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

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

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

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Instructor</th>
<th>Instructor</th>
<th>Instructor</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Peter Aird</td>
<td>Mr. Paul Gardner</td>
<td>Mr. Aaron Klein</td>
<td>Mr. Bob Nichol</td>
<td>Dr. Robert Skopeck</td>
</tr>
<tr>
<td>Mr. Jeff Aldrich</td>
<td>Mr. Mason Gomez</td>
<td>Mr. Larry Lens</td>
<td>Mr. William Ott</td>
<td>Dr. Carl Sodergebld</td>
</tr>
<tr>
<td>Dr. Rosalind Archer</td>
<td>Mr. Greg Hazlett</td>
<td>Mr. Bob Lippincott</td>
<td>Mr. Roberto Peveraro</td>
<td>Dr. John Spivey</td>
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<tr>
<td>Dr. Omar Barkat</td>
<td>Mr. Ron Hinn</td>
<td>Mr. Alain Louis</td>
<td>Mr. Bill Powell</td>
<td>Dr. Marc Summers</td>
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<tr>
<td>Mr. Larry Britt</td>
<td>Mr. Aaron Horn</td>
<td>Dr. Heloise Lynn</td>
<td>Mr. Gerry Ross</td>
<td>Dr. E.C. Thomas</td>
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<tr>
<td>Mr. Richard Carden</td>
<td>Mr. Stephen Jewell</td>
<td>Mr. Steve McKeever</td>
<td>Mr. Steve Sadoskas</td>
<td>Dr. Jack Thomas</td>
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<tr>
<td>Dr. Iskander Dityashev</td>
<td>Dr. Satish Kalra</td>
<td>Mr. Steve Metcalf</td>
<td>Dr. Helmy Saydoun</td>
<td>Mr. Bob Westermark</td>
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<tr>
<td>Mr. Eric Foster</td>
<td>Dr. Mohan Kelkar</td>
<td>Mr. David Patrick Murphy</td>
<td>Dr. Subhash Shah</td>
<td>Mr. Larry Wolston</td>
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### Unconventional Resources Course Progression Matrix

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<tr>
<th>Geoscience</th>
<th>Petrophysics</th>
<th>Reservoir Engineering</th>
<th>Well Construction/Drilling</th>
<th>Production and Completions Engineering</th>
<th>Facilities and Project Management</th>
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<tbody>
<tr>
<td>Introduction to Geomechanics for Unconventional Reservoirs (Page 4)</td>
<td>Petroleum Systems Analysis - PSA (Page 4)</td>
<td>Foundations of Petrophysics - FPP (Virtual course also) (Page 2)</td>
<td>Well Test Design and Analysis - WTA (Page 2)</td>
<td>Production Operations 1 - PO1 (Virtual course also) (Page 3)</td>
<td>Oil Well Pad Facilities (for non-Facilities Engineers) - OWPP-NFE (Page 4)</td>
</tr>
</tbody>
</table>
Basic Petroleum Engineering Practices – BE

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

Basic Petroleum Technology Principles – BPT

This course will be delivered virtually through PetroAcademy providing participants with the knowledge they need at their convenience.

This course provides the participant with an understanding of basic petroleum technology in the context of the Petroleum Value Chain, from exploration to abandonment. The participant will understand how and when geoscience and engineering professionals use technology to determine and then optimize the economic value of an oil and gas field. This enables the participant to maximize their professional and administrative contribution in their organization.

DESIGNED FOR

Those who need to achieve a context and understanding of E&P technologies, and the role of technical departments in oil and gas operations. An understanding and use of oilfield terminology is developed.

