



Fundamentals of Reservoir Engineering

Course Objective:

This course offers the know-how knowledge to make the every day decision-making become simple: How to plan data acquisition ? What kind of data is needed ? How to use the data as a reservoir management tool ? How to increase ultimate recovery & projects' NPV's? The theory concepts will be covered to assist reservoir and exploitation engineers to effectively understand and perform their main tasks; determine oil and gas reserves and maximize hydrocarbon recovery under primary, secondary and tertiary schemes with emphasis on the bottom line results. Other topics such as well test analysis, horizontal well applications, and reservoir drives will be covered. Interesting class examples using actual field data will reviewed. A course hand-out which is an excellent reference, will be provided.

Who Should Attend:

This course is aimed at reservoir, petroleum and exploitation engineers/technologists, geophysicists, and geologists who are involved in the of field development and exploitation.

Course Instructor:

Mr. Saad Ibrahim, P. Eng, president of Petro Management Group Ltd. with over 30 years of diversified experience in the oil and gas industry as a worldwide highly recognized engineering consultant and a distinguished instructor (Please see his professional profile).

Course Agenda:

- **Petroleum Geology:**
 - ▶ Origin of the solar system and depositional environments
 - ▶ Geologic cycle/time and types of reservoir rocks
 - ▶ Main elements of petroleum reservoirs: hydrocarbon migration & traps
- **Rock Properties:**
 - ▶ Porosity types, permeability: relative, absolute, effective
 - ▶ Rock wettability and capillary pressure (class problem)
- **Fluid Properties:**

- ▶ Hydrocarbon classifications
- ▶ Fluid behaviors; oil and gas physical properties (class problem)
- ▶ Fluid sampling and PVT analysis

- **Reservoir Drive Mechanisms:**
 - ▶ Primary, secondary, and tertiary recovery schemes
 - ▶ Performance characteristics of different reservoir drive mechanisms

- **Reserves Determination:**
 - ▶ Volumetric, material balance, and probabilistic methods (class problem)
 - ▶ Decline analysis (class example)
 - ▶ Empirical (Russian method !) and statistical method

- **Methods to Estimate Well Productivity**
 - ▶ Darcy equation and boundary conditions
 - ▶ Inflow performance relationship (IPR), and well allowable

- **Well Testing:**
 - ▶ Test objectives (well, reservoir) and types of tests
 - ▶ Buildup analysis (skin factor, reservoir press., boundaries) (class problem)
 - ▶ Reservoir limit and gas well testing (case study)

- **Water Coning and Water Influx:**
 - ▶ Time to break-through and critical rate determination
 - ▶ Estimate of water influx (steady-state and unsteady-state methods)

- **Secondary and Tertiary Recovery Schemes:**
 - ▶ Review and screening of EOR schemes
 - ▶ Scheme planning and design (case study)
 - ▶ Performance and recovery factor prediction

- **Introduction to Unconventional Oil and Gas**
 - ▶ Gas content and reservoir characteristics
 - ▶ Production mechanism and reserves determination

- **Horizontal Well Applications:**
 - ▶ Well productivity and reserves estimate methods (case study)
 - ▶ Design optimization and performance analysis of multi-stage fraced Hz wells (**MFHZ**). How to minimize geologic, drilling, and completion risks

Closing remarks and a question period