostic testing based on production data • Flow in pipes and restrictions: pressure loss; effects of liquids-liquid loading, liquid removal methods, multiphase flow correlations; erosional velocity • Compression: types of compressors; compressor selection; effects of variables; capacity and horsepower • Total system analysis: tubing and flowline size effects; perforating effects; relating deliverability to time; evaluating compressor installations; analyzing injection wells • Flow measuring: orifice metering; other metering methods •Condensate reservoirs: reservoir types; reserve estimates, laboratory simulation; gas cycling • Field operations problems: interpreting P/Z plots; hydrate formation

2016 Schedule and Tuition / 5 Days

CALGARY, CANADA	21-25 NOV	US$4100+GST*
HOUSTON, US	14-18 MAR	US$4140*

*plus computer charge

Hydraulic Fracturing Applications – HFU

INTERMEDIATE

The course takes a practical approach to the applications of hydraulic fracturing. Fracturing technology benefits and limitations in all types of sandstone and carbonate reservoirs are explained. Fracture modeling is used as a tool to demonstrate how modeling software can be used effectively in practical applications. All aspects of the planning, designing, and implementation of fracturing treatments are covered. In addition to the technical presentation, the course contains many practical exercises and class problems based on case histories. You will take home a fresh approach to hydraulic fracturing, eager to select viable candidates for more effective fracturing applications.

DESIGNED FOR

Production, reservoir, and drilling engineers, as well as others who need a better understanding of fracturing applications.

YOU WILL LEARN HOW TO

- Design hydraulic fracture treatments for typical field situations
- Apply the concepts of well stimulation by hydraulic fracturing to various types of reservoir conditions to optimize well productivity
- Recognize opportunities for substantial production improvement by application of effective hydraulic fracturing
- Gather pertinent well data and information to plan, design, implement, and evaluate fracturing treatments for all types of reservoirs
- Realize the strengths and limitations of hydraulic fracture theory as it relates to field applications of fracturing
- Become a participant in each fracturing treatment rather than just a technical observer

COURSE CONTENT

Introduction to the fracturing process and mechanics • Practical fracture design • Fracturing fluid additives and proppant • Strengths and limitations of fracturing applications • Production increase • Factors involved in field implementation • Acid fracturing vs. proppant fracturing • Frac packs • Waterfracs • Fracturing in horizontal wells • QA/QC of fracturing treatments • Evaluation of fracturing treatment success

2016 Schedule and Tuition / 5 Days

ABERDEEN, UK	25-29 JUL	US$4770+VAT
HOUSTON, US	25-29 APR	US$4140

Petrophysics of Unconventional Reservoirs – PUR

INTERMEDIATE

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

DESIGNED FOR

Geoscientists involved with the evaluation and exploitation of unconventional reservoirs including tight gas sands, shale gas, and coal-bed methane.

YOU WILL LEARN HOW TO

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

COURSE CONTENT

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

2016 Schedule and Tuition / 3 Days

HOUSTON, US	13-15 JUN	US$3075

Reservoir Management for Unconventional Reservoirs – RMUR

INTERMEDIATE

This course in unconventional reservoir management is aimed at all petro-technical professionals who have little experience with these resource types but who wish to quickly learn some key elements and issues associated with the exploitation of unconventional reservoirs (tight gas, tight oil, and shales). The course is built around the role of the reservoir engineer and, hence, concerns itself with the integration and use of information to make well rate and recoverable volumes estimates, making decisions on desirable data collection, and planning answers to common questions such as choice of initial development spacing and the value of subsequent infill drilling.

DESIGNED FOR

All petro-technical professionals who have little experience with unconventional reservoirs but who need or desire to start developing some understanding of important basic concepts and methods associated with these resource types. CBM reservoirs are not addressed.

YOU WILL LEARN HOW TO

- Plan solutions to common reservoir management problems for unconventional reservoirs
- Apply approaches to estimate rate and recoverable volumes for wells prior to development in an unconventional reservoir
- Use classical and current non-simulation methods for estimating wells rates and recoverable volumes using production data from unconventional reservoirs
- Better understand the limitations of these rate and recoverable volume prediction methods
- Address the development of a life-of-field surveillance plan for an unconventional reservoir
- Better understand the use, design and analysis of pressure transient tests appropriate for the characterization of unconventional well/reservoir systems