YOU WILL LEARN

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

COURSE CONTENT

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

Self-paced, virtual course
- start anytime.
Tuition US$3570

For more information, visit petroskills.com/bptonline

Basic Petroleum Technology – BPT

This course is appropriate for those who need to achieve a context and understanding of E&P technologies in conventional and unconventional fields, and/or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

YOU WILL LEARN

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

COURSE CONTENT

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

Oil Well Pad Facilities (for non-Facilities Engineers) – OWPF-nFE

This course provides a comprehensive overview of onshore oil well-pad facilities as typically utilized for the development of shale/tight oil fields. The course is focused on the purpose, function, and operation of the facilities - what, why, how, not only the more detailed engineering aspects which are covered in a companion course OWPF-FE (for Facilities Engineers). A major aspect of the non-Facilities Engineers course is how the pad facilities integrate with the wells/subsurface and also the product (oil, gas, produced water) outlet systems. This course does not contain many calculations; instead the intent is to generate discussion and better understanding of the issues involved with design, operation and management of the pad facilities and their role in providing value to the development as a whole.

DESIGNED FOR

This course is aimed primarily at non-Facilities Engineers, e.g. production/reservoir engineers, operations personnel, environmental staff, etc, or anyone who needs a basic understanding of oil well pad facilities – what they do and how they work.

YOU WILL LEARN

• The different types of process flow schemes typically used for oil well pad facilities
• The various types of engineering drawings used to describe facilities and how to interpret them
• How well production characteristics/ performance should be integrated into the facilities design
• The range of fluid compositions and properties typically encountered in the newer shale/tight oil developments and their impact on facilities design and operation
• The main processing requirements and associated equipment types typically required
• How the various processes and equipment types work with focus on the requirements of typical onshore shale/tight oil well pad facilities
• Effects of third party gas gathering system design and operation on the well pad facilities

COURSE CONTENT

Engineering drawings • Oil well pad process flow diagrams • Well production characteristics • Fluid compositions and properties • Separation equipment • Oil treatment • Oil stabilization • Storage tanks and vapor recovery • Facility piping systems • Compressors • Sand handling • Produced water handling • Flow measurement

2019 Schedule and Tuition (USD)

<table>
<thead>
<tr>
<th>Location</th>
<th>Dates</th>
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<tr>
<td>ABERDEEN, UK</td>
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FOR MORE INFORMATION, VISIT PETROSKILLS.COM/BPTONLINE

2019 Schedule and Tuition (USD)

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<td>OKLAHOMA CITY, US</td>
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See website for dates and locations.
Evaluating and Developing Shale Resources – SRE

FOUNDATION 5-Day

This course will cover current practices for evaluating, drilling, and completing these challenging reservoirs with the primary goal that all participants come away with a clear understanding of the role and value of every discipline in an integrated team. Discussions and exercises will include a focus on the limitations of many of the current tools and technologies. Information and opportunities for many of the 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.

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
• Recognize and describe shale play complexities and differences between type reservoirs and identify the sweet spots
• Estimate gas 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 formations
• Evaluate and forecast individual well and reservoir performance
• Determine how to estimate well reserves in both PDP (proved developed producing) and PUD (proved undeveloped) categories

COURSE CONTENT
Current shale plays and their global impact
• Reservoir characterization and evaluation: organic quality; rock quality and mechanical 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 and lateral drilling; challenges; mechanical considerations
• Completions: cased vs. open hole; perforation schemes; stimulation design and considerations; case histories
• Field trials and pilots: strategies for implementing a 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

2019 Schedule and Tuition (USD)

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

VIRTUAL DELIVERY $4325

PETROSKILLS.COM/FPPONLINE

Well Design and Engineering – WDE

FOUNDATION 5-Day

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 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 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

Well Test Design and Analysis – WTA

FOUNDATION 5-Day

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

PETROSKILLS.COM/WTONLINE

+1.918.828.2500   |   www.petroskills.com   |   +1.800.821.5933 (toll free North America)                           All classes available at your location. Contact us today.
## Production Operations 1 – PO1

### Foundation

PO1 represents the core foundation course of PetroSkills’ production engineering curriculum and is the basis for future oilfield operations studies. Course participants will become familiar with both proven historical production practices as well as current technological advances to maximize oil and gas production and overall resource recovery. The course structure and pace apply a logical approach to learn safe, least cost, integrated analytical skills to successfully define and manage oil and gas operations. Applied skills guide the participant with a framework to make careful, prudent, technical oil and gas business decisions. Currently emerging practices in the exploitation of unconventional resources including shale gas and oil, and heavy oil and bitumen complement broad, specific coverage of conventional resource extraction.

