Course unit title:	Geotechnical Engineering		
Course unit code:	CE215		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	2		
Semester when the unit is delivered:	4		
Number of ECTS credits allocated :	5		
Name of lecturer(s):	Dr. Christakis Onisiphorou		
Learning outcomes of the course unit:	1. Perform calculations for total and effective stresses, pore water pressure and stress changes due to surcharge loads. 2. Estimate soil stiffness, soil settlement and consolidation settlement based on oedometer test data. 3. Define shear strength in soils and perform shear box and triaxial tests for deriving shear strength parameters. 4. Determine the bearing resistance of shallow foundations for various loading conditions and soil profiles. 5. Apply lateral earth pressure theory for retaining structures, identify basic retaining wall types and modes of failure. 6. Perform calculations for retaining wall stability and for anchor pull-out resistance. 7. Describe different types of piled foundations and installation methods.		
Mode of delivery:	Face-to-face		
Prerequisites:		Co-requisites:	
Recommended optional program components:			
Course contents:	**Introduction**: review of material from course *Engineering Geology and Soil Mechanics*. **Soil Stresses:** Total stress, pore water pressure and effective stress. Examples. Stress distributions. Calculation of stress changes due to surcharge using various methods including Fadum's chart and Boussinesq's formulations. Practical examples. **Settlement and Consolidation:** One-dimensional compression theory of soils. Soil stiffness and settlement of soils. Calculation of settlement based on elastic theory. Consolidation of clays. Oedometer test. Practical examples for estimating foundation settlements. **Soil shear strength**: Inter-particle friction as source of soil strength. Dependence on effective stress and hence pore water pressure. Inter-dependency of soil strength and density. Dilation and critical state strengths. Undrained and drained behaviour. Measurement of soil shear strength parameters using shear box and triaxial cell. **Shallow foundations**: Bearing resistance of soils using Terzaghi's equation. Example cases for foundations with varying load and ground conditions. **Lateral Earth Pressure and Retaining Walls**: Earth pressure at rest, active and passive earth pressure coefficients. Types of retaining walls, advantages, disadvantages and modes of failure. Stability check for cantilever walls. **Ground anchors:** Main features of ground anchors. Calculation of pull-out		

	resistance for sands and stiff clays. **<u>Piled foundations</u>**: concepts of shaft friction and end bearing resistances. Negative shaft friction. Types of piles and installation methods, advantages and disadvantages.
Recommended and/or required reading:	
Textbooks:	• Craig, R.F., *Soil Mechanics*, 7th ed., Spon Press, 2004.
References:	• Smith, I., *Smith's Elements of Soil Mechanics*, 8th ed., Wiley-Blackwell, 2006. • Bowles, J., *Foundation Analysis and Design*, McGraw-Hill, 2001.
Planned learning activities and teaching methods:	The course will be presented through theoretical lectures in class and by demonstration and student participation in laboratory classes. The lectures will present to the student the course content and allow for questions. Part of the material will be presented using visual aids. Lecture notes, homework assignments, laboratory data, practice questions, feedback and additional material such as site videos and photographs will be available to students at any time on the University e-learning platform. The learning process will be enhanced with the requirement from the student to solve exercises and to process laboratory data. These include self-evaluation exercises which will be solved in class or as homework. The instructor will be available to students during office hours or by appointment in order to provide any additional tutoring.
Assessment methods and criteria:	• Coursework 40% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No