COURSE CONTENT

Reservoir management and the role of the reservoir engineer • Unconventional reservoirs: quality recognition and development life-stages • A review of the fundamentals of volumetric in unconventional reservoirs • Rate and recoverable volumes prediction: before development • Rate and recoverable volumes prediction: after development • Pressure transient testing: appropriate methods; design and analysis • Life-of-field surveillance planning • Solving common unconventional reservoir management problems: setting initial spacing • Solving common unconventional reservoir management problems: valuing and planning infill drilling • Solving common unconventional reservoir management problems: development drilling sequence • Reservoir simulation versus non-simulation tools • Uncertainty issues

2016 Schedule and Tuition / 5 Days

HOUSTON, US	25-29 APR	US$4140*
OKLAHOMA CITY, US	14-18 MAR	US$4100*

*plus computer charge

Unconventional Resources

Surface Water Management in Unconventional Resource Plays – SWM

INTERMEDIATE

In order to establish and implement an optimized water management plan for hydraulic fracturing operations, operators and service companies need an understanding of a broad array of subjects, including water chemistry, systems modeling, water treatment technology, the regulatory landscape, and best practices for field operations. This course first establishes a foundation of knowledge regarding water awareness, water chemistry, fluid dynamics, and water analysis tools. Upon this foundation the course will build a model for optimizing water management in support of hydraulic fracturing operations, providing reviews of best practices and the latest industry technology, while always considering key stakeholders

DESIGNED FOR

Production, completion, operations, and surface facilities engineers; operations managers, logistics coordinators, field superintendents; any personnel involved in establishing, improving, or supervising the implementation of an organization's water management plan; personnel in service organizations seeking a more thorough understanding of the water system in unconventional resource plays.

YOU WILL LEARN HOW TO

- Design and implement a water management plan for an unconventional resource play
- Assess the regional hydrological cycle in the operational area
- Adopt emerging best practices regarding water management
- Establish a water sampling and analysis program
- Design and run a water treatment technology pilot test
- Find the lowest cost solution for sourcing fluid for hydraulic fracturing operations
- Select a water treatment technology for a project
- Manage the primary service/equipment providers critical to water management
- Establish basic water quality requirements necessary for frac fluid
- Build a water management plan that complies with regulations
- Build a water management cost model to use as a tool to optimize a water management plan

COURSE CONTENT

Global water awareness and the oil and gas industry's impact • Flowback and produced fluid • Basic water chemistry focused on oilfield concerns • Water quality considerations for hydraulic fracturing operations • Water sampling and analysis, in the field and in the lab • Water treatment for reuse and recycling programs • Acquisition, storage, transportation, disposal, and treatment of water • Holistic field water management • Regulations applicable to water management • Water management system cost modeling

2016 Schedule and Tuition / 3 Days

HOUSTON, US	19-21 SEP	US$3075

Advanced Hydraulic Fracturing – AHF

SPECIALIZED

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

DESIGNED FOR

Production, operations, and completions engineers who are actively involved in hydraulic fracturing applications and desire a more in-depth understanding of hydraulic fracturing theory and applied concepts. It is designed for engineers that have some fracturing experience or those who have already attended the PetroSkills intermediate level Hydraulic Fracturing Applications course.

YOU WILL LEARN HOW TO

- Better understand rock properties and rock mechanics related to fracturing applications
- Better understand fracturing fluid mechanics and proppant transport
- More effectively design fracturing treatments through better understanding of factors influencing hydraulic fracturing applications
- Use pre-frac injection test data and real-time fracturing treatment data in fracturing applications to define fracture parameters and improve frac treatment design
- Consider factors influencing post-frac fracture conductivity and well cleanup
- Realize the strengths and limitations of existing hydraulic fracturing technology and fracture models
- Expand fracturing applications to fit a wider range of reservoir types and conditions

COURSE CONTENT

Rock properties and fracture mechanics related to the fracturing process • Fracturing fluid mechanics • Proppant transport • Pre-frac injection test analysis • Fracture closure • Fracture monitoring and fracture measurement • Fluid leak-off • Re-fracturing considerations • Review of existing fracture modeling software • Evaluation of post-frac well performance

2016 Schedule and Tuition / 5 Days

HOUSTON, US	8-12 AUG	US$4240
MIDLAND, US	12-16 SEP	US$4200

Applied Rock Mechanics – ARM

SPECIALIZED

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

DESIGNED FOR

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

YOU WILL LEARN HOW TO

- Determine the stress, strain, and failure mechanics of rocks
- Apply rock mechanics concepts and generate economic benefits in all phases of reservoir development

