Unsaturated Soil Mechanics - Web course

NPTEL

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Civil Engineering

COURSE OUTLINE

Most of the geotechnical engineering analyses rely on unsaturated soil mechanics. However, this field has now been recognized to be most important for better understanding of the engineering behavior. The proposed course has following outcomes:
(i) the variables responsible for unsaturated soil behavior will be understood.
(ii) water retention capacity and hydraulic characteristics of several unsaturated soils will be taught.
(iii) flow mechanisms and behavior through unsaturated soils will be appreciated
(iv) basic modeling of unsaturated flow and behavior will be understood (v) aspects of strength, contaminant transport mechanisms etc. will be introduced.

COURSE DETAIL

Sl. No.	Module/ Lecture Topics	No. of (Total) Hours
1.	Saturated and unsaturated soil mechanics	2.0
2.	Scope and interest of unsaturated soil mechanics in engineering	3.0
3.	Physical variables of air and water (Surface tension etc.)	3.0
4.	Water retention and hydraulic conductivities of soils	2.0
5.	Capillarity and capillary fringe phenomenon	4.0
6.	Capillary barrier mechanism	4.0
7.	Flow through unsaturated soils	5.0
7.1	Steady flow	
7.2	Transient flow	
8.	Experimental determination of retention and conductivity functions	5.0
9.	Water retention models	3.0

Pre-requisites:

Soil Mechanics, Basics of engineering physics

Coordinators:

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10.	Hydraulic conductivity model	**5.0**
11.	Contaminant transport	**1.0**
12.	Shear strength of unsaturated soils (stress phenomena etc.)	**2.0**
13.	Concept of consolidation	**1.0**

References:

1. N. Lu and W. J. Likos, Unsaturated Soil Mechanics, John Wiley & Sons, Inc., 2004
2. D. G. Fredlund, H. Rahardjo, M. D. Fredlun, Unsaturated Soil Mechanics in Engineering Practice