

Course unit title:	Marine Geotechnical Engineering		
Course unit code:	CE470		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	4		
Semester when the unit is delivered:	7		
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. Classify marine soils according to their origin and behavior, and plan the main phases of a marine site investigation.</li> <li>2. Describe the cyclic behaviour of soils under drained and undrained conditions and recognize the importance of liquefaction phenomena.</li> <li>3. Apply simplified and complex methods of analyses for calculating the ultimate lateral resistance and deflection of single piles and pile groups.</li> <li>4. Assess the stability of drained, undrained and partially submerged marine soil slopes.</li> <li>5. Calculate the pull-out capacity of seabed anchors for different loading conditions.</li> <li>6. Compute the bearing capacity, settlement and rotation for different types of marine and offshore foundations.</li> <li>7. Develop skills for relating geotechnical applications in marine and offshore engineering to oil and gas exploration in seas and oceans.</li> </ol>		
Mode of delivery:	Face-to-face		
Prerequisites:		Co-requisites:	None
Recommended optional program components:	None		
Course contents:	<ul style="list-style-type: none"> <li>• <b>Marine Soils:</b> Introduction to marine soils and sediments. Topographical features of seafloor. Origin, classification and behaviour of marine soils. Typical geotechnical profiles. Shear strength and consolidation properties. Scour and erosion.</li> <li>• <b>Marine Site Investigations:</b> Phases and Planning of a marine site investigation. Geophysical surveys, bathymetry and seafloor topography. Drilling and sampling procedure. In-situ testing and on-board testing.</li> <li>• <b>Soil behaviour under cyclic loading:</b> Cyclic behaviour of soils. Drained and Undrained cyclic loading. Effects of drainage. Constitutive modelling. Laboratory tests for sands and clays. Liquefaction phenomena. Liquefaction potential and analysis.</li> <li>• <b>Lateral loading of piles:</b> Driven and Bored piles. Pile behaviour under lateral load. Essential soil and pile parameters. Ultimate lateral resistance and deflection of single piles and pile groups. Design recommendations using Eurocode 7. Simplified and complex methods of analyses.</li> <li>• <b>Marine slope stability and seabed anchors:</b> Seafloor stability and mechanisms of instability. Stability analysis of drained, undrained and partially submerged soil slopes. Analysis under gravity and wave effects. Earthquake effects and liquefaction hazard. Types and load capacity of anchors.</li> <li>• <b>Types of Foundations for Marine and Offshore Structures:</b> Foundations for gravity platforms and jack up rigs. Offshore pile foundations. Design loads and</li> </ul>		

	design considerations. Calculation of bearing capacity and settlement. Construction and installation techniques. Prediction of performance.
Recommended and/or required reading:	
Textbooks:	Poulos, H.G., <b>Marine Geotechnics</b> , Spon Press, 1988.
References:	Reese, L.C. & Van Impe, W.F., <b>Single Piles and Pile Groups under lateral loading</b> , Taylor & Francis, 2000.  Gerwick, B.C., Jr, <b>Construction of Marine and Offshore Structures</b> , 3rd ed., CRC Press, 2007.
Planned learning activities and teaching methods:	The course will be presented through formal lectures. The lectures will present to the student the course content and allow time for questions and discussion. Numerical examples are also solved in class and tutorial questions are provided for private study. Part of the material will be presented using visual aids such as powerpoint slides. The aim is to familiarize the student with the different and faster pace of presentation and also allow the instructor to present related material (photographs etc). Notes shall be taken by the students in class during lectures. In addition, all of the course material will be made available through the university e-learning platform. Finally, the instructor will be available to students during office hours or by appointment in order to provide any necessary tutoring.
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