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This may also be of interest

### Basic Reservoir Engineering

### Enhanced Oil Recovery Fundamentals and Practices #101

### Waterflooding from A to Z

## Description

This course is designed to enable the participants to develop skills analyzing and understanding the behavior of gas condensate reservoirs, with the objective to optimize the production and the final recovery factor. It addresses the concepts and definition applicable to gas reservoirs, its classification criteria, the composition of the different types of gases, the use of phase diagrams and equations of state; rock fluid saturation functions relative permeabilities modelling, velocity, and interfacial tension effects; well productivity and pseudo-pressure calculations for different completion strategies; material balance equations and numerical simulation applications.

Field cases of retrograde gas condensates are presented and reviewed with emphasis in the gravity drainage effects in condensate banking, practical applications of fluid flow numerical simulation models and construction of integrated asset modelling from the reservoir to the wells and production facilities.

This course utilizes proven learning techniques to ensure maximum understanding, comprehension and retention of the information presented. It is designed as a blended environment of presentation, class exercises, field application, analysis and several industry videos.

## Objectives

- Learn the concepts and principles of natural gas reservoirs and gas condensate reservoirs
- Learn to identify a gas reservoir from the compositions and representation in a phase diagrams
- Understand the criteria applicable for gas reservoir classification, dry gas, wet gas, condensate and retrograde condensate
- Understand the condensate banking phenomenon in retrograde gas condensates
- Learn how to model a gas condensate reservoir and how to create an integrated asset model
- Review the potential simplification of the project design cycle time using the Integrated Asset Model concept.

## Audience

- Operation engineers
- Production Engineers
- Reservoir Engineers
- Facilities Engineers
- Geologists & Petro physicists
- Engineers who are new to the profession
- Commercial analysts
- Other individuals and professionals involved with gas fields operations.
- This course is intended for all engineers engaged in the oil and gas industry, in particular for those engineers involved with gas condensate reservoirs.



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## Content

### Day 1

#### Natural Gases and Condensates Phase behavior

- Introduction, natural gases concept definitions, and classifications
- Phase behavior, Equations of state for ideal and real Gases
- Fluid sampling and laboratory PVT tests: CCE, CVD,
- Compressibility factor (z), equilibrium constants (k) and molar Consistency Checks
- Real gases law, Equation of State for Real Gases
- EOS Modeling (Ideal and Real Gases) 2 & 3 Phase parameters equations, Van der Waals Cubic EOS
- Peng-Robinson, Soave-Redlich-Kwong equations of state
- Prediction of phase behaviors and reservoir fluid properties

### Day 2

#### EOS continuation & Condensate issues

- Tuning an EOS using experimental data
- Field application of fluid data in commercial simulators,
- Comparison of black oil and compositional models.
- Condensate Issues
- Condensate banking generalities
- Critical condensate saturation
- Gravity drainage effects in condensate banking,
- Residual trapped gas and condensates
- Condensate banking; and well remedial

### Day 3

#### Reservoir Flow

- Introduction, banking effects in the reservoir flow
- Relative permeability measurement methods,
- Relative Permeability models, Capillary number, interstitial tension & mechanism models of coupling
- Relative permeability models and correlations for use in numerical simulators
- Water flooding in gas reservoirs

### Day 4

#### Estimating volumes and production mechanisms

- Material balance equations for gas reservoirs
- Gas in-place calculations, and drive mechanism identification
- High pressure and high temperature reservoirs
- Natural Depletion for dry, wet and gas condensate reservoirs
- Active aquifers
- Pressure maintenance by water injection
- Pressure maintenance by gas injection
- Gas cycling operations



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ENHANCED OIL RECOVERY

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Fundamentals and  
Practices #101

PRACTICES #101

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## Content

### Day 5 Well issues

- Steady state and pseudo-steady state flow equations
- Well productivity calculations
- Perforation and fracture characteristics and effective parameters
- Perforation and fracture design
- Skin factor estimations for perforated, fractured, deviated and horizontal wells.
- Well completions in Gas Condensate wells
- Wrap Up and Conclusions

End of the training.