



Civil Engineering

Advanced Geotechnical Engineering

Course Introduction

Advanced geology focused on engineering practice. Interpretation of in-situ testing and laboratory test data (**including groundwater**) for the derivation of design parameters for input into numerical modeling software. The topics covered include, but are not limited to, design and analysis of site investigation, advanced core logging, slope stability analysis, rock fall assessment, introduction to numerical modeling, liquefaction and seismic hazard assessment for engineering design.

This course introduces practical aspects of Engineering Geology as related to professional Engineering Geological Practice. The focus will be on the design and interpretation of ground investigations, the selection of appropriate parameters to be used in design and how to analyse some common engineering geological problems.

Target Audience

- Professionals already working in construction, civil engineering, or environmental engineering who want to deepen their understanding of soil mechanics, foundation design, and ground investigation techniques.
- Engineers interested in pursuing certifications or enhancing their skills for working on infrastructure projects, such as roads, bridges, tunnels, dams, and buildings.
- Researchers who want to explore new methods and technologies in geotechnical engineering, such as soil-structure interaction, soil stabilization, or geotechnical earthquake engineering.

Learning Objectives

- applied to engineering practice
- Critically evaluate geological data from the field and laboratory and recognize their geotechnical importance
- Demonstrate an enhanced understanding of the inter-relationships between geological processes and the behavior of the ground
- Develop a ground investigation plan based on an in-depth knowledge of geological and engineering constraints derived from a critical evaluation of desk study data and the scientific literature;
- Measure and represent the changes of position, orientation, volume and shape in rocks bodies ranging in size from single crystals to lithospheric plates;
- Understand the processes at microscopic and atomic scale that allow minerals and rocks to deform;
- Document the geometries and processes characteristic of extensional environments such as rifts;
- Understand the major tectonic environments and processes in convergent zones and orogens;
- Investigate environments involving strike-slip motion, including transgressions and trans tension
- Apply an understanding of geological principles to assist engineers in the design of structures
- Analyze the safety of slopes and excavations, and outline suitable measures to mitigate problems and ensure safety under in service conditions
- Demonstrate an ability to evaluate the appropriateness of different approaches to problem solving associated with the discipline
- Work autonomously within a structured environment
- Demonstrate the ability to work within professional boundaries and norms where appropriate.
- Observing the results of the earth's history and processes
- Reconstructing the events giving rise to certain formations and their arrangement
- Predicting where oil accumulations might occur

Course Outline

- DAY 01

Fundamentals and Petroleum Systems

- Introduction to petroleum geology and petroleum systems
- Structural geology and subsurface mapping
- Reservoir sedimentology and sequence stratigraphy
- Exploration geophysics
- Exploration geochemistry
- Accurate geological maps and cross-sections

- Day 02

Geological Mapping and Logging

- Drill hole geological information
- Alteration type and intensity using field observations, spectral information, and geochemical data
- Best-practice mapping and logging skills

"Anaconda-style" mapping:

- Documenting spatial, geometric, and paragenetic relationships
- Outcrop-scale studies in deformed, altered, and mineralized rocks

- Day 03

Subsurface Exploration and Cross-Section Construction

- Subsurface mineral exploration targets
- Advanced methods of cross-section construction

Exploration potential (including deposit types) of an area using:

- Field mapping
- Stratigraphy, structure, alteration, and exploration potential

• Day 04

Structural Geology and Deformation Mechanisms

- Geometric techniques
- Translation and rotation: Plate kinematics
- Measuring strain and dynamics
- Deformation mechanisms
- Rifts and convergence (subduction zones and orogens)

Convergence: thrust belts and polyphase deformation

• Day 05

Advanced Tectonics and Regional Insights

- **Convergence (continued):** thrust belts and strike-slip tectonics
- **Talks:** Regional structural geology
- Review of key concepts and skills
- Integration of self-derived findings and exploration strategies
- Course summary and participant Q&A

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
April 28, 2025	May 2, 2025	5 days	4250.00 \$	UAE - Abu Dhabi
Sept. 8, 2025	Sept. 12, 2025	5 days	4250.00 \$	UAE - Dubai

FROM	TO	DURATION	FEES	LOCATION
Nov. 2, 2025	Nov. 6, 2025	5 days	4250.00 \$	KSA - Al Khobar