

# ENERGY GEOSTRUCTURES ANALYSIS AND DESIGN

FIFTH EDITION

NOVEMBER  
6<sup>TH</sup> - 8<sup>TH</sup>  
2023

HYBRID VERSION

## PROGRAMME DIRECTORS AND LECTURERS

**Prof. Lyesse Laloui, Ph.D.**

Professor and head of Soil Mechanics Laboratory, EPFL

**Prof. Alessandro F. Rotta Loria, Ph.D., P.E.**

Assistant Professor and head of Mechanics and Energy Laboratory, Northwestern University

## INVITED LECTURERS

**Tony Amis**, Endurant Energy

**Didier Mülhauser**, Marti Foundations

**Luis de Pereda**, Eneres

**Antonia Cornaro**, Amberg Engineering

## FACILITATOR

**Sofie ten Bosch**

# ABOUT THE PROGRAMME DIRECTORS

## **LYESSE LALOUI, PH.D.**

---

CHAIR FULL PROFESSOR, SWISS FEDERAL INSTITUTE OF TECHNOLOGY, EPFL  
DIRECTOR OF THE CIVIL ENGINEERING SECTION AND LABORATORY OF  
SOIL MECHANICS, CO2 SEQUESTRATION AND GEO-ENGINEERING, EPFL  
FULL MEMBER, SWISS ACADEMY OF ENGINEERING SCIENCES  
EDITOR IN CHIEF, GEOMECHANICS FOR ENERGY AND THE ENVIRONMENT



Prof. Lyesse Laloui is an active scientist at EPFL since 1994, where he directs the Soil Mechanics Laboratory as well as the Civil Engineering Section. In addition, he is the honorary director of the International Joint Research Center for Energy Geotechnics in China and until 2020 was an adjunct professor at Duke University, USA. He is also a full member of the Swiss Academy of Engineering Sciences. In 2021 he has been elected as the European Vice President of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) and will serve his new role between 2022-2026.

Prof. Laloui has a strong focus on sustainability and geo-energy topics. His efforts to help meet society's needs in areas such as climate change, renewable energy and the optimisation of natural resources have been recognized and awarded by European Research Council with an Advanced ERC Grant for his project BIOGEOS (BIO-mediated GEO-material Strengthening), followed by an ERC Proof of Concept Grant (PoC) in 2020. Prof. Laloui has also developed several projects for the European Commission as well as the Swiss National Science Foundation.

Founder and Editor-in-Chief of the Elsevier Geomechanics for Energy and the Environment journal, he is a leading scientist in the field of geomechanics and geo-energy. His research portfolio includes 13 written and edited books and over 350 peer reviewed papers; resulting in more than 9000 times with an h-index of 48 (Scopus). Two of his papers are among the top 1% in the field of Engineering. Prof. Laloui has given keynote and invited lectures at more than 40 leading international conferences. He received the "Excellent Contributions Award" of the International Association for Computer Methods and Advances in Geomechanics in 2008, the "2012 Vardoulakis Lecture" from the University of Minnesota, the "12th G.A. Leonards Lecture" from the University of Purdue in 2014, the "2016 RM Quigley Award" from the Canadian Geotechnical Society, the 30th Roberval Award at the French Academy of Science in 2018 and the "2020 Kersten Lecture" at the Geo-congress 2020 in Minneapolis. Prof. Laloui has four patents that he is developing in the context of three start-ups (MeduSoil, Enerdrape, Nesol), and he is also a founding partner of the international engineering company Geog.

## **ALESSANDRO F. ROTTA LORIA, PH.D., P.E.**

---

ASSISTANT PROFESSOR, NORTHWESTERN UNIVERSITY, USA  
DIRECTOR OF THE MECHANICS AND ENERGY LABORATORY

---



Dr. Alessandro F. Rotta Loria is an Assistant Professor at Northwestern University (USA), where he directs the Mechanics and Energy Laboratory within the Department of Civil and Environmental Engineering. He received his B.Sc. and M.Sc. degrees in Architectural Engineering from the Politecnico di Torino (Italy) while his Ph.D. degree in Mechanics from the Swiss Federal Institute of Technology in Lausanne, EPFL (Switzerland). His main research interests lie at the intersection of Geomechanics, Energy, and Environmental Sustainability. Dr. Rotta Loria is the co-author of the book “Analysis and Design of Energy Geostructures” (2019, Academic Press). He has co-authored more than 30 research articles published in international scientific journals, 30 research articles published in conference proceedings, and 1 international patent. Dr. Rotta Loria is Editorial Associate of the international journal Geomechanics for Energy and the Environment and the task force leader of the Academia-Industry Partnership for Innovation on Energy Geotechnics for the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). Dr. Rotta Loria is the recipient of several awards, including the Zeno Karl Schindler Foundation Award (2019), the ISSMGE Bright Spark Lecture in Energy Geotechnics (2020), the Promising Investigator Award from the International Association for Computer Methods and Advances in Geomechanics (2021), and the National Science Foundation CAREER Award (2021). In 2021, he was nominated as one of the 100 world innovators under 35 from MIT Technology Review. As a part of his activities, he co-founded two startups: GEOEG and enerdrape.