### Designed For

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

### You Will Learn How To

- Recognize geological models to identify conventional and unconventional (shale oil and gas and heavy oil) hydrocarbon accumulations
- Understand key principles and parameters of well inflow and outflow
- Build accurate nodal analysis models for tubing size selection and problem well review
- Design and select well completion tubing, packer, and other downhole equipment tools
- Plan advanced well completion types such as multilateral, extended length, and intelligent wells
- Design both conventional and unconventional multi stage fractured horizontal wells
- Apply successful primary casing cementing and remedial repair techniques
- Select equipment and apply practices for perforations
- Plan well intervention jobs using wireline, snubbing, and coiled tubing methods
- Manage corrosion, erosion, soluble and insoluble scales, and produced water handling challenges
- Apply well completion and workover fluid specifications for solids control and filtration
- Empoly the five main types of artificial lift systems
- Identify formation damage and apply remedial procedures
- Design and execute successful carbonate and sandstone reservoir acidizing programs
- Understand the causes of sand production and how to select sand control options
- Understand the proper use of oilfield surfactants and related production chemistry
- Identify and successfully manage organic paraffin and asphaltene deposits
- Choose cased hole production logging tools and interpret logging results
- Understand modern conventional fracture stimulation practices
- Understand multistage, horizontal well shale gas and shale oil massive frac job design and operations
- Review heavy oil development and extraction including mining operations and current modern thermal processes

### Course Content

- Basic well completion design, practices, and strategies
- Safety aspects
- Subterranean injection and pressure testing
- Understanding real-time data acquisition and applications
- Completion and workover well fluids
- Well intervention: wireline, hydraulic
- Equipment
- Primary and remedial cementing operations
- Perforating design and equipment
- Well testing
- Understanding inflow and outflow and applied system analysis
- Well testing methods applicable to production operations
- Well completion design and related equipment
- Primary and remedial cementing operations
- Perforating design and applications
- Completion and workover well fluids
- Well intervention: wireline, hydraulic
- Workover operations and tools
- Problem well analysis
- Artificial lift completions: rod pump, gas lift, ESP, PCP plunger lift, and others
- Problem well analysis
- Artificial lift completions: rod pump, gas lift, ESP, PCP plunger lift, and others
- Well intervention: wireline, hydraulic

### 2019 Schedule and Tuition (USD)

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*plus computer charge

P01 is also available as a virtual course which is an enhanced version of the face-to-face public session.

### 2019 Schedule and Tuition (USD)

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<tr>
<td>Mooland, US</td>
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*plus computer charge

TO LEARN MORE, VISIT PETROSCKILLS.COM/PO1-BLENDEDCAW
Introduction to Geomechanics for Unconventional Reservoirs – IGUR

FOUNDATIONS 5-Day

This course provides an overview of petroleum geomechanics and its applications for development of unconventional plays. It is presented in three sections: (i) fundamentals of petroleum geomechanics, (ii) geomechanical characterization, stress modeling and building mechanical earth models, and (iii) geomechanical modeling for unconventional plays.