COURSE CONTENT

Introduction to rock mechanics and geomechanical principals • 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 • Borehole stability • Sand control • Fracture mechanics • Unconventional reservoir applications • Reservoir engineering applications • Wireline log predicted mechanical properties • Data integration

2016 Schedule and Tuition / 3 Days

HOUSTON, US	25-27 APR	US$3135
	24-26 OCT	US$3135

Coalbed Methane Reservoirs: Advanced Analysis Techniques – CMR

SPECIALIZED NEW

This four day advanced coalbed methane (CBM) / coal seam gas (CSG) course is designed to present attendees with the most current analysis techniques developed by industry for application to CBM reservoirs. The class will cover a full range of integrated topics ranging from characterization of the coals through data collection and testing, drilling and completion, reservoir engineering, pilot design and production management strategies. CBM Resource and Reserve guidelines are developed so that the attendee can best design field development plans. A set of course notes is provided, including problems and solutions developed from actual CBM data sets. This course is designed for technical and managerial staff who desire a comprehensive understanding of the state of the art analysis techniques currently being used to assess and evaluate CBM reservoirs worldwide.

DESIGNED FOR

Technical and managerial staff who need an understanding of coalbed methane / coal seam gas (CBM/CSG) testing, appraisal and production methodologies.

YOU WILL LEARN HOW TO

- How to design a data collection program which will optimize the classification of CBM reserves and resource volumes
- How to interpret information collected from coal cores, and how to avoid common mistakes in core analysis
- Production management strategies to optimize the performance of CBM reservoirs
- How to determine gas in place and ultimate gas recovery from CBM wells and reservoirs
- How to design an initial pilot program and how to mature that pilot to a large-scale development plan

COURSE CONTENT

Coal geology • Core analysis and lab experiments • Gas content and saturation of coals • Critical desorption pressure testing • Coal permeability • Designing a data collection program • Drilling and completion strategies • Production performance • Analytical analyses • CBM reservoir simulation • Pilot performance • CBM reserves and resources • Production management strategies • Enhanced CBM methods • Carbonaceous shales • Lessons learned from US experience • Case studies

See website for dates and locations.

Horizontal and Multilateral Wells: Analysis and Design – HML1

SPECIALIZED

The complex, interdisciplinary decisions in advanced well projects are emphasized in this course. The process of candidate screening and selection, involving geological, reservoir, and production characteristics are considered, as well as constraints on drilling and completion options. Methods to predict well performance and recovery from horizontal and multilateral wells are presented with integration of inflow and wellbore flow performance for individual and multilateral wells. Well completion options and its impact on well performance for horizontal and multilateral wells are summarized. The improvement by multistage hydraulic fracturing and matrix acidizing is evaluated. Economic and risk analysis are also presented with a number of case histories to highlight the performance and benefits of horizontal wells and the elements of risk and uncertainty at the initial design stage. The instructor will use the examples from participants' field cases for analysis in the class.

DESIGNED FOR

Geologists, reservoir engineers, production and completion engineers, and development, asset, and project managers.

YOU WILL LEARN HOW TO

- Identify the applications of horizontal, multilateral, and intelligent wells from geological and reservoir aspects
- Assess multidisciplinary inputs for successful screening of advanced well projects
- Predict horizontal and multilateral well productivity with integrated reservoir flow and well flow models
- Evaluate formation damage and well completion effects on advanced well performances
- Diagnose problems in advanced wells and conduct the necessary sensitivity analyses
- Evaluate well stimulation treatments, including multiple-stage fractured horizontal well performance and matrix acidizing results
- Intelligent well concept, design and field applications
- Minimize technical and economic risk in advanced well projects

COURSE CONTENT

Technical and economic benefits of advanced well systems • Reservoir applications for various well types • The screening of applications for advanced well applications • Geological structure characteristics • Classification of advanced wells • Reservoir inflow performance at different boundary conditions • Wellbore flow and integrated well performance • Commingled production and cross flow in multilateral wells • Formation damage in horizontal and multilateral wells • Well completion and combined effect of completion and damage on well performance • Well stimulation evaluation by productivity improvement • Optimal design of stimulation • Reservoir simulation considerations • Applications of intelligent completion in advanced wells • Risk identification and assessment

See website for dates and locations.

