

**Training Title**

**FUNDAMENTALS OF PETROLEUM GEOMECHANICS**

**Training Duration**

**5 days**

**Training Venue and Dates**

	<b>Fundamentals of Petroleum</b>				
<b>DE131</b>	<b>Geomechanics</b>	<b>5</b>	<b>15-19 Jan. 2024</b>	<b>\$5,500</b>	<b>Dubai, UAE</b>

**In any 5-star hotel. The exact venue will be intimated once finalized.**

**Training Fees**

**\$5,500 per participant for Public Training. Fees Includes Course Materials/Handouts, Tea/Coffee, refreshments, International Buffet Lunch.**

**Training Certificate**

**Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.**

**TRAINING DESCRIPTION**

This course covers the necessary fundamentals of geomechanics for wellbore applications; the origin of stresses in the subsurface and how in situ stresses can be understood from wellbore data; mechanical properties such as rock strength, and the origins of pore pressure and how it is measured and estimated. The course then proceeds to show how these data are applied through the Mechanical Earth Model to critical problems in exploration and field development. There are detailed case studies on wellbore stability sand production and hydraulic fracturing. The course also includes an introduction to reservoir geomechanics, showing the geomechanically influence of pressure changes in the reservoir.

**TRAINING OBJECTIVE**

- ✓ Fundamental understanding of petroleum geomechanics.
- ✓ Data requirements for geomechanically studies
- ✓ Application of geomechanics to wellbore applications
- ✓ The use of the Mechanical Earth Model in geomechanically studies

**TRAINING METHODOLOGY:**

This training program is lecture-based and customized to the needs of the audience, providing meaningful experience for personnel that work in petroleum plants.

Daily sessions include formal presentation, prepared in the Power Point, interspersed with directed discussions and case study.

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In addition to formal lectures and discussions, the delegates will learn by active participation through the use of problem-solving exercises, group discussions, analysis of real-life case studies etc. All attendees receive a course manual as a reference.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises
- 20% Videos & General Discussions

### **WHO SHOULD ATTEND?**

Geologists, geophysicists, drilling engineers, production engineers, completion engineers, reservoir engineers, exploration supervisors and managers concerned with wellbore stability, sand production, screenless completions, fracture stimulation, overpressures or image log interpretation.

### **COURSE OUTLINE**

#### **Day 1**

#### **Fundamentals and experimental rock mechanics**

- The stress tensor, units, principal stresses, strain, resolving stresses on a plane, construct Mohr's Circle and analyze stress, elasticity and elastic properties, effective stress, internal friction, cohesion, modes of rock deformation, unconfined compressive strength, Mohr-Coulomb failure
- Experimental rock mechanics, uniaxial and triaxial testing, thick wall cylinder tests, scratch testing, true triaxial tests, tensile tests, analyze results

#### **Day 2**

#### **Stress, Pore pressure and the Mechanical Earth Model**

- Principal earth stresses, regional and local stresses, World Stress Map, Andersonian classification of faults, overburden stress, horizontal stress orientation, borehole breakouts, drilling-induced tensile fractures, image logs, horizontal stress magnitudes, leak-off tests, fracture gradients
- Origins of pore pressure, methods for measurement, methods for estimation, vertical and horizontal methods, Eaton's method, real-time approach
- Concept and construction of the Mechanical Earth Model, data requirements and types of input data

**Day 3**

Wellbore geomechanics and wellbore stability

- Wellbore geomechanics, state of stress in the wellbore
- Modes of rock deformation in the wellbore, the effect of well azimuth and inclination, simple calculations
- Wellbore deformation in fractured rock masses and non-classical rock failures

**Day 4**

Applications

- An introduction to planning for wellbore stability and real time operations
- Sand production and management, causes of sand failure, experimental evidence, an introduction to screenless completion design for sand prevention
- Hydraulic fracturing, process of hydraulic fracturing, geomechanically factors effecting fracture development and simple calculations.
- Reservoir behavior, an introduction to compaction and subsidence, well integrity, use of 4D seismic in geomechanics and the effects of injection (pressure maintenance, waste disposal and gas storage)

**Day 5**

Case study practical

- Working in teams, an opportunity to put into practice the geomechanics learnt during the week to design a wellbore stability plan for a proposed high angle well.

**TRAINING OUTCOME:**

- Use routinely collected and specialized data to make basic geomechanically calculations for wellbore stability, sand production and hydraulic fracturing.
- Select and design data acquisition for geomechanically studies.
- Interpret image data to identify basic geomechanically behavior.

**NOTE:**

**Pre & Post Tests will be conducted**

**Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.**

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