

## Basic Formation Evaluation /Reservoir Engineering

### Course general description:

The course aims to provide basic information about formation evaluation using valid geological information as well as well log and core data. Other Main objectives of the present course are to enhance the participants' knowledge on reservoirs and their mechanisms and tests. In addition, the course aims to increase the knowledge of the geologists, geophysicists and the others who are working in the field of oil and natural gas production. This course Applications and limitations of geologic and engineering procedures and tools are discussed. Field examples and case studies demonstrate the importance of integrated geologic and engineering studies in developing effective, economical reservoir management strategies for different types of reservoirs. The attendees will feel that they became more professional, and know more about the reservoirs; their different types, evaluation and performance. The comprehensive course documentation has been designed as a useful guide for future reference.

### Audience:

This course is designed for:

1. Geologists
2. Petroleum Geologists
3. Geophysicists
4. Wellsite geologists
5. Drilling engineers
6. Stratigraphers
7. Geochemists,
8. Petroleum engineers
9. Production Engineers
10. Petrophysicists.

### Course objectives:

By end of the course participants will learn :

- Identify the different rock types.
- Know more about the oil and gas generation.
- Identify uncertainty of oil reserves.
- Identify different reservoir mechanisms and performance.
- Know the main properties of reservoirs and Oil traps.
- Know more about the Oil migration.
- Differentiate between the hydrostatic and dynamic pressure.
- Measure the porosity and permeability for reservoir rocks.
- Know the factors controlling the porosity and permeability.
- Know the different porosity-permeability relationships and Models.
- Know what are the capillary pressure and wettability.
- Know more about factors controlling capillary pressure and wettability.
- Differentiate between different types of migration.
- Know the different geochemical data procedures and acquisition.
- Know how the hydrocarbons were generated and their main properties.
- Know how to conduct PVT measurements?
- Conduct Reservoir injection and EOR.
- Know how to conduct well testing and to estimate the well productivity and reserves.

**Course duration:**

5 days

**Course Location:**

Cairo-Dubai-Istanbul

**Course contents:**

**Day-1: Basic Formation Evaluation**

- What is the formation evaluation and why?
- Mud logging.
- Coring process, core preservation and preparation.
- Traditional and special core analysis.
- Principles and applications of bore hole logging.
  - Natural phenomena.
  - Physical properties measured by inducing responses from the formation.
  - Borehole effects and invasion.
  - The effect of tool geometry.
  - The effect of logging speed.
  - The effect of hostile environments.
  - Logging equipment-surface and downhole.
  - The logging tool.
  - Tool combinations.

**Day-2: Open bore hole logging**

- Principles and applications.
- Electric Logs.
  - SP logs.
  - Resistivity Logs.
  - Induction Logs.
- Nuclear Logs.
  - Gamma ray Logs.
- Formation density Logs.
- Neutron Logs.
- Sonic Logs.
- LWD & MWD.
- RFT & MDT.

**Day-3: Petrophysical Properties from Well Logs**

- Quick Look interpretation.
- Shale volume.
- Porosity determination.
- Saturation parameters, a, m & n.
- Cross-plots.
- Core analysis and Log data integration.
- Integrating the core and log data sets.
- Case Study.

**Day-4: Porosity and Permeability of Rocks:**

- Coring and Sample Preparation for Petrophysical measurements.
- Porosity and the Different Classifications of Pore spaces.
- Factors governing Porosity values.

- Measuring Porosity and density.
- Permeability and classification of Permeability.
- Factors affecting the magnitude of permeability values.
- Measuring Permeability; specific and relative Permeability.
- Porosity-Permeability cross-plots.
- Irreducible water saturation 'Swirr'.
- Apparent and true electric resistivity.
- Formation resistivity factor.
- Factors controlling the electric properties.
- How to calculate 'a', 'm' (constant and variable 'm') and 'n'.

**Day-5: Reservoir Drive Mechanisms**

- Classification and origin of rocks
- Reserve estimation and uncertainty.
- Proved and unproved reserves.
- Reservoir drive mechanisms.

**Methodology:**

- 50% lectures & concepts
- 10% Videos
- 20% Case studies
- 10% Exercises
- 10% Discussions

**Course code: (TRSV001)**