

DEPARTMENT OF CIVIL ENGINEERING  
COURSE SYLLABUS

Course Details					
<b>Code</b>				<b>Academic Year</b>	<b>Semester</b>
BAU545				1	2
<b>Title</b>	<b>T</b>	<b>A</b>	<b>L</b>	<b>ECTS</b>	
Offshore Geotechnics and Design of Foundations for Offshore Wind Turbines	3	-	-	6	
<b>Language</b>	English				
<b>Level</b>	<b>Undergraduate</b>		<b>Graduate</b>	✓	<b>Postgraduate</b>
<b>Department / Program</b>	Civil Engineering				
<b>Forms of Teaching and Learning</b>	Formal				
<b>Course Type</b>	<b>Compulsory</b>		<b>Elective</b>	✓	
<b>Objectives</b>	<p>The module will be focused on the geotechnical aspects in offshore engineering, and designing of fixed-bottom foundation systems for offshore wind turbines (OWTs). After completing the module, the students will gain in-depth theoretical and practical knowledge on the geotechnical investigation methods and approaches for the design of OWT's foundation systems. Students will acquire knowledge on the estimation methods of design soil parameters for OWTs. They will understand the soil-structure interaction phenomena (SSI) and recommended SSI models for the foundations of OWTs. They will gain knowledge on scour development and protection around the foundation systems. They will get knowledge on model and field tests in order to understand the response of the foundations for OWTs. They will learn the approximations for the estimation of the behavior of foundation systems for OWTs under long-term cyclic loading. They are going to get information on design considerations of real offshore wind farm projects.</p>				
<b>Content</b>	<ul style="list-style-type: none"> <li>• The aspects of geotechnical engineering in offshore</li> <li>• Standards and guidelines for the design of foundations for OWTs</li> <li>• The geotechnical aspects of seafloor and marine soils</li> <li>• The implementation of soil testing in field and laboratory for the estimation of design soil parameters for OWTs</li> <li>• Design approaches of especially bottom-fixed foundation systems for OWTs in moderate and deep waters</li> <li>• Behavior of foundation systems for OWTs under monotonic, cyclic loading, and combined loading conditions</li> <li>• The approximations for the estimation of the behavior of foundation systems for OWTs under long-term cyclic loading</li> <li>• Model and field tests to understand the behavior of foundation systems for OWTs</li> <li>• Scour development and scour protection around the foundation of OWTs</li> <li>• Numerical methods for the estimation of the response of OWTs</li> <li>• To understand the soil-structure interaction phenomena (SSI) and SSI models for the foundations of OWTs</li> <li>• Case studies, applied real offshore wind farm projects</li> </ul>				
<b>Prerequisites</b>	-				
<b>Coordinator</b>					
<b>Lecturer(s)</b>	Assoc. Prof. Dr. Cihan Taylan Akdağ				

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Assistant(s)			
Work Placement			
<b>Recommended or Required Reading</b>			
Books / Lecture Notes	<p>[1] Randolph, M. &amp; Gourvenec, S. (2011). Offshore Geotechnical Engineering. USA: Spon Press</p> <p>[2] B. C. Gerwick (2007). Construction of Marine and Offshore Structures. USA: Taylor &amp; Francis.</p> <p>[3] M. Tomlinson &amp; J. Woodward (1997). Pile Design and Construction Practice. USA: Taylor &amp; Francis.</p> <p>[4] Reese, L. C., &amp; Van Impe, W. F. (2001). Single piles and pile groups under lateral loading. Rotterdam: A.A. Balkema.</p>		
Other Sources	-		
<b>Additional Course Material</b>			
Documents	-		
Assignments	-		
Exams	-		
<b>Course Composition</b>			
Mathematics und Basic Sciences			%
Engineering			%
Engineering Design			%
Social Sciences			%
Educational Sciences			%
Natural Sciences			%
Health Sciences			%
Expert Knowledge			%
<b>Assessment</b>			
Activity	Count	Percentage (%)	
Midterm Exam	1	40	
Quiz			
Assignments	2	10	
Attendance			
Recitations			
Projects			
Final Exam	1	50	
		<b>Total</b>	<b>100</b>
<b>ECTS Points and Work Load</b>			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	14	8	112

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Assignments	2	8	16
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
<b>Total Work Load</b>			<b>174</b>
<b>ECTS Points (Total Work Load / Hour)</b>			<b>6</b>

**Learning Outcomes**

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**Weekly Content**

1	The aspects of geotechnical engineering in offshore
2	Standards and guidelines for the design of foundations for OWTs
3	The geotechnical aspects of seafloor and marine soils
4	The implementation of soil testing in field and laboratory for the estimation of design soil parameters for OWTs
5	Design approaches of especially bottom-fixed foundation systems for OWTs in moderate and deep waters
6	Behavior of foundation systems for OWTs under monotonic, cyclic loading, and combined loading conditions
7	The approximations for the estimation of the behavior of foundation systems for OWTs under long-term cyclic loading
8	Model and field tests to understand the behavior of foundation systems for OWTs
9	Scour development and scour protection around the foundation of OWTs

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10	Numerical methods for the estimation of the response of OWTs
11	To understand the soil-structure interaction phenomena (SSI) and SSI models for the foundations of OWTs
12	Case studies, applied real offshore wind farm projects
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**Contribution of Learning Outcomes to Program Objectives (1-5)**

	P1	P2	P3	P4	P5	P6	P7
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**Contribution Level** 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

**Compiled by:**

**Date of Compilation:**