

CE 582 Advanced Shallow Foundation Engineering

Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)														
Required, or Elective	Required														
Course Description	Development of design skills in foundation engineering for upnormal soil type and condition, such as foundation on layered soil, Sabkha soil, expansive soil, collapsing soil, weathered and fractured rock material.														
Prerequisites or Co-requisites	None														
Course Learning Outcomes	<p>Students completing this course successfully will be able to:</p> <table> <thead> <tr> <th>Course Learning Outcomes (CLOs)</th><th>Related Student Outcomes (SO)</th></tr> </thead> <tbody> <tr> <td>CLO1. Recognize and identify the distribution of the type of the up-normal soils in the Kingdom of Saudi Arabia, and method of analysis. K1</td><td>SO1</td></tr> <tr> <td>CLO2. Perform necessary experimental lab work for the determination of the soil design parameters. S1</td><td>SO2</td></tr> <tr> <td>CLO3. Develop design criteria for the up-normal soil behavior. S1</td><td>SO2</td></tr> <tr> <td>CLO4. Perform characterization of the up-normal soil types. S1</td><td>SO2</td></tr> <tr> <td>CLO5. Explain and analyze alternative methods of treatment for up-normal soils. S2</td><td>SO3</td></tr> <tr> <td>CLO6. Design and evaluate alternative methods and design procedures of foundation of the up-normal soils using available design programs in addition to manual design procedure methods. S4</td><td>SO5</td></tr> </tbody> </table>	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)	CLO1. Recognize and identify the distribution of the type of the up-normal soils in the Kingdom of Saudi Arabia, and method of analysis. K1	SO1	CLO2. Perform necessary experimental lab work for the determination of the soil design parameters. S1	SO2	CLO3. Develop design criteria for the up-normal soil behavior. S1	SO2	CLO4. Perform characterization of the up-normal soil types. S1	SO2	CLO5. Explain and analyze alternative methods of treatment for up-normal soils. S2	SO3	CLO6. Design and evaluate alternative methods and design procedures of foundation of the up-normal soils using available design programs in addition to manual design procedure methods. S4	SO5
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Student Outcomes related to this Course	<p>SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems.</p> <p>SO 2 Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors.</p> <p>SO 3 Investigate scientific research problems independently or through teamwork using critical thinking, appropriate techniques, advanced tools, and management principles.</p> <p>SO 5 Design novel advanced Civil Engineering systems and evaluate their performance, sustainability, and effectiveness for engineering practice and their impact in global, economic, environmental, and societal contexts.</p>														

Topics Covered	List of Topics		Related CLOs
	1. Introduction		CLO 1
	2. Review of the geotechnical soil exploration		CLO 1,2
	3. Studying the Sabkha soil and design methods		CLO 1,2
	4. Studying the expansive soil and design criteria.		CLO 1,3,4
	5. Studying the collapsing soil and foundation methods		CLO 3,4,5
	6. Foundation on layered soil and comparison with single layered methods		CLO 5,6
	7. Studying the weathered and fractured rock formation		CLO 1,6
Textbook(s) and Other Required Material	<ul style="list-style-type: none"> • Foundation engineering books and related research papers 		
Grading System	Assignments	10 %	
	Term Papers No. 1	10 %	
	Term Papers No. 2	10 %	
	Mid-term exams	30 %	
	Final Exam	40 %	
Instructors	Prof. Abdulhafiz Alshenawy		
Date of Review	November, 2024		