CVLE 432 Foundation Engineering

Course Syllabus – Spring 2015-2016

Curricular Area		Civil Engineering – Structural Sequence
Type of Course		Compulsory - Major
Catalogue Description		Foundation perspective, classification and types. Site exploration, methods of site investigations, planning the exploration program, soil boring, soil sampling of disturbed and undisturbed specimen, determination of soil properties from direct site investigations SPT, CPT, Vane shear test, ground water location, geophysical exploration, soil profile and geotechnical report. Bearing capacity of shallow foundations, Terzaghi's equation. General bearing capacity equation and water table effect on the bearing capacity. Bearing capacity of eccentrically loaded foundations, Bearing capacity for footings on layered soil, bearing capacity from SPT and CPT. Settlement of shallow foundations, immediate settlement for rigid and flexible footings, immediate settlement by Schmertmann method, immediate settlement of eccentrically loaded foundations, consolidation settlement, and differential settlement. Design of spread footings: square footings, rectangular footings. Design of rectangular combined footing. Mat foundations: bearing capacity, settlement and design. Pile foundations, types: steel piles, concrete piles, timber piles and composite piles. Point bearing and friction piles. Load transfer mechanism. Equations for estimating pile capacity, laterally loaded piles, Immediate settlement under piles. Pile groups, Efficiency, load bearing, elastic settlement, consolidation settlement. Design of pile caps: Circulage method
Prerequisites by Courses		CVLE 333 Soil Mechanics
Prerequisites by Topics		Principle of effective stresses. Theory of consolidation. Failure criteria. Shear strength of soil.
Instructors		Lina Jaber
Office Hours		
Load		3 credits; 2 Lectures/week –75 min per lecture + 1 solving session/week – 50 min per session
Textbook		B. M. Das, "*Principles of Foundation Engineering*", CENGAGE Learning. Seventh Edition.
Reference Books		1. J. E. Bowels, *"Foundation Analysis and Design"*, McGraw Hill. Companies, Inc. 6th Ed. 2001. 2. R. W. Day, *"Foundation Engineering Handbook"*, McGraw Hill. Construction-ASCE Press. Ed. 2006.
Topics	**Week [1]**	Week[1] Foundation perspective, classification and types Week [2-3] Site Exploration • Methods of site investigations • Soil boring and sampling • Determination of soil properties from site tests • Geophysical exploration • Laboratory test and geotechnical report Week [4-5] Bearing Capacity of Shallow Foundations • Failure patterns of shallow foundations. • Terzaghi's bearing capacity equation for shallow foundations • General Capacity equation and water table effect • Bearing capacity of eccentrically loaded foundations • Bearing capacity for footings on layered soil • Bearing capacity from SPT and CPT
	Week [2-3]	
	Week [4-5]	

	Week [6]	Week [6] Settlement of shallow foundations • Immediate for flexible and rigid footings • Immediate settlement by Schmertmann method, • Immediate settlement of eccentrically loaded foundations, • Consolidation settlement • Differential settlement.
	Week [7-8]	Week [7-8] Design of Spread footings • Square footings • Rectangular footings
	Week [9-10]	Week[9] Design of Rectangular Combined footing Week[10] Design of Mat Foundations • Bearing capacity of mat foundation • Differential settlement of mats • Structural design of mat foundations • Conventional rigid method
	Week [11-15]	Week [11-15] Pile Foundations • Steel, concrete, timber and composite piles • Estimating pile length • Load transfer mechanism • Equations for estimating pile capacity • Laterally loaded piles • Immediate settlement under piles • Pile groups: efficiency, load bearing, elastic settlement, and consolidation settlement. • Design of pile caps: Circulage method