CONCEPT

Geothermal Energy: Exploration, Reservoir Assessment and Project Development

24 – 28 October 2027
Jeddah - Corniche four-star



Geothermal Energy: Exploration, Reservoir Assessment and Project Development

Ref: 454_14235 **Date:** 24 – 28 October 2027 **Location:** Jeddah - Corniche four-star **Fees:** 19500 SAR

Introduction:

Geothermal energy projects stall when teams treat a hot-water reservoir like an oil field, underestimate resource risk before the first well, or pick a plant type that does not match the fluid temperature. This Core Concept course equips petroleum geoscientists, engineers and developers to read geothermal systems and heat sources, run exploration with geology, geochemistry and geophysics, estimate the resource, adapt drilling and well design, and select dry steam, flash, binary, enhanced geothermal or direct-use options. Participants build a Geothermal Prospect Assessment and Development Plan with a resource estimate, risk register and economics model.

Course Objectives:

- Classify a geothermal play by heat source, temperature and enthalpy and match it to power, direct-use or heat pump applications
- Plan an exploration programme that combines geological mapping, fluid geothermometry and resistivity and potential-field geophysics into a conceptual model
- Estimate geothermal resource size with the volumetric stored heat method and interpret well test and pressure-temperature data
- Adapt oil and gas drilling, casing and cementing practice to high-temperature, fractured and corrosive geothermal wells
- Select a dry steam, flash, binary or enhanced geothermal configuration, or a district heating and cooling scheme, for a given resource
- Build a project risk register and economics model that support financing of exploration and development drilling

Target Audience:

- Petroleum geoscience staff who interpret subsurface data and are moving into geothermal exploration and reservoir work
- Drilling and well engineering staff who design and supervise wells and need the differences geothermal wells impose
- Project development staff who screen geothermal prospects, prepare feasibility studies and assemble financing
- Energy and utility planning staff responsible for adding firm low-carbon heat or power to a supply portfolio
- Technical consultants who review geothermal resource reports, plant proposals and drilling programmes

Course Outline:

Day 1: Geothermal Systems, Heat Sources and the Resource Landscape

- Earth Heat Flow, Geothermal Gradient and Crustal Heat Sources
- Geothermal Play Types: Volcanic, Fault-Controlled, Sedimentary Aquifer and Hot Dry Rock Settings
- Resource Classification by Temperature and Enthalpy: High, Medium and Low Enthalpy Fields
- Geothermal Use Spectrum: Power Generation, Direct Use and Ground-Source Heat Pumps
- Oil and Gas to Geothermal Skills Transfer Map: Subsurface, Wells and Project Delivery

Day 2: Exploration Methods: Geology, Geochemistry and Geophysics

- Geological Mapping of Faults, Hydrothermal Alteration and Surface Manifestations
- Fluid Geochemistry: Hot Spring Sampling with Solute and Gas Geothermometers
- Magnetotelluric and Resistivity Surveys for Clay Cap and Upflow Zone Imaging
- Gravity, Magnetic, Seismic Reflection and Temperature Gradient Hole Data
- Geothermal Conceptual Model Diagram: Heat Source, Upflow, Outflow and Recharge

Day 3: Reservoir Assessment, Resource Estimation and Geothermal Wells

- Geothermal Reservoir Properties: Fracture Permeability, Fluid Enthalpy and Two-Phase Behaviour
- Volumetric Stored Heat Method with Monte Carlo Probabilistic Resource Estimates
- Geothermal Well Testing: Injectivity Tests, Pressure-Temperature Logs and Output Curves
- Geothermal Drilling Differences: Abrasive Rock, Lost Circulation, Large-Bore Casing and Thermal Cement
- Reinjection Strategy, Doublet and Triplet Well Layouts and Reservoir Simulation Overview

Day 4: Conversion Technologies: Power Plants, Enhanced Geothermal Systems and Direct Use

- Dry Steam and Single and Double Flash Plant Configurations
- Binary Cycle and Organic Rankine Cycle Plants for Medium-Temperature Fluids
- Enhanced Geothermal Systems: Hydraulic Stimulation, Closed-Loop Designs and Traffic Light Protocols for Induced Seismicity
- Direct Use Schemes: District Heating and Cooling, Absorption Chillers, Greenhouses and Process Heat
- Ground-Source Heat Pumps at Overview: Closed-Loop, Open-Loop and Borehole Heat Exchangers

Day 5: Prospect Modelling Build and the Development Plan

- Case Prospect Data Pack: Conceptual Model Review and First Well Targeting
- Resource Estimate Build: Stored Heat Calculation and Plant Capacity Selection
- Project Risk Register: Resource, Drilling, Scaling, Corrosion and Induced Seismicity Risks
- Geothermal Economics Model: Capex Phasing, Capacity Factor, Levelised Cost and Risk-Sharing Finance
- Geothermal Prospect Assessment and Development Plan Drafting and Peer Review

Skills You Will Gain:

- Geothermal Play Classification
- Geothermometry Interpretation
- Magnetotelluric Data Reading
- Stored Heat Resource Estimation
- Geothermal Well Test Analysis
- Conversion Technology Selection
- Geothermal Risk Registering
- Geothermal Project Economics

Why Attend This Course:

- Return with a Geothermal Prospect Assessment and Development Plan built from a realistic prospect data pack
- Reuse petroleum subsurface and drilling experience by learning exactly where geothermal reservoirs, fluids and wells behave differently
- Challenge resource reports and plant proposals by testing the temperature, enthalpy and uncertainty behind them
- Compare approaches with geoscientists, drilling engineers, developers and utility planners from different energy sectors

Conclusion:

A geothermal project succeeds when the heat resource, the wells and the conversion technology are judged together from the start. The one week move from geothermal systems and play types through geological, geochemical and geophysical exploration to reservoir assessment, stored heat estimation and geothermal well design, then to flash, binary, enhanced geothermal and direct-use options. The final day applies these methods to a prospect case and produces a Geothermal Prospect Assessment and Development Plan ready for internal review.