Horizontal and Multilateral Wells: Completions and Stimulation – HML2

SPECIALIZED

Successful multilateral and horizontal wells require new considerations, interdisciplinary planning, and special techniques. This intense course addresses the critical need for a proper understanding of all aspects of horizontal and multilateral design, completion, and stimulation that make these wells unique. It is designed for those planning or working with horizontal and multilateral wells and interested in effective use of the latest technology. Basic understanding of important reservoir characteristics, hole stability, formation damage, crucial zonal isolation, and hydraulic fracturing are just some of the critical issues addressed by this course. Hydraulic fracturing aspects of unconventional resources plays, including conductivity, proppant selection, and practices, are discussed. A combined practical and technical theme is employed, with emphasis on economy and efficiency in designing, completing, and producing horizontal and multilateral wells.

DESIGNED FOR

Completion, production, reservoir, and research engineers; geologists; managers in completion, production, drilling, and exploration; others involved in various phases of horizontal and multilateral wells or interested in gaining an interdisciplinary up-to-date understanding of this continually evolving technology.

YOU WILL LEARN HOW TO

- Successfully design and optimize horizontal and multilateral well completions
- Engineer wells, taking into account limitations imposed by well bore stability and borehole friction
- Determine the appropriate zonal isolation methods for horizontal and multilateral wells
- Perform hydraulic fracturing of horizontal wells
- Design damage removal, stimulation, and workover operations

COURSE CONTENT

Reservoir characteristics for horizontal and multilateral well applications • Well performance prediction • Wellbore stability of horizontal wells • Stress field effect on drilling, completion, production, and stimulation • Geosteering • Multilateral well structure, junction, and application • Formation damage and its effect on horizontal well performance • Well completion and its effect on horizontal and multilateral wells • Intelligent completion: downhole monitoring and control • Well trajectory and completion optimization• Horizontal well fracturing • Acidizing of horizontal wells • Other stimulation methods

2016 Schedule and Tuition / 5 Days

HOUSTON, US	4-8 APR	US$4240*
	12-16 DEC	US$4240*
OKLAHOMA CITY, US	29 AUG-2 SEP	US$4200*

**plus computer charge*

Use of Full Azimuth Seismic and Microseismic for Unconventional Plays – FAMS

SPECIALIZED

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, VSPs, and core work. For microseismic, participants will learn the strengths, weaknesses, limitations, and benefits of microseismic imaging of hydraulic fractures.

DESIGNED FOR

For surface seismic, experienced geoscientists working seismic to evaluate unconventional resources, and/or fractured reservoirs that require hydraulic stimulation. For microseismic, all professionals using microseismicity to plan, monitor, evaluate, and diagnose stimulations will find this course useful.

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 and 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

COURSE CONTENT

Fundamentals of reflection seismology; seismic anisotropy—its causes and uses • Issues, goals, and pitfalls in seismic full-azimuth acquisition • Seismic data processing—nonazimuthal 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 and discussion, historical background, Yeoman science 101 • Hydraulic fracture technology, in-situ and other studies of hydraulic fracture geometries • Earthquake seismology and hydraulic-fracture-induced microseismology • The means and the methods of microseismic imaging • Examples I: results—the dots • Examples II: interpretation and integration • Pitfalls, benefits, FAQs • Wrap-up discussion

2016 Schedule and Tuition / 5 Days

HOUSTON, US	13-17 JUN	US$4240

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Flexibility—less time away from work

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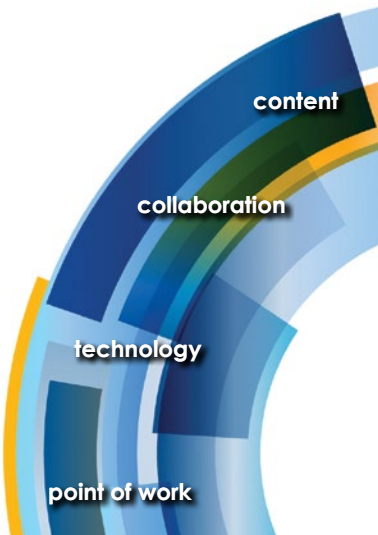

TO VIEW OUR COURSES IN OTHER DISCIPLINES, VISIT:

Subsurface

Introductory/Multi-Discipline
Geology
Geophysics
Petrophysics
Reservoir Engineering
Well Construction/Drilling
Production & Completions Engineering
Unconventional Resources
Integrated - Heavy Oil
Petroleum Data Management

Facilities

Gas Processing
Process Facilities
Water & Corrosion
Offshore
Pipeline
Instrumentation, Controls, & Electrical
Mechanical
Reliability Engineering
Procurement/Supply Chain Management
Refining

Operations & Maintenance

Health, Safety, Environment

Petroleum Business and Professional Development

Petroleum Professional Development
Petroleum Business
Project Management

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