



# GEOLOGY AND SOIL MECHANICS

## PROF. PRIYANKA GHOSH

Department of Civil Engineering

IIT Kanpur

**PRE-REQUISITES** : Mechanics of solids/Strength of materials

**INTENDED AUDIENCE** : UG/PG of BTech/BE

**INDUSTRIES APPLICABLE TO** : Civil construction companies, PWD, PHE, Irrigation etc.

### COURSE OUTLINE :

The course prepares the student to be able to make effective learning of basic soil mechanics. The course should have the pre-requisite of mechanics of solids/strength of materials course.

### ABOUT INSTRUCTOR :

Prof. Priyanka Ghosh is an Associate Professor in the Department of Civil Engineering, IIT Kanpur. After completion of PhD from IISc, Bangalore in 2005, he served as faculty member at BITS, Pilani, IIT Kharagpur and IIT Kanpur. His primary research focus is in Computational Geomechanics and in particular, analysis of foundations, ground anchors, retaining structures, vibration isolation and geopolymers. He is the recipient of several awards like "IEI Young Engineers Award" by The Institute of Engineers (India), "Outstanding Young Investigator Award" by International Association for Computer Methods and Advances in Geomechanics (IACMAG), USA, "Scholarship for Young Indian Researchers" by the Italian Ministry of Education, University and Research, "Indo-US Research Fellowship" by Indo-US S&T Forum, "Class of 1982 Research Fellowship" by IIT Kanpur etc. He has published several research papers in various international journals and conferences. He has guided several post graduate students for their thesis work and taught different courses in various capacities. He has completed a number of sponsored research projects funded by different government organization such as Dept. of Science and Technology (DST), India; Research Design and Standards Organisation (RDSO), Indian Railway, India etc.

### COURSE PLAN :

**Week 1:** Description of soil, engineering geology of soils and their formation, clay mineralogy

**Week 2:** Index properties of soil

**Week 3:** Classification of soils

**Week 4:** Soil compaction

**Week 5:** Permeability in soil & Seepage in soil and flow net construction

**Week 6:** Seepage in soil and flow net construction

**Week 7:** In-situ stresses & criteria for filter design

**Week 8:** Effective stress principle & soil-water systems: capillarity

**Week 9:** Fundamental of consolidation

**Week 10:** Fundamental of consolidation & Shear strength of soil

**Week 11:** Shear strength of soil

**Week 12:** Stress in soil (Boussiensq, Westergaard theories) & Earth pressure theories