SUBSURFACE ALLIANCE

DATA DRIVEN | SCIENCE BASED | FIT-FOR-PURPOSE

We believe in educating clients as the foundation for a long-term business relationship.

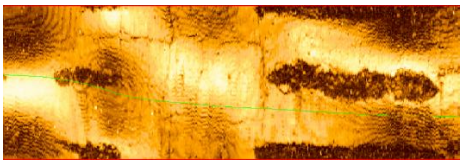
ONLINE TRAINING CATALOGUE

Fundamentals of Geomechanics

Duration: 4 half days (16 hours)

Type: Online

Audience: Geoscientists, reservoir, drilling, and completion engineers wanting to gain a broader appreciation for the basics and applications of geomechanics.



Summary

This multi-day course is designed to provide a broad overview of the principles of geomechanics and its applications to the subsurface. The class will cover the fundamentals of building a 1D stress model using commonly available wellbore data. The second part of the course focuses on the different applications of the geomechanical model, including wellbore stability, sand production prediction, fault reactivation or casing integrity, for example.

What you will learn

- Data needed to build a geomechanical model
- Principles of pore pressure
- Interpretation of stress orientation using borehole image logs
- How to constrain in-situ stresses
- Principles of wellbore stability
- How to apply a geomechanical model to solve common subsurface challenges

Available in English, Spanish and Portuguese.

Naturally Fractured Reservoirs

Duration: 3 half days (12 hours)

Type: Online

Audience: Geoscientists and reservoir engineers working on characterization and modeling of fractured reservoirs.

Summary

This multi-day course takes a deep dive into the characterization and modeling of fractured reservoirs. The class introduces the processes behind fracture development, how to collect quantitative fracture data from wellbores and how to process them to generate the inputs for reservoir model. This class spends a considerable amount of time working key datasets like image logs and core. This class has strong hands-on/practical component.

What you will learn

- Process based approach to fracture characterization
- Methods for collecting quantitative data from core
- Interpretation of natural fractures using borehole image logs
- How to generate inputs for a DFN model
- Available tools and methods for distributing fracture intensity
- Applications of geomechanics and natural fractures

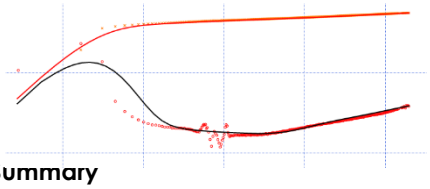
Available in English and Spanish.

Carbonate Excess Permeability

Duration: 3 half days (12 hours)

Type: Online

Audience: Geoscientists and reservoir engineers working carbonate assets



Summary

This course focuses on identifying, characterizing and modeling non-matrix (fractures and karst) in carbonates with dual porosity. The class describes an integrated multiscale interdisciplinary workflow used to characterize extreme permeability features. We will touch on how to estimate porosity and permeability values for such features, and how they can impact reservoir dynamics. We will review the lessons learned from real cases where non-matrix had an impact on reservoir performance.

What you will learn

- What to look for in commonly available datasets
- Karst and fracture processes
- Use of drilling losses to differentiate fractures from karst
- Interpretation of non-matrix using borehole image logs
- How to estimate pore volume associated to caves
- Well-test integration
- Impact on reservoir performance

Available in English and Spanish.

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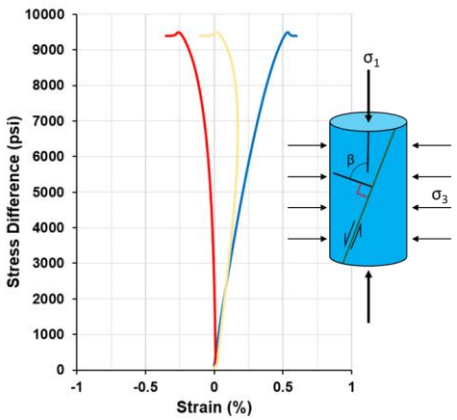
ONLINE TRAINING CATALOGUE

Geomechanics for Sanding and Fracturing

Duration: 2 half days (8 hours)

Type: Online

Audience: Geologists and completion engineers who want to acquire concepts of applied geomechanics for sand production prediction and hydraulic fracturing design.



Summary

This class covers the best practices for determining the rock mechanical properties that are key inputs to predict sand production and design hydraulic fractures. The course introduces practical workflows to calculate mechanical properties using laboratory tests wireline logs for different lithologies. The end goal is to provide a set of tools to evaluate the likelihood of sand production and optimize hydraulic fracturing.

What you will learn

- Data required to build a geomechanical model
- Rock mechanical properties needed for sanding and fracturing studies
- Design, QC and interpretation of laboratory rock tests
- Derive and calibrate mechanical properties using petrophysical logs
- Hand-on experience deriving mechanical properties using SA MechPro software

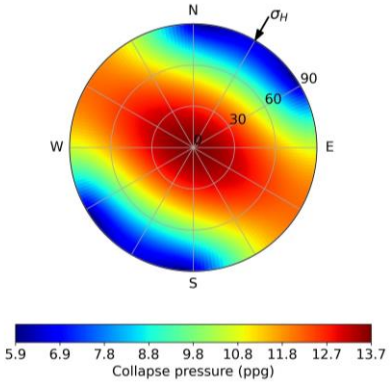
Available in English, Spanish, and Portuguese.

