

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	ESC 308	Environmental Geotechnology	3	0	0	9

Course Objective

- To learn various soil engineering for land reclamation purposes, conversion of degraded waste land in new landuse, creation of new lands.
- To learn the application of soil mechanics in soil improvement, soil remediation, subgrade-drainage system, enhancing slope stability in mining areas, hilly regions, etc.

Learning Outcomes

Upon successful completion of this course, the students will :-

- learn about various kind of soil and environmental geotechniques to reclaim degraded land for conversion into various land-uses like construction, infrastructure, plantation, agriculture, forestry or development of aesthetics.
- be able to stabilize erosion prone land, unstable hill and mine slopes; understand flow of contaminants in soil; conduct polluted soil remediation.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Geotechnology and environment ; Basics of soil materials, Physical Characterisation of soil, Solids-water-air relationships, Consistency, Index properties, Classification	10	The unit will provide an overview of different types of soil, its index properties, classification and their physical characteristics.
2	Soil Compaction: Factors affecting compaction, Optimum moisture content. Engineering Behaviour. Compressibility and Consolidation: Primary and Secondary Consolidation, Consolidation of disturbed soil, Ground improvement techniques.	5	This unit will help student in understanding various soil compaction and consolidation techniques for improving the engineering behavior of different soils.
3	Shear strength of soils: Shear strength of soils and its application in waste dumps, reclaimed sites, hill slopes, etc. Stability analysis. Stability of Slopes	4	This unit will help the students in understanding the shear strength of soil for determination of stability conditions.
4	Effective Stress, Capillarity and Permeability of soil: Effective Stress, Capillarity and Permeability of soil Hydrodynamic Case-Flow Condition.	6	This unit provides a detailed overview of permeability of soil for ground water movement, rainwater harvesting, flow of contaminants, etc.
5	Seepage Through Soils: Flow nets through a pervious medium, Two Dimensional Flow-Laplace's Equation, Steady State Flow, Flowlines, Equipotential Lines. Prevention of erosion, protective filters.	6	This unit will help the students in understanding the flow conditions and simulating techniques.
6	Soil Exploration, waste materials in geotechnical construction, application of geotextiles, Instrumentation in Environmental Geotechnology, case studies, Issues in soil degradation and remediation..	11	This unit will help the students in exploration of soil and utilization of waste for geotechnical applications as replacement of natural soil.

Text Books:

1. Environmental Geotechniques - R Sarsby, Thomas Telford Publishing, London, 2000.
- 2.. Basic and Applied Soil Mechanics (2nd ed.) – G Ranjan & ASR Rao, New Age Publ. 2008.

Reference Books:

1. Geotechnical Engineering – SK Gulhati and M Datta, Tata McGraw Hill, New Delhi, 2005.
2. Hydrology – HM Ragonath, Wiley Eastern Limited, 1990.