Ph.D. student – Civil/Geotechnical engineer

Your mission:

The Laboratory of Soil Mechanics (LMS) at the Swiss Federal Institute of Technology, EPFL, Lausanne, is seeking a Ph.D. student to support the **development of innovative tools for designing geotechnical engineered barriers for the isolation of waste from the environment**. The focus of the project concerns both nuclear waste and municipal waste barriers.

LMS is a research lab directed by Prof. Lyesse Laloui and dedicated to prioritizing the protection from geo-hazards and industrial damage to the environment, landforms and structure, mobilizing its experimental and modeling resources to understand, describe and predict the environmental impact of the technologies of future days.

Compacted expansive clays are high-density clays characterized by clay minerals having significant physicochemical interaction with water. Remarkable swelling capacity and pressure, self-healing capacity upon wetting, and very low permeability are distinct features. In light of the latter, they are chosen for engineering applications such as geosynthetic clay liners and nuclear waste geological storage. Knowledge of their mechanical behavior in these complex contexts and corresponding modeling tools are crucial for correctly designing engineered geotechnical barriers. Despite this, experimental investigations and the reliability of predictive models are still limited.

The project's main objective is **to improve the understanding and modeling of the mechanical behavior of compacted clays for their use as engineered geotechnical barriers**. More precisely, the project will focus on (i) **identification and understanding of the mechanisms involved in the various environmental and mechanical contexts** to which the clays are subjected; (ii) improvement of the **numerical modeling approach aimed at predictive purposes** for the different engineering time scales of interest.

The project results aim to increase confidence in environmental protection systems, positively impacting modern society and institutions' decision-making process.

Primary duties and responsibilities include:

- A comprehensive review of existing scientific evidence
- A comprehensive review of existing prediction models for design purposes
- Study and analysis of recent experimental studies and models developed by the LMS
- Proposals for innovative modeling methods for design purposes, development of related numerical approaches, and design flowcharts
- Collaboration in research and teaching activities of LMS

Your profile:

- You have a background in mechanics and geotechnics (e.g., an MSc degree in civil engineering).
- You have excellent analytical skills and knowledge of at least one programming language (such as Python or MATLAB).
- You are enthusiastic, ambitious, and with a strong interest in geomechanics.
- Proficient in oral and written English.

We offer:

- Opportunity to work on a competitive and innovative project in a top-ranked engineering school
- As an EPFL employee, you will work in a stimulating, dynamic, and interdisciplinary environment
- EPFL is an equal opportunity employer. We offer a competitive salary commensurate with skills and experience and subject to the EPFL pay scale

More information can be found at the following websites:

- https://www.epfl.ch/labs/lms/
- https://www.linkedin.com/company/the-laloui-group/

Starting date:

As soon as possible

Term of employment:

Fixed-term (CDD)

Duration:

3 to 4 years, depending on the progress of the research work.

Contact:

Please send an email with the subject line "Ph.D. application – SNSF project" including your motivation letter and your CV to recruitment.lms@epfl.ch and angelica.tuttolomondo@epfl.ch.

Applications will be evaluated as soon as received.