**DESIGNED FOR**
Geoscientists, petrophysicists, engineers, or anyone involved in unconventional reservoir development.

**YOU WILL LEARN**
- Essentials of rock mechanics concepts such as stress and strain tensors, rock constitutive models, and failure criteria
- To review lab measurement reports to understand mechanical rock properties and to understand the application of this data to case studies
- The key geomechanical parameters of shales
- The origins of pore pressure generation and pressure prediction and measurement methods for unconventional plays
- The processes of multi-source data collection (from cores, logs, lab and field tests, drilling, seismic, microseismic, etc.) for characterization of rock properties and in-situ stresses and building Mechanical Earth Models (MEMs)
- To analyze and interpret the geomechanical aspects of image logs, mini-frac and CRT tests, and drilling and completion reports
- To use different methodologies to measure/estimate in-situ stress components
- To apply geomechanical modeling to unconventional plays
- Practical approaches for drilling and mud window design
- The basic principles of hydraulic fracture design
- To characterize natural fractures and use discrete fracture network (DFN) modeling to account for their influence on hydraulic fracturing operations
- About modeling and monitoring of fault reactivation and seismicity induced by hydraulic fracturing and waste fluid disposal
- The application of data analytics and machine learning for optimization of drilling, completion, and production in unconventional plays

**COURSE CONTENT**
Introduction to petroleum geomechanics
- Stress and strain tensors
- Deformation models and failure criteria
- Laboratory measurement of elastic and strength rock properties
- Mechanical behavior properties and key geomechanical aspects of shale plays (fractures, brittleness, and anisotropy)
- In-situ stresses and plate tectonics in the earth
- Effective stresses and the role of pore pressure in geomechanics
- Origins of pore pressure generation and different pore pressure measurement and calculation methods

Oil Well Pad Facilities (for Facilities Engineers) – OWPF-FE

**FOUNDATIONS 5-DAY**

This course is focused on onshore well-pad facilities that are typically used for the development of shale/tight oil fields. The course starts with the review of typical well-pad facility process flow diagrams (PFDs) and the considerations involved in selecting a suitable PFD for the given conditions. Variations on the different PFDs are evaluated and their applications, pros and cons discussed.

**DESIGNED FOR**
- Geologists, geophysicists, and petrophysicists involved on the development of unconventional reservoirs
- Geoscientists at a fundamental level.

**YOU WILL LEARN**
- Essentials of rock mechanics concepts such as stress and strain tensors, rock constitutive models, and failure criteria
- To review lab measurement reports to understand mechanical rock properties
- To analyze and interpret the geomechanical aspects of image logs, mini-frac and CRT tests, and drilling and completion reports
- To use different methodologies to measure/estimate in-situ stress components
- To apply geomechanical modeling to unconventional plays
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- In-situ stresses and plate tectonics in the earth
- Effective stresses and the role of pore pressure in geomechanics
- Origins of pore pressure generation and different pore pressure measurement and calculation methods

Petroleum Systems Analysis – PSA

**FOUNDATIONS 5-Day**

This course addresses the fundamentals of the Petroleum System, and a holistic view of how it works, which is essential for geoscientists and engineers involved in today’s challenging conventional and unconventional exploration and development projects. The elements of the Petroleum System Charge, Trap, and Reservoir, are described systematically within the framework of play and prospect evaluation. The charge element begins with the deposition of the source rock and the establishment of its volumetric potential, or feedstock, for the system. Charge access involves converting this potential to expelled volumes, making, and then moving, the volumes from source bed to trap/reservoir. In the case of some unconventional reservoirs, this is within or adjacent to the source bed itself. A trap receives charge and petroleum columns build along its edges, until the container limit of the critical weak point is reached, or it splits. Reservoir rock storage and deliverability are modified by mechanical and chemical compaction, and fluid properties, fundamentally affecting project economics. Fluid properties further impact economics via the product value itself. This 5-day class uses new purpose-designed materials, and draws on a global database and familiarity with many different styles of producing basin, play, and accumulation.

**DESIGNED FOR**
- Geoscientists, geophysicists, and petrophysicists working on basin, play, prospect or reservoir evaluation, and reservoir engineers seeking a better understanding of the genesis of their reservoir, or field. The course provides a refresher in new concepts in this field for geoscientists at a fundamental level.

