College of Engineering

Department of Civil Engineering

CE 581 Advanced Soil Mechanics

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Required for a MSCE degree
Course Description	Stress-strain relations, elasticity equations, shear strength theories. Principles of effective stress in saturated and partially saturated soils. Classical plasticity theory, critical state concept. Geosynthetics (Types, properties, & function).
Prerequisites or Co-requisites	None
Course Learning Outcomes	Students completing this course successfully will be able to

Course Learning Outcomes	***Related Program Outcomes***
CLO1: Recognize and identify the most critical issues and challenges in soil Mechanics.	**K1**
CLO2: Determine the appropriate type of soil shear strength to be used for analysis and design of geotechnical structures (e.g slope, foundations, earth retaining structures etc.)	**S1**
CLO3: Apply current practical and theoretical knowledge of fundamental geotechnical engineering principles, concepts and technologies to solve related problems for building structures on soil in regional contexts.	**S1**
CLO4: Characterize soil behavior using stress paths and soil models.	**S1**
CLO5: Evaluate effects of submergence, partial draining boundaries, time-dependent loading and radial drainage on the consolidation properties of soil as well as time-rates of consolidation of compressible soils for a variety of engineering problems	**C2**

<table>
<tr><td>Student Outcomes related to this Course</td><td>K1. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems.

S1. Provide solution for complex and real-life engineering problems through critical thinking and using modern engineering tools and identify its impact on social and ethical issues.

C2. Design novel advanced Civil Engineering systems and evaluate its performance and effectiveness for engineering practice and its impact on society.</td></tr>
<tr><td>Topics Covered</td><td><table>
<tr><th>List of Topics</th><th>Related CLOs</th></tr>
<tr><td>1. Introduction, Philosophy of Testing</td><td>CLO1</td></tr>
<tr><td>2. Index Properties & Classification of Soils.</td><td>CLO2</td></tr>
<tr><td>3. Compaction</td><td>CLO3</td></tr>
<tr><td>4. Hydraulic Conductivity</td><td>CLO3</td></tr>
<tr><td>5. Consolidation</td><td>CLO3</td></tr>
<tr><td>6. Shear Strength of Granular Materials</td><td>CLO4</td></tr>
<tr><td>7. Deformation & Modulus</td><td>CLO4</td></tr>
<tr><td>8. Shear Strength of Cohesive Materials</td><td>CLO1</td></tr>
<tr><td>9. Stress Paths and critical state soil mechanics</td><td>CLO4</td></tr>
<tr><td>10. Special Topics</td><td>CLO5</td></tr>
<tr><td>11. Geosynthetics (Types, properties, & function)</td><td>CLO5</td></tr>
</table></td></tr>
<tr><td>Textbook(s) and Other Required Material</td><td>• An Introduction to Geotechnical Engineering by Robert D. Holtz, William D. Kovacs, Thomas C. Sheahan, 2nd Edition.</td></tr>
<tr><td>Grading System</td><td>Assignments 10%
Term Paper No. 1 10%
Term Paper No. 2 10%
Midterm Exam 30%
Final Exam 40%</td></tr>
<tr><td>Instructors</td><td>Dr. Abdullah Abdulrahman A Almajid (2A101), e-mail: alabduallah@ksu.edu.sa</td></tr>
<tr><td>Date of Review</td><td>February, 2021</td></tr>
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