



 3-DAY COURSE | FACE-TO-FACE OR ONLINE

Energy geostructures: analysis and design

TARGET AUDIENCE

Professionals - such as civil and energy engineers, architects, urban project managers or geologists - and scientists who want to acquire knowledge on the energy, geotechnical and structural performance of energy geostructures.

The course will be given in English.

REQUIREMENTS

- No specific experience with energy geostructures is needed
- Basic knowledge of soil and structural mechanics

Participants should bring their own laptop (for use during the practical application exercises)

ORGANIZATION

Laboratory of Soil Mechanics (LMS), Swiss Federal Institute of Technology Lausanne (EPFL)

OVERVIEW

The application of environmentally friendly technologies that exploit renewable energy sources is key to follow international agreements for the development of low-carbon buildings and infrastructures.

Energy geostructures are an innovative, multifunctional technology that can be used to address the aforementioned challenge.

By coupling the role of the ground structures with that of the geothermal heat exchangers, energy geostructures can serve as structural supports as well as heating and cooling elements for buildings and infrastructures.

How can energy geostructures be analysed and designed from a geotechnical and structural point of view? What will be the energy performance of energy geostructures over time?

OBJECTIVES

- Understand the thermal and mechanical behaviour of energy geostructures, with reference to the latest scientific achievements
- Be able to perform the energy, geotechnical and structural design of energy geostructures
- Learn how to exploit current standards available at the European level (e.g., the so-called “Eurocodes”) for the design of energy geostructures
- Experiment with practical exercises all the key steps involved in the analysis and design process of energy geostructures
- Learn on some practical examples of recent projects worldwide



Monday November 6,
Tuesday November 7 and
Wednesday November 8, 2023



CHF 1'900.-

- Course material
- Three-month license of academic version of the Thermo-Pile software
- 10% special discount for contributing members of EPFL Alumni



From 9 am to 5 pm (UTC+2)



Face-to-face (EPFL, Lausanne, Switzerland) or online



On-line registration
Registration deadline: September 18, 2023
Number of participants is limited



Certificate of attendance

LEARN MORE



PROGRAM

PART A – Observed performance of energy geostructures (Day 1)

- Energy geostructures: principles
- Thermo-hydro-mechanical behaviour of energy pile foundations
- Thermo-hydro-mechanical behaviour of energy tunnels, walls, and slabs
- Thermo-hydro-mechanical behaviour of soils and soil-concrete interfaces
- Performance-based design of energy geostructures in the framework of Eurocodes

PART B – Analysis and design of energy geostructures (Day 2)

- Heat transfer, mass transfer, and deformation in the context of energy geostructures
- Analytical modelling of heat transfer around energy piles
- Energy design of an energy pile foundation
- Analytical modelling of capacity and deformation of energy piles
- Geotechnical and structural design of an energy pile foundation
- Thermal potential of sites and design parameters

PART C – Application of energy geostructures (Day 3)

- Development of projects of energy geostructures
- Analysis of constructed energy geostructure projects around the world

PROGRAMME DIRECTORS

- **Prof. Lyesse Laloui, Ph.D.**
Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland
- **Prof. Alessandro F. Rotta Loria, Ph.D., P.E.**
Northwestern University, Chicago, U.S.A.

INVITED SPEAKERS

- **Mr. Tony Amis**
Energy expert, GI-Energy, U.S.A.
- **Mr. Didier Mülhauser**
Contractor expert, Marti SA, Switzerland
- **Mr. Luis de Pereda Fernández**
Architect, ENERES, Spain

TEACHING APPROACH

- Optimum balance between theory and practice (application sessions including analytical and numerical simulation exercises)
- Teaching based on cutting-edge scientific achievements
- Case studies based on real energy geostructure projects, for which the Programme Directors worked as expert consultants