**YOU WILL LEARN HOW TO**
- Employ Petroleum System concepts as a holistic approach to risk and volume estimation in play, prospect, and reservoir evaluation
- Predict and confirm source rock distribution from rock and fluid data, and estimate volumetric potential
- Predict the temperature, timing, volumes, compositions and phases expelled from kitchens, and the controls exerted by hydrodynamics and capillarity on migration from source bed to trap/reservoir
- Describe a trap in terms of the critical weak points on its edges
- Estimate column heights containable by those edges
- Understand the Petroleum System controls on reservoir rock quality
- Understand reservoir and reservoir fluid properties that govern deliverability, well recovery, and economics (rate, product value)

Unconventional Resources Completion and Stimulation – URCS

**FOUNDATIONS 5-Day**

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.

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

**YOU WILL LEARN HOW TO**
- Use key multi-disciplinary tools for successful completions and stimulations in unconventional resources
- Understand the importance of geomechanics 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 principles 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
- 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

**2019 Schedule and Tuition (USD)**

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See website for dates and locations.
Advanced Practices in Exploration and Development of Unconventional Resources – EDUR
INTERMEDIATE 5-Day
In this course, participants will learn and practice the techniques used by various disciplines to evaluate unconventional resources. The objective is to understand the significance and limits of the various tools in order to optimize integration, improve communication, and allow for greater efficiency in follow-up projects. In addition to covering the techniques, many of the exercises and problems use data from active producing unconventional basins. Several spreadsheets are provided to allow for quick tool reviews.

**YOU WILL LEARN HOW TO**
- How to use engineering and geoscience methods to analyze unconventional well data
- To reduce risk by understanding the strengths and limitations of various assessment tools
- How to effectively collect and integrate data from multiple sources
- The essential functions of each key discipline in order to become a valuable member of the integrated team, contributing and communicating effectively

**COURSE CONTENT**
Introduction to shale classification, mineralogy, physical and chemical attributes • Determining porosity, permeability, and water saturation in unconventional reservoirs • Biostratigraphy, sequence stratigraphy, and anoxia in unconventional reservoirs • Petrophysical and sequence stratigraphy, and anoxia in unconventional reservoirs • Geochemistry, kerogen typing, thermal effects, and reserve estimation • Physical parameters affecting unconventional resources: capillary properties, pressure, seal capacity, etc. • Using global and regional stress maps • Application of the Mohr circle • Determination of frac gradients • Leak-Off Test (Minifrac) and microseismic • global and regional stress maps • Application of Geochemistry, kerogen typing, thermal effects, reservoirs; rock physics and brittleness • Geophysical techniques in unconventional reservoirs • Petrophysical and sequence stratigraphy, and anoxia in conventional reservoirs

**YOU WILL LEARN HOW TO**
- The importance of identifying and agreeing on the objectives of production optimization and artificial lift early in the well planning cycle
- The critical differences and requirements for applying artificial lift to unconventional vs. conventional wells
- The effect of changing Inflow Performance Relationship (IPR) over time, how to construct and profitably use relevant IPR curves
- Benefits and challenges of applying Systems Nodal Analysis in artificial lift for unconventional wells
- The strengths and weaknesses of each major artificial lift method used
- Challenges and issues in operating artificial lift and how to troubleshoot/mitigate them
- How to select an effective artificial lift method for individual wells
- How to analyze staging of artificial lift methods over time to enhance value
- and more...