Drilling Geomechanics

Duration: 3 half days (12 hours)

Type: Online

Audience: Drilling engineers and operation geologists wanting to gain a deep understanding of the geomechanics principles that govern wellbore stability.



Summary

This course covers the fundamentals of building a geomechanical model from data to workflows. The geomechanical model is applied to optimize the mud program and casing points to achieve a stable borehole while reducing the non-productive time. The driving mechanisms behind wellbore instability will be discussed and diagnostic indicators reviewed.

What you will learn

- Geomechanical model building
- How to mine geomechanical data from drilling reports
- How to use drilling experience to calibrate a geomechanical model
- Pore pressure and fracture gradient calculations
- Impact of wellbore trajectory and drilling practices on wellbore stability
- How to differentiate between mechanical and chemical instability and how to approach each situation

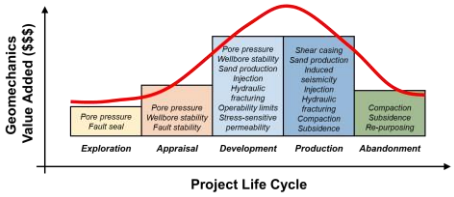
Available in English, Spanish, and Portuguese.

Geomechanics for Decision Makers

Duration: Half day (4 hours)

Type: Online

Audience: Managers and decision makers wanting to gain an appreciation for the value of geomechanical information in reducing risks and costs of a subsurface project.



Summary

This class aims to demonstrate how geomechanics can be applied during a project life cycle to reduce subsurface risks, constrain uncertainties and optimize development plans. Case studies will be used to demonstrate how geomechanics supported the decision-making process. Participants will gain an understanding of geomechanics that is adequate to help them identify those cases that would benefit the most from geomechanics studies. This course is applicable to oil & gas as well as to geothermal and geologic storage projects.

What you will learn

- Main components of a geomechanical model
- Basic geomechanical data to be acquired
- How to maximize the value of geomechanical data
- Types and applications of laboratory tests
- Case studies where geomechanics had a significant economic impact
- What are the key uncertainties a geomechanics study should to address

Available in English, Spanish and Portuguese.

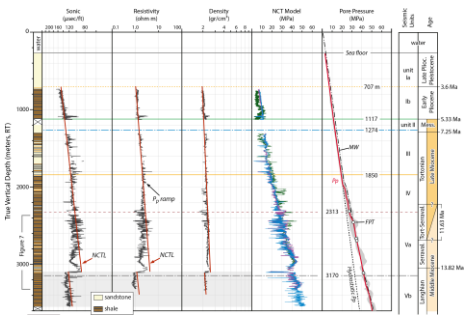
ONLINE TRAINING CATALOGUE

Pore Pressure Prediction

Duration: 3 half days (12 hours)

Type: Online

Audience: Operations geologists and drilling engineers who want to acquire a deep knowledge of the methods of pore pressure prediction in the subsurface.



Summary

This course provides a detailed view of the main mechanisms responsible for generating overpressure in sedimentary basins. The class will review the main pore pressure prediction methods, their limitations as well as data needed for quantitative predictions. Case studies from around the world will be used to run practical exercises, discuss approaches, and help fix concepts. The last section of the course will cover the use of seismic interval velocities to derived pore pressure trends in exploration acreage.

What you will learn

- Main overpressure generation mechanisms
- Relationship between pore pressure and in situ stress
- Methods of pore pressure prediction, advantages, disadvantages, and limitations
- Implication for wellbore stability and planning
- Fracture gradient estimation
- Pore pressure prediction from seismic interval velocities

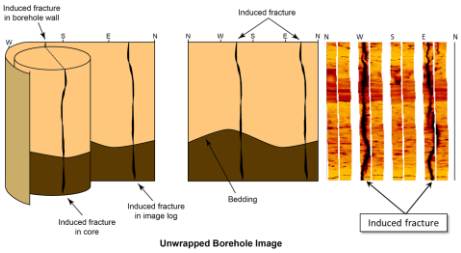
Available in English, Spanish and Portuguese.

Borehole Image Log Interpretation

Duration: Half day (4 hours)

Type: Online

Audience: Geologists and engineers interested on the interpretation and different applications of borehole image logs.



Summary

This class is designed to equip attendants with the knowledge and tools needed to interpret the different types of features that are commonly observed on image log data like FMI™, UBI™ and similar. The course will cover the main types of image data available on the market, as well as the advantages and limitations of each one. An extensive collection of examples will be used to illustrate different types of features and describe key diagnostic indicators. The class will also cover how to obtain quantitative stratigraphical, structural and geomechanical information. The last section of the class will introduce a workflow to improve image log interpretation by integrating core and image log observations.

