

Course unit title:	Geotechnical Design		
Course unit code:	CE315		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	3		
Semester when the unit is delivered:	5		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Christakis Onisiphorou		
Learning outcomes of the course unit:	<ol style="list-style-type: none"> <li>1. Identify methods of site investigation, foundation and retaining wall types and understand the geotechnical design process from site investigation, interpretation, design and monitoring.</li> <li>2. Apply design techniques for shallow and deep foundations with complex loads, cantilever and gravity retaining walls, and also anchored walls.</li> <li>3. Analyse site investigation data for the selection of appropriate shallow and deep foundation, types or retaining wall types and calculation of factors of safety on stability for complex cases.</li> <li>4. Evaluate degree of certainty and hence degree of conservatism, need for further investigation, need for monitoring.</li> <li>5. Create design calculations for shallow and deep foundations with various loads and soil conditions, supported and unsupported embedded retaining walls, as well as overall stability performance.</li> </ol>		
Mode of delivery:	Face-to-face		
Prerequisites:		Co-requisites:	
Recommended optional program components:			
Course contents:	<p><b>Introduction:</b> review of material from course <i>Geotechnical Engineering</i>.</p> <p><b>Site investigation and Geotechnical Data:</b> In-situ and laboratory testing methods. Measured and derived soil parameters. Correlations of parameters with field data.</p> <p><b>Design to Eurocode 7:</b> Introduction to Eurocode programme. Basic definitions. Partial factors. Characteristic and Design values. Design approaches. National Annex</p> <p><b>Spread foundations:</b> Bearing resistance and partial factors. Design of shallow and strip foundations for various soil conditions for ultimate limit state in EC7. Inclined actions and moments. Settlement of shallow foundations and serviceability limit state calculations based on field test data.</p> <p><b>Pile foundations:</b> Pile resistance and partial factors. Pile design in accordance with EC7 for vertical loads in clays and sands. Design of pile groups. Pile design by testing and relevant partial factors. Raking piles. Modes of failure for laterally loaded piles.</p> <p><b>Retaining structures and Anchorages:</b> Earth pressure coefficients and use of partial factors. Design of cantilever and embedded retaining walls according to EC7. Calculation of design anchor loads. Design of ground anchors for supported retaining structures.</p> <p><b>Overall stability:</b> Evaluation of stability for soil slopes. Overall stability of geotechnical structures for various soil conditions.</p>		
Recommended and/or required reading:			

Textbooks:	<ul style="list-style-type: none"> <li>• Frank, R., Bauduin, C., Driscoll, R., Kavvas, M., Krebs Ovesen, N., Orr, T.L.L. &amp; Schuppener, B., "Designer's Guide to EN 1997-1 Eurocode 7: Geotechnical Design-General Rules" Thomas Telford Publishing, London, 2004.</li> <li>• Simons, N. &amp; Menzies, B., "A Short Course in Foundation Engineering", Thomas Telford Publishing, 2<sup>nd</sup> ed., 2000.</li> </ul>
References:	<ul style="list-style-type: none"> <li>• EN 1997-1: 2004. Eurocode 7: Geotechnical Design. Part 1: General rules. CEN, European Committee for Standardization, Brussels.</li> <li>• Tomlinson, M.J., "Foundation Design and Construction", Prentice-Hall, 7<sup>th</sup> ed., 2001.</li> <li>• Tomlinson, M. J. &amp; Woodward, J., "Pile Design and Construction Practice", 6<sup>th</sup> ed., CRC Press, 2014.</li> <li>• Simons, Menzies and Matthews, A Short Course in Geotechnical Site Investigation, 2002</li> </ul>
Planned learning activities and teaching methods:	<p>The course will be presented through theoretical lectures in class. 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, practice questions, feedback and additional material will be available to students at any time on the e-learning platform. The learning process will be enhanced with the requirements from the student to solve exercises. These include self-evaluation exercises which will be solved in class. Exercises will also be given as homework which will be part of their assessment. The instructor will be available to students during office hours or by appointment in order to provide any additional tutoring.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> <li>• Coursework                      40%</li> <li>• Final Exam                        60%</li> </ul>
Language of instruction:	English
Work placement(s):	No