**COURSE CONTENT**
Artificial lift objectives, value, rate and recovery, cost • Differences between conventional and unconventional wells • Applying Nodal Analysis for artificial lift selection in unconventional wells

Artificial Lift for Unconventional Wells – ALUW
INTERMEDIATE 5-Day
NEW
This course addresses artificial lift methods and practices for unconventional wells for oil and gas producers, as well as associated industry service providers and contractors. The focus of the course is optimizing value from upfront well planning through the end of life of unconventional wells by selecting, installing and operating artificial lift effectively. Upon completion of this course, the participant will understand how to choose and implement artificial lift and be able to utilize best practices to resolve and reduce issues and challenges that frequently occur during the life cycle of unconventional wells. The course focuses on optimizing production and recovery by ensuring the proper artificial lift technology is used in conjunction with optimum surface pressure and related facilities in a holistic approach. Participants will understand the steps necessary to develop an effective artificial lift strategy for wells specific to areas/plays. All participants will be asked to bring a challenge they are currently facing in artificial lift for unconventional wells and will present the challenge (Day 2) and their path forward based on what they have learned (Day 3).

**DESIGNED FOR**
Geoscientists, engineers, and managers who need an enhanced understanding of assessment techniques for unconventional resources and how to integrate them.

**YOU WILL LEARN HOW TO**
- Make survey calculations
- Interpret TVD, polar and rectangular coordinates, and horizontal projection
- 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 unbalanced
- 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

Directional, Horizontal, and Multilateral Drilling – DHD
INTERMEDIATE 5-Day
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, and multilateral 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,顶端pouchers, managers, and technical support personnel.

**YOU WILL LEARN HOW TO**
- Systematically assess the evolution of a basin’s conventional and unconventional petroleum system criticals through space and time through a practical application of geology, geophysics, and geochemistry
- Evaluate the geomechanical fundamentals controlling a basin’s burial history through tectonic subsidence analysis
- Relate organic source quantity and quality to sedimentary processes and environments
- Delineate migration pathways through space and time
- Evaluate seal/trap quality
- Geovaluate the kinetic model
- Rank and quantify petroleum system risk both deterministically and stochastically using Monte Carlo methods
- Determine within a basin the optimal stratigraphic and spatial locations for exploring conventional and unconventional resources
- Work in an integrative team to generate and present a prospect from the team’s own crafted 2D basin model from both well control and seismic generated virtual wells
- and more...

**COURSE CONTENT**
Geomechanical fundamentals • Geothermal criticals • Geochemical criticals • Migration criticals • Reservoir criticals • Seal and trap criticals • Timing criticals • Risk and decision-making

Basis Analysis Workshop: An Integrated Approach to the Exploration and Evaluation of Conv. and Unconv. Resources – BA
INTERMEDIATE 5-Day
Basin analysis, whether for conventional or unconventional resource play analysis, demands an integrated approach from explorationists. It is 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. Therefore, this five-day course does not passively present an inventory of basins of the world. Instead, this workshop provides the theory, methods, and active practice for participants to develop and optimize their own individual basin evaluation and modeling modus operandi. Incorporated as practical problems for workshop analysis and student talk submission are case histories and new findings from throughout the world utilizing geologic, geophysical, and geochemical data sets. In addition, students construct and interpret their own 1D and 2D basin models using BASINMOD, an industry standard of basin modeling software.

**DESIGNED FOR**
Geoscientists, especially those in New Ventures or in Asset Evaluation, who require a non-superficial but practical application of an integrated variety of state-of-the-art geological/geochemical/geophysical tools for the regional to local evaluation of conventional and unconventional resource plays in sedimentary basins.

**YOU WILL LEARN HOW TO**
- Rank and quantify petroleum system risk
- Delineate migration pathways through space and time
- Evaluate seal/trap quality
- Geovaluate the kinetic model
- Rank and quantify petroleum system risk both deterministically and stochastically using Monte Carlo methods
- Determine within a basin the optimal stratigraphic and spatial locations for exploring conventional and unconventional resources
- Work in an integrative team to generate and present a prospect from the team’s own crafted 2D basin model from both well control and seismic generated virtual wells
- and more...

