2 PhD positions at EPFL Lausanne in Geomechanics for engineered geological barriers

Offer description

The Laboratory of Soil Mechanics group (LMS), headed by Prof. Lyesse Laloui at the School of Architecture, Civil and Environmental Engineering at EPFL, is looking for two outstanding and highly motivated **Ph.D. students with training in the fields of civil and geotechnical engineering**.

We are offering two 48-month Ph.D. positions for two early-stage researchers (ESR) in the area of **geomechanics.**

We will provide excellent research facilities and a competitive salary (55000 CHF/year). The EPFL offers a unique international ecosystem full of training and development opportunities. We are looking for motivated candidates ready to undertake advanced experimental and numerical work within our team. Positions include participation in teaching activities.

Job description

The two Ph.D. students will conduct research activities for improving the technology of engineered geological barriers such as nuclear waste geological repositories and geosynthetic clay liners. In particular, the two research projects will focus on enhancing our geomechanical knowledge and predictive capabilities of the mechanical behavior of compacted expansive clays involved in these applications, where these geomaterials are subject to different mechanical and environmental actions.

The anticipated results/outcomes of the two research projects will be crucial for adopting engineered geological barriers in Switzerland and worldwide. For this reason, they will be presented at international conferences and published in the most relevant peer-review scientific journals in the field.

At the end of the Ph.D., the two Ph.D. candidates will have acquired advanced geomechanical skills. They will be able to both pursuing a career in academia or work in high-level engineering companies.

What are you going to do?

Project 1: Mechanical behavior of compacted expansive clays under different mechanical and environmental conditions

Objectives: The overall aim of this project is to gain insights into the mechanical behavior of compacted expansive clays for different mechanical loads and under different environmental conditions. To this end, the Ph.D. student will have to set up and perform an experimental laboratory campaign. Particular attention will be paid to understanding the mechanisms underlying the empirical evidence obtained. The Ph.D. student will have to interpret the results obtained in an appropriate theoretical framework. The experimental and interpretative contribution of the results obtained will be relevant to both a scientific and a corporate community.

Resources: He/she will benefit from the advanced equipment and expertise of the Laboratory of Soil Mechanics, as well as of the advanced equipment made available to the Laboratory of Soil Mechanics by EPFL.

Project 2: A modeling framework for predicting the mechanical behavior of compacted expansive clays under different mechanical and environmental conditions

Objectives: This research project aims to develop an advanced modeling framework to predict the mechanical behavior of compacted expansive clays under different mechanical and environmental conditions. The Ph.D. student will have to create a methodology to interpret the available experimental data in a scientifically valid way and develop a suitable mechanical stress-strain constitutive model for the interpretation and prediction of the mechanical behavior of compacted expansive clays. The developed modeling framework will be relevant to both a scientific and a corporate community.

Resources: The Ph.D. student will benefit from the experimental results collected so far on compacted expansive clays in the Laboratory of Soil Mechanics (LMS) and the experimental results that will be progressively collected in the context of project 1. Also, he/she will benefit from the modeling expertise developed over the years at the LMS group.

Your profile

Eligibility: To perform successfully, potential candidates should ideally have a recent MSc degree in the fields of civil and geotechnical engineering.

Essential requirements are excellent analytical skills and excellent grades in mechanical and geotechnical subjects. Solid knowledge of at least one programming language (such as Python or Matlab) is required for Project 2.

A strong interest in geomechanics, independent research, and scientific reporting skills are expected.

Language requirement: Proficient oral and written English skills.

EPFL Lausanne

The Swiss Federal Institute of Technology, EPFL, is one of the two prestigious Swiss federal institutes of technology in Switzerland and one of the world's top-ranked universities. It can count on the expertise of more than 16,000 personalities from over 120 countries worldwide. It is a university built on excellence in teaching, research, and innovation. The EPFL provides all the necessary facilities to stimulate motivation in a highly cosmopolitan environment.

The Laboratory of Soil Mechanics group (LMS) is one of the leading groups in fundamental and applied geomechanics. The LMS is part of the School of Architecture, Civil and Environmental Engineering (ENAC) of the Swiss Federal Institute of Technology, Lausanne (EPFL). The LMS focuses its research activities on the protection from geo-hazards and industrial damage to the environment, landforms, and structures. Our experimental and modeling resources are mobilized to understand, describe and predict the environmental impact of the technologies of future days, such as nuclear waste disposal, petroleum and gas exploitation, transportation and storage, methane hydrate technology, CO2 geological sequestration, and energy technologies related to heat storage. The LMS is directed by Prof. Lyesse Laloui. The LMS can count on a team with more than 30 members, including senior scientists, post-docs, and Ph.D. students. More information about the LMS and its current research can be found at http://lms.epfl.ch/en.

Interested?

The expected start date of the two projects is November 2021. Applications are accepted until the positions are filled. Each position is for 4 years. The candidates will be enrolled as Ph.D. students at the EPFL, School of Architecture, Civil and Environmental Engineering (ENAC), within the Mechanics Program EDME (Geomechanics).

Applicants should apply as soon as possible to the EDME doctoral school. All details can be found on this website: https://www.epfl.ch/education/phd/edme-mechanics/.

Applicants should then send the submitted documentation and the application reference number to one of the following email addresses: recruitment.lms@epfl.ch, angelica.tuttolomondo@epfl.ch.

Candidates will be pre-selected based on the submitted documentation and will be accordingly invited for an interview (in person or remote).