

# Geoenery Production, Injection and Storage Engineering (G546)



## Tutor(s)

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## Overview

This course covers fundamental aspects and best practices of production, injection and storage engineering for different geoenery applications, where the subsurface is used as a source (hydrocarbons, geothermal energy), or as a periodic/seasonal store (natural gas, compressed air, hydrogen, thermal energy), or as a sink (CO<sub>2</sub>, radioactive waste). The course focuses on an integrated system approach, to ensure compatibility between subsurface and surface engineering processes, and to understand scalability of technologies that may play a pivotal role in the transition to a sustainable energy future.

## Duration and Logistics

**Classroom version:** A 3-day course comprising a mix of lectures, case studies and exercises. The manual will be provided in digital format and participants will be required to bring a laptop or tablet computer to follow the lectures and exercises.

**Virtual version:** Five 3.5-hour interactive online sessions presented over 5 days. A digital manual will be distributed to participants before the course. Some reading is to be completed by participants off-line.

## Level and Audience

**Advanced.** The course is intended for geoscientists, geoenerys, project managers and regulators wishing to learn how to design, manage and monitor integrated geoenery systems, from the subsurface to the surface (and vice versa), including the associated uncertainties and risks.

## Objectives

You will learn to:

1. Appreciate the different ways in which the subsurface can be exploited for different geoenery applications.
2. Bring together the different elements of a production/injection/storage geoenery system towards integrated design and management.
3. Identify the uncertainties and risks of different geoenery projects over their lifetimes.
4. Assess the impact of different operational requirements on overall system design and performance.
5. Optimize system performance under constraints.

## Course Content

## Course Details

The course includes integrated modelling demos for a selection of geoenergy applications and will cover the following topics:

- Introduction to an integrated approach to geoenergy systems, from subsurface to surface (and vice versa)
- Characterization of productivity/injectivity/storativity of the subsurface
- Examples of wells, underground infrastructure and surface infrastructure designs for different geoenergy applications
- Integrated flow modelling and reconciliation of boundary conditions
- Flow assurance issues and system integrity over project lifetime
- System analysis: linking the subsurface and the surface facilities, and identifying sources of uncertainties and risk
- Short-, medium- and long-term asset optimization
- Measurement, monitoring and in-perpetuity liabilities (where the subsurface is used as a sink)