Applied Reservoir Engineering

Instructor
Mr. Charles Evans / Esanda Engineering

Objectives
- To learn material balance analysis and the limits of application of different types of drive mechanism.
- To provide an overview of fluid properties and their behavior under changing conditions
- To understand the concept of fluid flow in porous media and permeability and Darcy's Law
- To learn well testing and the analysis of pressure data, one of the main sources of permeability estimates
- To understand what the reservoir engineer has to deliver – production forecasts and resource estimates

Course Outline
The course begins with an overview of fluid properties and their behavior under changing conditions; this is followed by an overview of material balance calculations which rely on PVT data. The next concept is fluid flow in porous media, which introduces permeability and Darcy’s Law. This leads on to a review of well testing and the analysis of pressure data, one of the main sources of permeability estimates. The next two topics cover what the reservoir engineer has to deliver – production forecasts and resource estimates. To ensure the students understand each concept exercises will be provided.

Course Contents
- PVT measurements
- Phase behavior
- Fluid types
- Oil in place estimation – Deterministic/statistical
- Primary drive mechanism for reservoirs
- Reservoir estimation - Material balance
- Reservoir estimation – Decline curve analysis
- Flow in porous media
- Permeability and Darcy’s law
- Fluid viscosity
- Capillary pressure
- Relative permeability data
- Estimation of Well performance
- Well test operations
- Transient flow / semi-steady state flow Semi log plots
- Radius of investigation
- Skin – formation damage
- Recovery mechanisms
- Recovery factors
- Reservoir simulation
• Integrated production modeling
• Petroleum Resource Management System (PRMS)
• Contingent resources
• Proved and probable reserves

Who Should Attend
This course is intended for the disciplines listed below, as well as anyone with a specific interest in the topic.

• Reservoir engineers – who have not attended any formal training in reservoir engineering
• Geologists
• Drilling engineers
• Petroleum engineers
• Production engineers
• Production technologists

Prerequisites
None

Course Method
The course will be made of the following delivery methods

• Presentations – 60%
• Exercises - 35%
• Videos - 5%

A PC/laptop will be required for each participant or at least one per two participants. Software, such as Microsoft excel, is required in order to include spreadsheets during the course.

Daily Course Schedule
The course schedule will include a morning and afternoon break as appropriate during throughout the training sessions.

<table>
<thead>
<tr>
<th>Time</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
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</thead>
<tbody>
<tr>
<td>Morning Session</td>
<td>Introduction</td>
<td>Rock properties</td>
<td>Fluid flow in porous media</td>
<td>Fluid displacement</td>
<td>Decline Curve Analysis</td>
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<tr>
<td>10:00 – 12:45</td>
<td>Role of the reservoir</td>
<td>Volumetrics</td>
<td>Well testing</td>
<td>Two phase flow</td>
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<td>(2h45 min)</td>
<td>engineer</td>
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<td>Lunch</td>
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<td>Afternoon Session</td>
<td>Fluid properties</td>
<td>Drive Mechanisms &amp;</td>
<td>Well productivity</td>
<td>Simulation &amp; uncertainty</td>
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<td>13:45 – 17:00</td>
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<td>material balance</td>
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<td>modeling</td>
<td>Resource categories</td>
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<td>(3h15min)</td>
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