



Unsaturated Soil Mechanics

Civil Engineering

Instructor Name: Prof.TV Bharat

Institute: IIT Guwahati

Department: Civil Engineering

Course Intro: : The knowledge of soil behavior is very important in the Geotechnical engineering practice. The soil behavior in saturated state is widely taught in the undergraduate and graduate programs, all over. The existence of air-phase in natural soils prompts the soil to behave differently from the saturated soils. The present course would provide the fundamental principles, mechanisms, and behavior of partly saturated soils.

Pre Requisites: : Knowledge of basic "soil mechanics"

Core/Elective: : Elective

UG/PG: : Both

Industry Support : www.maccaferri.com

Reference : (1) Lu, N. and Likos, W.J., Unsaturated soil mechanics, Wiley, 2004 (2) Fredlund, D. J., Rahardjo, R., and Fredlund, M.D. Unsaturated Soil Mechanics in Engineering Practice, Wiley, 2012

About Instructor: Dr. Tadikonda Venkata Bharat, Ph.D., is currently an Associate Professor of Civil Engineering at IIT Guwahati. He received both his M.Sc. (Eng.) and Ph.D. from Indian Institute of Science (IISc), Bangalore, in 2004 and 2009, respectively. He worked at University of Saskatchewan as a visiting fellow and post-doctoral fellow during 2009 " 2012. Dr. Bharat has nearly 16 years of research experience and 7 years of teaching experience in India and Canada. He received numerous awards in both India and abroad for his contribution in computational Geoenvironmental research. Dr. Bharat is actively working on understanding the fundamental behavior of different clays and clay minerals for their application in engineering, infiltration and drainage characteristics of unsaturated soils, diffusion characteristics of various clays.



COURSE PLAN

SL.NO	Week	Module Name
1	1	Introduction; Application areas; Basic parameters
2	2	Basic parameters; Phase equilibrium
3	3	Concept of water retention; Soil water characteristics (SWCC); Hysteresis; Mechanisms
4	4	Measurement of state variables
5	5	Measurement of state variables; Theoretical SWCC
6	6	Demonstration of software for fitting SWCC; Pedo-Transfer functions (PTF)
7	7	Hydraulic Conductivity; Measurement; Predictive models
8	8	Hydraulic Conductivity prediction; Capillary barriers; Software demonstration
9	9	Steady-state flow; Absence and influence of gravity
10	10	Transient flow
11	11	Analytical methods for transient flow; Shear strength
12	12	Shear strength; Swell and Collapse behavior