What you will learn

- Principles of borehole image data
- Identification of common features observed in borehole images
- Interpretation of in situ stress orientation
- Applications of borehole image data to reservoir characterization
- Integration of image logs with core for improved for reservoir characterization

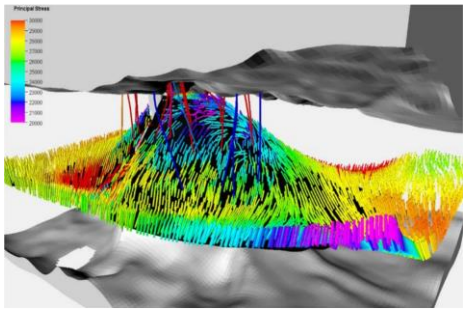
Available in English and Spanish.

3D Geomechanical Modeling

Duration: 2 half days (8 hours)

Type: Online

Audience: Geomechanics specialists, geologists, reservoir and production engineers who want to develop their skills on 3D geomechanical modeling.



Summary

This training is oriented to those who are interested to develop capabilities on how to build 3D geomechanical models. These models can be either static or dynamic, and be used for wellbore stability, hydraulic fracturing, sand production prediction, seal and fault integrity, compaction and subsidence, induced seismicity risk assessment, during injection and production of a subsurface reservoir, not only oil and gas, but also geothermal and geological sequestration of CO_2 and storage of H_2.

What you will learn

- Types of 3D geomechanical models
- Required data for building the 3D geomechanical models
- Use of seismic velocities to build 3D geomechanical models
- How to incorporate complex geological structures like salt diapirs
- Coupling between reservoir models and geomechanical models
- Applications of the 3D geomechanical models in drilling, production, and development.

Available in English, Spanish and Portuguese.

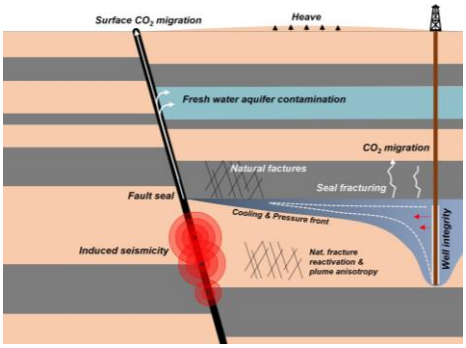
ONLINE TRAINING CATALOGUE

Geomechanics for CCS

Duration: 4 half days (16 hours)

Type: Online

Audience: Geologists, engineers, and managers interested in identifying and mitigating subsurface risks associated with CO_2 injection and storage.



Summary

This course provides a comprehensive review of the most critical aspects of geomechanics in CCS projects. The first part focuses on how to build a geomechanical model including data, methods, and workflows. The second part of the course focuses on how to apply quantitative geomechanical analyses to assess and mitigate subsurface risks associated with injection and storage. Topics like thermal stresses, induced seismicity, fault reactivation, seal and wellbore integrity, will be discussed. Last, several case studies from around the world will be used to illustrate real life examples of the role of geomechanics in CCS projects.

What you will learn

- Critical subsurface risks associated with CO_2 injection and storage
- Required geomechanical data to assess and mitigate risks
- Workflows, methods and tools needed for proper risk assessment
- How geomechanics played a role in different projects worldwide
- Effects of thermal stresses in rock and wellbore integrity

Available in English, Spanish and Portuguese.

Geomechanics for Geothermal Projects

Duration: 3 half days (12 hours)

Type: Online

Audience: Geologists, engineers, and managers interested in learning the role of geomechanics in geothermal project development.

Summary

This training will equip attendants with the knowledge and tools required to understand the *in situ* stress field, rock mechanical properties and how they affect the performance of a geothermal system. Participants will learn the basic principles of rock mechanics and how to build a geomechanical model. We will discuss how the thermal effects combined with rock mechanics can affect wellbore stability, natural fracture permeability, fault stability and induced seismicity. We will use case studies to demonstrate how geomechanics can help optimize geothermal field developments.

What you will learn

- How to build a geomechanical model
- Thermal effects and geomechanics
- How to use a geomechanical model to assess risks associated to wellbore integrity, fault reactivation or induced seismicity
- Relationship between in situ stress, natural fracture permeability and reservoir performance

Available in Spanish, English and Portuguese.

Our Instructors

Ewerton Araujo, PhD –
Geomechanics specialist with more than 20 years of industry experience. He started his career as a R&D engineer and later worked for GeoMechanics International, Equinor and BHP. Dr. Araujo expertise spans across all geomechanics related aspects in the subsurface, from drilling, completion, and abandonment of wells, to geomechanics applied to reservoir in the exploration, appraisal, development, and production phases.

Fermín Fernández-Ibáñez, PhD –
Geologist with more than 15 years of experience in development, production, and research. He is an expert in structural geology and geomecahnics. He worked as a consultant with GeoMechanics International before joining ExxonMobil in 2012, where he became SME for fractured reservoirs worldwide. He also has extensive experience with geothermal and CCS projects.

Jorge Pastor, PhD –
Geomechanics specialist with more than 25 years of experience in the oil and gas industry. Jorge started his career developing geomechanics simulators for Petrobras. Later, he worked for SLB and BHP where he led several projects 1D and 3D geomechanical projects. His experience includes design, quality control and interpretation of laboratory rock mechanical tests and software development.