



ENVIRONMENTAL GEOMECHANICS

PROF. DEVENDRA NARAIN SINGH

Department of Civil Engineering
IIT Bombay

PRE-REQUISITES : Basics in Geotechnical Engineering

INTENDED AUDIENCE : Civil Engineering, Geotechnical Engineering, Environmental Engineering, Geoenvironmental Engineering

INDUSTRIES APPLICABLE TO : • Bhabha Atomic Research Centre, • Jawaharlal Nehru Port Trust, • Reliance Industries Limited, • Hindustan Lever Limited, • Council of Scientific and Industrial Research (CSIR), • Hindalco Industries Pvt. Ltd. • Department of Science and Technology, • Indian Council of Agricultural Research, • Municipal Corporations • Landfill operators • Mining Industries

COURSE OUTLINE :

A consideration of technical and scientific aspects of key geo-societal issues will be covered in this course. Case studies and analysis of current and historic databases will be used to illustrate topics including, but not limited to, impact of climate change, energy resources, water and soil pollution, and health risks posed by heavy metals and emerging pollutants. Upon successful completion of this course, the student would:

- Have an exposure to interdisciplinary issues pertaining to environment and geotechnical engineering.
- Be trained to develop sustainable and environmentally sound solutions for geoenvironmental issues.
- Understand the relevance of various legal aspects involved in addressing environmental consequences associated with geotechnical issues

ABOUT INSTRUCTOR :

Prof. Devendra Narain Singh is an D.L. Shah Chair Professor for Innovation in Department of Civil Engineering at Indian Institute of Technology Bombay. He obtained his bachelors, masters and Ph. D degrees from Indian Institute of Technology Kanpur. His research focuses are geomaterial characterization, contaminant- geomaterial interaction, sensors for soil moisture measurement, modelling of heat migration through soils, utilization of industrial by-products, municipal solid waste management and other fields associated with Environmental Geotechnics since 1994. He guided 38 Ph. Ds and 35 Master students and several are on-going. He is the editor-in-chief for the journal Environmental Geotechnics, ICE (UK)

COURSE PLAN :

- Week 1:** Introduction, Nature of Soil
- Week 2:** Natural and Manmade Environments
- Week 3:** Physico-chemical Characterization of Soil
- Week 4:** Mineralogical Characterization of Soil
- Week 5:** Soil-water-air Interaction
- Week 6:** Shrinkage and Swelling
- Week 7:** Cracking Characteristics of Soil
- Week 8:** Hydraulic Conductivity
- Week 9:** Mass Transport Phenomena
- Week 10:** Thermal and Electrical Properties of Soils
- Week 11:** Thermal and Electrical Properties of Soils,cont'd
- Week 12:** Applications