Instructors:
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Chemical Engineering

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Course Structure
Lectures, presentation materials

Duration
1–2 days

Location
EGI’s Salt Lake offices or your location

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Petroleum Geomechanics:
Fundamentals & Applications
Available to EGI Corporate Associate Members

Introduction
As the industry moves from the era of easy oil/gas to challenging oil/gas, especially at the time of petroleum recession, lowering the operational cost, improving production, increasing the return of investment, and continued adherence to safety are becoming far more important than any time before. Thus a geomechanics specialist or engineer with a knowledge of geomechanics can play a significant role in improving field operations. However, petroleum geomechanics as an interdisciplinary course encompasses the fields of structural geology, logging interpretation, pore pressure prediction, rock-fluid interaction, rock mechanics, fracture mechanics, etc. Efficient integration of geomechanical fundamentals, laboratory testing and field observations, and proper interpretation and implementation of the results in the field are vital to assure positive outcomes. Therefore, we have tailored an in-house petroleum geomechanics course, and attempt to strike a balance between the theoretical and practical parts, and aim to maximize the practitioners’ benefits by properly implementing geomechanics techniques in daily operations.

At the end of the course attendees will be able to:

• Design the data collection and testing plan for wellbore stability, lost circulation, sand production, and hydraulic fracturing.
• Diagnose potential risks from the well history of offset wells.
• Gain the know-how on mitigating unscheduled drilling & completion events.
• Gain practical solutions to improve hydraulic fracturing efficiency and mitigate negative impacts of solid production.
**SYLLABUS**

**Day 1**  
**Fundamentals of rock mechanics and data collection and interpretation**
- **Principles of mechanics**: aim to teach the “dry” concepts in the context of the oilfield. It will cover 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, and Mohr-Coulomb failure.
- **Experimental Geomechanics**: conventional and unconventional geomechanics testing, cover fundamentals and include shale and unconsolidated sand.
- **Borehole Geophysics**: pore pressure prediction, rock strength prediction, in-situ stresses calculation, natural fractures characterization.
- **Cutting Characterization**: interpret events from the size, shape of cuttings and cavings.
- **Field Tests**: Leak-off test, formation integrity test, mini-frac test, DFIT analysis.
- **Calibration**: build more reliable correlations by calibrating the predicted results with laboratory and field results.

**Day 2**  
**Practical Training of Drilling Geomechanics & Completion Geomechanics**
- **Wellbore Stability**: describe the diagnosis, approaches and industry practice of wellbore instability mitigation.
- **Lost Circulation**: describe the diagnosis approaches and industry practice of lost circulation mitigation.
- **Hydraulic Fracturing**: introduce the role of natural fractures in hydraulic fracturing, describe the methodologies of enhancing the hydraulic fracturing efficiency in terms hydraulic fracturing mechanics, and suggest best practices of pumping schedule.
- **Solid Production**: describe the diagnosis approaches and industry practice of solid production prediction, mitigation, and treatment; perforation stability and frac-packing.

*Course content can be modified.*