2019

# Analysis and Design of Energy Geosttructures

Theoretical Essentials and Practical Application

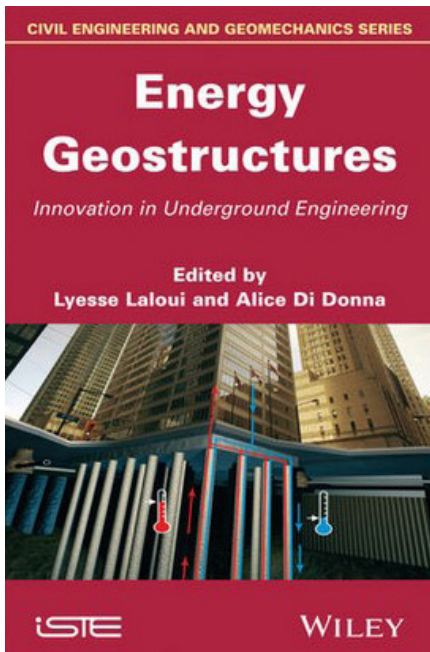


Lyesse Laloui and Alessandro F. Rotta Loria

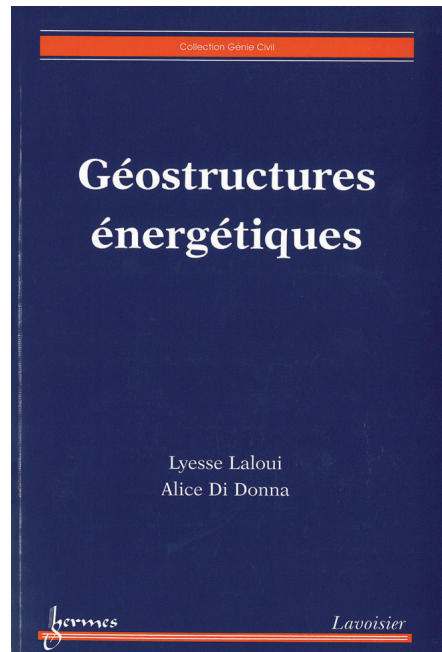


Copyrighted material

2013



2015



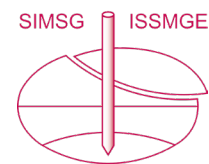
2017



FOR FURTHER INFORMATION:



International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)



**Title:** [Multiphysical Processes and Design of Thermo-Active Foundations](#)

**Delivered by** Prof. Lyesse Laloui

# COURSE CONTENT

TIME ZONE: CET

6 NOVEMBER 2023

9:00-9:15	15 min	Welcome and introduction	
9:15-10:15	60 min	<b>L1 - Geothermal and waste thermal energy: principles and opportunities</b>	Lyesse Laloui
10:15-10:30	15 min	Discussion	
10:30-10:45	15 min	Break	
10:45-11:45	60 min	<b>L2 - Energy geostructures in new and existing constructions</b>	Lyesse Laloui
11:45-12:00	15 min	Discussion	
12:00-13:30	Lunch break		
13:30-15:30	120 min	<b>L3 - Development of energy geostructures in the US</b>	Tony Amis for Endurant
15:30-15:45	15 min	Discussion	
15:45-16:00	15 min	Break	
16:00-17:00	60 min	<b>L4 - Development of energy geostructures in Europe, Asia and the Middle East</b>	Alessandro Rotta Loria for GEOEG
17:00-17:15	15 min	Discussion and summary	

7 NOVEMBER 2023

9:00-10:00	60 min	<b>L5 – Development of energy geostuctures in Switzerland</b>	Didier Mülhauser for Marti
10:00-10:15	15 min	Discussion	
10:15-10:30	15 min	Break	
10:30-12:00	90 min	<b>L6 - Development of energy geostuctures in Spain</b>	Luis de Pereda for Eneres
12:00-12:15	15 min	Discussion	
12:15-13:45	Lunch break		
13:45-14:30	45 min	<b>L7 - Thermal potential of sites and design parameters</b>	Lyesse Laloui
14:30-14:45	15 min	Discussion	
14:45-15:00	15 min	Break	
15:00-17:00	120 min	<b>Visit to the EPFL's Discovery Learning Laboratory and the Soil Mechanics Laboratory</b>	Lyesse Laloui

8 NOVEMBER 2023

9:00-9:45	45 min	<b>L8 – Heat transfer, mass transfer, and deformation in the context of energy geostructures</b>	Alessandro Rotta Loria
9:45-10:00	15 min	Discussion	
10:00-11:00	60 min	<b>L9 – Energy analysis and design of energy piles</b>	Alessandro Rotta Loria
11:00-11:15	15 min	Break	
11:15-12:15	60 min	<b>L10 – Geotechnical and structural analysis and design of energy piles</b>	Alessandro Rotta Loria
12:15-13:45	Lunch break		
13:45-14:30	45 min	<b>L11 - Analysis and design of other energy geostructures</b>	Alessandro Rotta Loria
14:30-14:45	15 min	Discussion	
14:45-16:45	120 min	<b>L12 - Underground means new perspectives</b>	Antonia Cornaro for Amberg Engineering
16:45-17:00	15 min	Discussion	
17:00-17:15	15 min	Final discussion and summary	Alessandro Rotta Loria & Lyesse Laloui





CONTACTS

**Lyesse Laloui:**  
[lyesse.laloui@epfl.ch](mailto:lyesse.laloui@epfl.ch)

**Alessandro F. Rotta Loria:**  
[af-rottaloria@northwestern.edu](mailto:af-rottaloria@northwestern.edu)

**Course website:**  
[www.formation-continue-unil-epfl.ch/en/formation/energy-geostructures-analysis-design/](http://www.formation-continue-unil-epfl.ch/en/formation/energy-geostructures-analysis-design/)