

DeGolyer and MacNaughton Training Seminar Well Performance Analysis and Forecasting for Unconventional Resources



Instructor: Dilhan Ilk, Ph.D. is a vice president and staff engineer at DeGolyer and MacNaughton in Dallas. He specializes in the analysis and forecasting of well test and production data. In particular, Ilk focuses on well performance analysis in unconventional reservoirs and has extensive practical experience in numerous tight oil and gas fields. He has written more than 30 articles on well test analysis, the analysis/interpretation of production data, and general reservoir engineering. Ilk has also presented multiple industry short courses and regularly serves in program committees at SPE events focused on unconventional reservoirs (conferences, workshops and forums), and currently is a member of SPE Reservoir Description and Dynamics Advisory Committee. He holds a bachelor's degree from Istanbul Technical University and master's and doctorate degrees from Texas A&M University, all in petroleum engineering.

Duration: Three or four days

Who Should Attend: This course is suitable for technologists, engineers, and engineering managers who are involved in the evaluation of well performance (time-rate and time-rate-pressure) data for optimizing production, understanding completion efficiency, and estimating reserves and ultimate recoveries.

Learning Outcomes:

- Learn how to collect, analyze, and interpret critical data for well performance analysis
- Identify well performance characteristics and flow regimes using diagnostic plots
- Estimate key reservoir and completion parameters using model-based production analysis
- Forecast production using numerical, analytical, and decline curve techniques
- Establish the optimal workflow to help quantify well performance uncertainty and non-uniqueness

Course Description: This course provides a comprehensive methodology for the diagnosis, analysis, and forecasting of well production data in unconventional resources. Participants receive an extensive introduction to the diagnostic tools for assessing data viability, checking data correlation, and identifying flow regimes. The principal focus of the course is the diagnosis of characteristic flow regimes associated with well production and the use of methods to estimate performance parameters and to forecast production. These methods include simple analytical tools, decline curves, and more complex techniques, such as non-linear numerical simulation. Examples from tight gas sands, gas shales, and liquids-rich shale systems will illustrate the theoretical considerations and practical aspects of the analysis and forecasting techniques. A course notebook will be provided along with copies of Powerpoint slides and a listing of reference materials.

Course Outline:

- Introduction to Unconventional Reservoir Systems
 - Flow at pore scale
 - Factors controlling productivity
 - Drilling and completion practices
- Decline Curve Analysis (Time-Rate-Analysis)
 - Background/historical work
 - Use and misuse of Arps' decline curves (exponential, hyperbolic)
 - Rate-time data diagnostics ("qDb" plot)
 - Advanced decline models (Stretched Exponential, Power-Law Exponential, Duong Model, etc.)
 - Continuous EUR method
 - Decline curve analysis exercises using software/spreadsheet

- Production Analysis (Time-Rate-Pressure Analysis)
 - Background/orientation/historical work/objectives
 - Decline type curves
 - Material balance concepts: Flowing material balance
 - Analysis by modeling
 - Solutions for vertical wells
 - Solutions for horizontal wells/horizontal wells with multiple fractures
 - Effects of non-linearities (pressure dependent properties, multi-phase flow)
 - Production analysis exercises using commercial software
- Case Studies: Integrated Diagnostics and Analysis of Production Data
 - Production data diagnostics: characteristic production performance
 - Diagnostic plots for well performance characteristics
 - Common challenges and pitfalls
 - Guidelines and workflow for well performance evaluation
 - Illustrative workflow examples from unconventional reservoirs using commercial software
- Advanced Topics
 - Correlation of rate-time and model-based production analysis
 - Multi-well interference
 - Multi-well modeling using commercial software
 - Resources and reserves

Email degolyer@demac.com to register.