

# ENERGY GEOSTRUCTURES

## 2024-2025 Course Introduction

# LECTURER & ASSISTANTS

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LYESSE  
LALOUI

Lecturer



ELENA  
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Lecturer



SOFIE  
TEN BOSCH

Assistant



# ENERGY GEOSTRUCTURES 2024-2025

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## COURSE CONTENT

### GEOTECH AND STRUCTURAL ASPECTS

- Deformation and strength in the context of energy geostructures
- Thermo-mechanical behaviour of single and groups of energy piles, energy walls and tunnels
- Thermo-hydro-mechanical behaviour of soils

### ENERGY ASPECTS

- Heat and mass transfers in the context of energy geostructures
- Analytical modelling of steady and transient heat transfer

### DESIGN; SUSTAINABILITY; ECONOMICS, APPLICATION

- In-situ and lab testing
- Extensions of Eurocodes
- Technoeconomic and Environmental assessment
- Energy pile, wall and tunnel applications



## TEACHING

- **Ex-cathedra discussions (2 hours)**
  - Principal lecturer
  - Invited lecturers
- **Exercises sessions (1 hour)**
  - 5 exercises to hand-in
- **Design project**
  - Dedicated hours during the course
  - Office hours



## TEACHING SUPPORT

- Slides
- Moodle
- Book “**Analysis & design of energy geostructures: theoretical essentials and practical application**” (available online, BEAST EPFL)

## EVALUATION (4 ECTS)

- Final written exam: **45% of the final mark**
- 5 assigned exercises: **25% of the final mark**
- Design project report: **20% of the final mark**
- Oral presentation of the project: **10% of the final mark**



## DESIGN PROJECT INTRODUCTION

- Design of a building of your choice
  - Conventional geotechnical and structural design of the foundations
  - Thermo-mechanical verification of the foundations
  - Energy design of the foundations
  - Environmental and technoeconomic analysis
- Project submission comprises :
  - Technical report
  - Technical schemes of the foundations

Detailed information will be presented during the course



## Office hours

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