**COURSE CONTENT**
Geomechanical fundamentals • Geothermal criticals • Geochemical criticals • Migration criticals • Reservoir criticals • Seal and trap criticals • Timing criticals • Risk and decision-making

2019 Schedule and Tuition (USD)

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* plus computer charge
Gas Production Engineering – GPO

INTERMEDIATE 5-Day
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. Problem-solving sessions allow participants to evaluate field problems. 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 which 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 flow after flow, isochronal, stabilized inflow performance; 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 tubing, flowlines, chokes, safety valves; effects of liquids-liquid loading, liquid removal methods, multiphase flow correlations; erosional velocity • Compression: types of compressors, compressor selection, reciprocating and centrifugal; 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 design, accuracy, troubleshooting; etc • Condensate reservoirs: reservoir types - wet gas, retrograde; reserve estimates, laboratory simulation; gas cycling • Interpreting P/Z plots; heat and formation

2019 Schedule and Tuition (USD)

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Petrophysics of Unconventional Reservoirs – PUR

INTERMEDIATE 3-Day
Petrophysics is central to the integration of a wide spectrum of related geoscience and engineering disciplines. However, students should also be familiar with at least two or more of the following topics: horizontal well drilling, wireline logging and log analysis, coring and core analysis, petrophysics, geophysics, geochemistry, formation testing, rock mechanics, hydraulic fracturing, and petroleum economics.

DESIGNED FOR
Geoscientists involved with the evaluation and exploitation of unconventional reservoirs including tight gas sands, shale gas, and 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
• Recognize consequences and magnitudes of shale anisotropy
• Interpreting capillary pressure measurements made on shale
• Interpret microstructural imaging of shale

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

2019 Schedule and Tuition (USD)

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Hydraulic Fracturing Applications – HFU

INTERMEDIATE 5-Day
The course reviews the basic concepts of hydraulic fracturing and the broad applications of the technique. Fracturing technology benefits and limitations in all types of sandstone and carbonate reservoirs are explained. It considers the critical components of the fracturing process, and it expands on the steps and data input requirements to effectively select stimulation candidates, plan, design, and implement hydraulic fracturing treatments. The use of modeling as an important tool to design and analyze treatments, how it can be effectively used in practical applications, and its limitations are explained. In addition to the technical presentation, the course contains many practical exercises and class problems based on case histories.

DESIGNED FOR
Production, reservoir, and drilling engineers, and others who have a basic understanding of hydraulic fracturing and need to enhance their knowledge about fracturing concepts and applications.

YOU WILL LEARN HOW TO
• Identify what are the data requirements and steps to implement to properly design hydraulic fracturing treatments
• Evaluate and select stimulation candidates, and apply hydraulic fracturing concepts to various types of reservoir conditions to optimize well productivity
• Recognize opportunities for substantial production improvements by application of effective hydraulic fracturing treatments
• Collect pertinent well data and information to plan, design, implement, and evaluate fracturing treatments for the most common types of reservoirs
• Realize the strengths and limitations of hydraulic fracturing theory as it relates to field applications
• Become an active participant in the different phases of typical hydraulic fracturing treatments

COURSE CONTENT
Introduction to the fracturing process and mechanics • Fracture design concepts and methodologies • Fracturing fluid additives and proppant • Strengths and limitations of fracturing applications • Production increase • Factors involved in field implementation • Acid vs. proppant fracturing • Frac packing concepts • Waterfracing concepts • Horizontal well fracturing • QA/QC of fracturing treatments • Methods to evaluate fracturing treatment success

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Advanced Hydraulic Fracturing – AHF

SPECIALIZED 5-Day
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-fracture 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 Petrobells 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-fracture 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-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 • Fracture design concepts and methodologies • Fracturing fluid additives and proppant • Strengths and limitations of fracturing applications • Production increase • Factors involved in field implementation • Acid vs. proppant fracturing • Frac packing concepts • Waterfracing concepts • Horizontal well fracturing • QA/QC of fracturing treatments • Methods to evaluate fracturing treatment success

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* plus computer charge
Reservoir Management for Unconventional Reservoirs – RMUR
INTERMEDIATE  5-Day
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 providing answers to common questions such as choice of initial development spacing and the value of subsequent infill drilling. Attendees should leave this course with an improved understanding of unconventional reservoir exploitation.

