

Course: CEE 341

INTRODUCTION TO GEOTECHNICAL ENGINEERING

GENERAL INFORMATION

1st semester

Credits: 4CU-6UC

Lectures: T 12:00-14:00; R 12:00-14:00

INSTRUCTOR(S)

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Catedrático de Universidad. Departamento de Ciencia e Ingeniería del Terreno y de los Materiales.

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COURSE OBJECTIVE

Origin and description (identification and state parameters) of soil and rock.
Ground water: Hydrostatic condition. Steady-state subsurface fluid flow.
Soil stresses: Stress components and parameters. Principle of effective stresses. Geostatic condition: stress history, overconsolidation, lateral stresses.
Confined compression of soils. Consolidation and settlement. Oedometric tests. Partially saturated soils: soil suction, collapse and swelling.
Soil strength and deformability: Drained and undrained strength. Soil behaviour in triaxial and shear tests.

TEXTBOOK

Fundamentals of Geotechnical Engineering (2nd ed.)

Das, B.M.

Publisher: Thompson

Published 2005

GRADING

Homework:	25%
Lab Experiments:	15%
Midterm exam:	30%
Final Exam:	30%

COURSE SYLLABUS

Week	Day	Class	Topic	Assigned reading
1	Tu	L	Introduction	2.1
		L	Soils and rocks. Origin, types of soils. Grain size analysis	2.2, 2.5 and 2.6
	Th	L	Clay minerals and structure	2.3
	.	L	Weight-volumen relationships Plasticity. Soil classification	3.1 to 3.5 3.6 a 3.10
2	Tu	PS	Problems	
		Lab	Soil characterization	
	Th	L	Ground water. Hydrostatic state	L. N.
		L	Steady flow. Permeability. Darcy's law	5.1 to 5.3

3	Tu	L	Laboratory and in situ permeability tests	5.4 to 5.7
		Lab	Permeability test	
	Th	PS	Problems	
		PS	Problems	
4	Tu	L	Flow analysis. Flow nets. Numerical methods	5.8, 5.9, L.N.
		L	Erosion. Dispersive soils. Drains. Filters	L.N.
	Th	PS	Problems	
		L	Soil stresses. Total and effective stresses	6.1 and 6.2
5	Tu	L	Geostatic stress. k_0 , overconsolidation ratio	L.N.
		L	Stress diagrams (p,q). Stress paths	L.N.
	Th	PS	Problems	
		PS	Problems	
6	Tu	L	One-dimensional compression. Oedometer tests	7.1 and 7.2
		L	Oedometer curve. Ideal and real samples. Preconsolidation	7.3 to 7.5
	Th	L	Settlement analysis	7.6 to 7.8
		PS	Problems	
7	Tu	PS	Problems	
		L	Pore pressure dissipation	7.10 and 7.11
	Th	L	Primary and secondary consolidation	7.9
		L	Practical problems: preloading, vertical drains	7.14 and 7.15
8	Tu	PS	Problems	
		Lab	Oedometer test	
	Th	PS	Problems	
		PS	Problems	
9	Tu	L	Partly saturated soils. Basic concepts	6.3 and L.N.
		L	Swelling and collapse. Special soils	L.N.
	Th	Exam		
		Exam		
10	Tu	L	Shear strength and deformation. Basic concepts.	8.1, 8.2 and L.N.
		L	Mohr-Coulomb criterion	
	Th	L	Direct shear tests. Drained behaviour	8.3
		L	Other shear tests	L.N.
11	Tu	L	Triaxial tests	8.4 and L.N.
		Lab	Direct shear test	
	Th	L	D test. Deformation. Strength. Volume change	8.5
		L	CU test. Pore pressure. Undrained deformation	8.6
12	Tu	L	Unconfined compression test. U test	8.7, 8.8, L.N.
		L	Undrained shear strength	L.N.
	Th	PS	Problems	
		PS	Problems	
13	Tu	L	Use of soil parameters	L.N.
		Lab	Triaxial. Unc. compression test	
	Th	L	Rocks. General. Characterization	L.N.
		L	Laboratory and in situ tests	
14	Tu	L	Geomechanical classifications	L.N.
		PS	Problems	
	Th	L	Ground exploration	10.1
		L	Borings, sampling. Penetrometers	10.2
15	Tu	L	Geophysical methods. In situ tests	L.N.
		L	Geotechnical report	10.11
	Th	Exam		
		Exam		

L.N. Lecture notes

L. Lecture

PS. Problem session