Coupled Unsaturated and THM Behavior of Soils and Rocks. Applications to Geo-Energy and Geo-environmental Problems

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Overview

In the last few years geo-engineering has expanded its domain of interest, particularly in the fields of geo-environmental engineering and geo-technology applied to assist present and future energy challenges (i.e. from energy production, to waste management and carbon sequestration). This has led to study of the behavior of unsaturated soils and rocks under extreme and complex conditions involving simultaneous hydraulic (both liquid and gas), thermal, and mechanical (THM) actions.

This course will be focused on the study of the main physical phenomena and processes that control the behavior of unsaturated soils and rocks. Problems of practical interest in the broad field geo-engineering and geo-mechanics will be analyzed during the course. The theoretical background will be presented for the general case of non-isothermal multiphase flow and transport problems in deformable porous media. The course also contemplates a brief introduction to the numerical approximation of the mathematical formulation. Experimental studies showing the behavior of soils and rocks under THM will be discussed, along with key constitutive relationships that can be used in numerical simulations. Further, laboratory- and field-scale physical modeling studies that have been performed to validate simulations will also be discussed.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

Modules	**A: Flow in saturated, unsaturated porous media : Dec 17 - Dec 19** **B: Applications to Geo-Environmental and Energy Geotechnics: Dec 20- Dec 21** **Number of participants for the course will be limited to fifty.**
You Should Attend If…	• Executives, engineers and researchers working on various aspects of Soil Mechanics from manufacturing, service and government organizations including R&D laboratories. • Students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.
Fees	The participation fees for taking the course is as follows: **Participants from abroad: US $100** **Industry/ Research Organizations: Rs2000** **Academic Institutions: Rs 2000** **Students: Rs 1000** The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges. The participants may be provided with accommodation on payment basis based on availability.

The Faculty

Prof. Marcelo Sanchez is a professor in the Department of Civil Engineering at Texas A&M University. His research interests include numerical modelling, nuclear waste disposal, coupled thermo-hydro-mechanical (THM) behavior of unsaturated soil, Geo-energy and Environmental Geotechnics.

Dr. Ramakrishna Bag is an Assistant Professor of Indian Institute of Technology, Patna. Prior to his current position, he was working as an Assistant Professor in the department of civil Engineering at NIT Rourkela. His research interest is physico-chemical behavior of soil, nuclear waste disposal, THM behavior of soil, Geo-energy and Environmental Geotechnics.

Prof. Shishir Kumar Sahu is currently Professor of Civil Engineering in National Institute of Technology, Rourkela. His research interest is Structural Dynamics, Composite Structures, Finite Element Method, Vibration and Stability of Plates and Shells, Modal analysis of structures, Fracture Mechanics.

Course Co-ordinators

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