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.

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 well 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 (DPRs & PRU)

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: development drilling sequence • Reservoir simulation versus non-simulation tools • Uncertainty issues

Surface Water Management in Unconventional Resource Plays – SWM
INTERMEDIATE  3-Day
Water management in unconventional resource plays has become a critical topic to the oil and gas industry in the last decade. 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 review of best practices and the latest industry technology, while considering key stakeholders. This course is designed for the practitioner: for the people who will design and implement all or a part of a water management plan in unconventional resource plays.

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 water management

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

Onshore Gas Gathering Systems: Design and Operations – PF45
INTERMEDIATE  5-DAY
This course deals with the design, operation, and optimization of onshore gas gathering systems and their associated field facilities, from the wellhead to the central gas processing facility. From a design perspective, the main variables that impact the flexibility and operational characteristics of an onshore gas gathering system will be discussed. Typical operating problems are covered including hydrates, multiphase flow issues, corrosion, declining well deliverability, etc. Exercises will be utilized throughout the course to emphasize the key learning points.

DESIGNED FOR
Production and facilities department engineers/senior operating personnel responsible for the design, operation and optimization of onshore gas gathering systems and their associated field facilities.

YOU WILL LEARN
• The impact of gathering system pressure on gas well deliverability
• The impact of produced fluids composition on gathering system design and operation
• How to evaluate field facility and gathering system configurations for different applications
• To recognize and develop solutions to operating problems with existing gas gathering systems

COURSE CONTENT
Gas well inflow performance and deliverability • Overview of gas well de-liquefication methods for low-rate, low pressure gas wells • Effect of gathering system/abandonment pressure on reserves recovery • Impact of produced fluids composition on reserves recovery • Impact of produced fluids on productivity • How to manage fluid composition • How to develop a water management plan that complies with regulations • How to build a construction project schedule that is realistic • How to build a water management plan...
UNCONVENTIONAL RESOURCES

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

SPECIALIZED 5-Day

For surface seismic, participants will learn to evaluate azimuthal seismic in fractured reservoirs or resource intervals needing hydraulic fracturing. The course presents reflection seismic and microseismic acquisition, 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 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 input parameters
• Identify the support data required for the successful completion of in-situ horizontal stress characterization
• Extract engineering benefits and meaning from seismic data
• Appraise the utilities, capabilities, and limitations of seismic data in 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 - narrow 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, Yeeoman 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: interpretation and integration • Pitfalls, benefits, FAQs • Wrap-up discussion

Applied Rock Mechanics – ARM

SPECIALIZED 3-Day

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

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

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

COURSE CONTENT
Introduction to rock mechanics and geomechanical 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

Horizontal and Multilateral Wells: Analysis and Design – HML1

SPECIALIZED 5-Day

The complex, interdisciplinary decisions in advanced well projects are emphasized in this course. The application and benefits of horizontal and multilateral wells are analyzed. 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 their impact on well performance for horizontal and multilateral wells are summarized. To improve well performance, stimulation methods are discussed. A combination of practical and theoretical themes are employed, with emphasis on economy and efficiency in designing, completing, and producing horizontal and multilateral wells.

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 wells projects
• Predict horizontal and multilateral well productivity with integrated reservoir flow and wellbore friction 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-staged 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

Horizontal and Multilateral Wells: Completions and Stimulation – HML2

SPECIALIZED 5-Day

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, propellant selection, and practices, are discussed. A combination of practical and theoretical themes 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 bore 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 • Stressed 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

2019 Schedule and Tuition (USD)

2019 Schedule and Tuition (USD)

HOUSTON, US 24-28 JUNE $4525

OKLAHOMA CITY, US 7-11 OCT $4470

* plus computer charge

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