PetroSkills

Unconventional Reservoir Geoscience and Engineering - URE - Instructor-led + eLearning

COURSE

About the Course

This course is designed for professional engineers and geoscientists with little experience in unconventional reservoirs who wish to quickly learn the key elements of these reservoirs and the technologies to exploit them. Focused on shale (tight) oil, tight gas, and coalbed methane this course begins with geoscience elements, reservoir fluid properties, and unconventional well completions. Tests and techniques such as diagnostic fracture injection tests (DFITs), diagnostic plots, and rate transient analysis (RTA) to understand individual well performance are discussed. Field level topics include field development and reservoir surveillance. Decline curve analysis (DCA) for individual wells is presented followed by assignment of reserves and resources in unconventionals.

Attendees should leave this course with a better understanding of the reservoirs which supply an ever increasing fraction of the world's oil and gas, unconventional reservoirs.

This program is comprised of Skill Modules™ in PetroSkills PetroAcademy. Each module ranges from 4-10 hours of self-paced or virtual instructor-led activities. Total course duration is approximately 38 hours of self-paced learning.

See detailed schedule

Target Audience

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

INTRODUCTION TO UNCONVENTIONAL RESERVOIRS

- What types of unconventional reservoirs exist
- How they are different from conventional reservoirs
- How the geologic characterization is different from conventional reservoirs
- How is reservoir management different from conventional reservoirs
- How is reservoir enhancement different from conventional reservoirs
- How is reservoir surveillance different from conventional reservoirs
- How is reservoir evaluation different from conventional reservoirs
- What constitutes a "sweet spot" in unconventional reservoirs

RESERVOIR FLUIDS

- Describe how fluids change in response to changes in pressure and temperature
- Define the engineering properties of reservoir fluids
- Describe the make-up of reservoir fluids
- Describe how fluids are sampled
- Describe how fluid properties are measured in the laboratory

RESERVOIR ROCK PROPERTIES

- Different types of rocks
- Primary rock properties from a reservoir engineering point of view
- How rock properties are measured
- How rock property values are interpolated/extrapolated throughout the reservoir

RESERVOIR FLOW PROPERTIES

- Explain the origin of Darcy’s law and how it evolved
- State the difference between gravity and the pressure gradients, and how they play a role in determining the rate of which fluid could flow
- in the porous medium
- Identify the differences between the equations of Linear versus radial flow when calculating the flow
- Explain how heterogeneities affect the flow in porous medium, and how Darcy's law can be applied to homogenize to calculate effective
- permeability
- Differentiate between oil and gas flow
- Apply Darcy’s law to gas and oil
- Calculate the amount of fluid that is flowing when you have single cell phase vs single phase oil
- Describe the Importance of non-Darcy effect on well performance
- Apply Darcy's law when calculating the rate of the of oil and gas well
- Identify the differences between layers in parallel and layers in series
- Discuss the effective permeability of both layers in parallel and layers in series
- State limitations of Darcy’s law
- Assess the differences between gas and oil reservoirs
- Describe the effect of non-Darcy flow

UNCONVENTIONAL RESERVOIR PROPERTIES

- Specifics about how Organic, Rock and Mechanical Quality is quantified
- Why each factor is important in the understanding of unconventional reservoirs
- The difference between Tight Gas Sands and Shale Reservoirs
- Uncertainties in Well and Laboratory measurements of Rock Properties

UNCONVENTIONAL RESERVOIR PROPERTIES FUNDAMENTALS

- Manage the difference between unconventional and conventional fluids
- Develop relationships between rock properties and well performance
- Calculate flow rates under conditions in which fluid models break down
- Use simulated rock volumes and discrete fracture networks

UNCONVENTIONAL RESERVOIR ANALYSIS

- What a DFIT, RTA, DCA analysis is
- How to read a Diagnostic Plot
- Why the analysis of these techniques are different in unconventional reservoirs
- Fundamental principles of reserves and resource management

UNCONVENTIONAL RESERVOIR ANALYSIS FUNDAMENTALS

- Calculate volumetric estimates in unconventional reservoirs
- Apply material balance analysis with corrections for unconventional reservoirs
- Calculate properties from DFIT's
- Calculate drainage volumes from rate transient analysis
- Match historical data and forecast future production using statistical tools adjusted for unconventional reservoirs

RATE TRANSIENT ANALYSIS

- Define the rate time analysis
- Distinguish between traditional pressure transient analysis and rate time analysis
- Describe the needs of the type of data which are typically used for rate time analysis
- Discuss the application of rate time analysis under transient and pseudo-steady state conditions
- Distinguish between the type of reservoir information we can obtain under transient and pseudo-steady state conditions
- Explain the use of dimensionless variables in rate time analysis
- Describe the limitations of the rate time analysis
- Distinguish between exponential, harmonic, and hyperbolic decline curves
- Explain the different parameters which impact the performance of a well
- Describe how the Economic Ultimate Recovery (EUR) is impacted by the assumptions about the type of decline method
- Explain how the traditional decline curve analysis can be extended to transient state conditions
- Describe how to extend the rate time analysis when the bottom hole pressure is not constant but a variable
- Compare both Blasingame and Agarwal type curve methods and evaluate both oil and gas wells using both these type curves
- Explain the concept of flowing material balance analysis
- Describe the application of rate time analysis for unconventional reservoirs
- Identify different flow regimes which are present for multiple fractured, horizontal wells
- Indicate important flow regimes which are typically observed in horizontal, multi-stage, fractured wells

- Determine the type of reservoir parameters we can obtain from evaluating rate time data for unconventional formations
- Indicate how the traditional decline curve analysis can be used for wells producing from unconventional reservoirs
- Describe the relationship between material balance and rate time analysis
- Explain how to combine material balance with rate equations to predict rate as a function of time
- Describe simple cases for single phase gas and oil reservoirs and predict the rates
- Indicate how the simple analysis can be extended to other complex situations

Course Content

BLENDED LEARNING WORKSHOP STRUCTURE

This program is comprised of the following activities:

ILT = Virtual Instructor-led Training

OL = Online Learning Activity/Reading

Week	Activity	Hours (Approx)	Subject
Week 1	**ILT**	1.0	Orientation Webcast (pre-recorded)
	OL	3.0	Introduction to Unconventional Reservoirs
Week 2	**OL**	4.0	Reservoir Fluid
	OL	4.0	Reservoir Rock Properties
Week 3	**OL**	3.0	Reservoir Flow Properties
	OL	3.5	Unconventional Reservoir Properties
Week 4	**ILT**	1.5	Unconventional Reservoir Properties Fundamentals - Session 1
	OL	3.0	Unconventional Reservoir Properties Fundamentals
	ILT	1.5	Unconventional Reservoir Properties Fundamentals - Session 1
Week 5	**OL**	4.0	Unconventional Reservoir Analysis
Week 6	**ILT**	1.5	Unconventional Reservoir Analysis Fundamentals - Session 1

	OL	6.0	Reservoir Fluid Displacement Fundamentals
	ILT	1.5	Unconventional Reservoir Analysis Fundamentals - Session 2
Week 7	**OL**	3.5	Rate Transient Analysis

Product Details

Categories: Upstream

Disciplines: Reservoir Engineering Geology

Levels: Foundation

Product Type: Course

Formats Available: Virtual On-Demand

Instructors: John Seidle Richard Henry Mohan Kelkar Jeffrey (Jeff) Aldrich

On-Demand Format

| Course | On-Demand (Available Immediately) $3,990.00