

## CE 584 Geotechnical Measurements and Exploration

<b>Credit and Contact hours</b>	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)												
<b>Required, or Elective</b>	Required												
<b>Course Description</b>	Planning and execution of subsurface exploration. Exploratory holes and sampling. Field instrumentation and testing. Generation of field parameters. Interpretation of field data for planning and design. Special laboratory tests												
<b>Prerequisites or Co-requisites</b>	None												
<b>Course Learning Outcomes</b>	<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><b>CLO1.</b> Recognize and identify the newest method of subsurface exploration. K1</td><td><b>SO1</b></td></tr> <tr> <td><b>CLO2.</b> Determine the appropriate sampling techniques, appropriate testing methods and measurement techniques. S1</td><td><b>SO2</b></td></tr> <tr> <td><b>CLO3.</b> Determine the appropriate number, depth of boreholes and method of boring. S1</td><td><b>SO2</b></td></tr> <tr> <td><b>CLO4.</b> Interpret and evaluate field data for planning and design. S4</td><td><b>SO5</b></td></tr> <tr> <td><b>CLO5.</b> Plan, manage and execute subsurface exploration with a high level of autonomy and responsibility. V2</td><td><b>SO7</b></td></tr> </tbody> </table>	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)	<b>CLO1.</b> Recognize and identify the newest method of subsurface exploration. K1	<b>SO1</b>	<b>CLO2.</b> Determine the appropriate sampling techniques, appropriate testing methods and measurement techniques. S1	<b>SO2</b>	<b>CLO3.</b> Determine the appropriate number, depth of boreholes and method of boring. S1	<b>SO2</b>	<b>CLO4.</b> Interpret and evaluate field data for planning and design. S4	<b>SO5</b>	<b>CLO5.</b> Plan, manage and execute subsurface exploration with a high level of autonomy and responsibility. V2	<b>SO7</b>
Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)												
<b>CLO1.</b> Recognize and identify the newest method of subsurface exploration. K1	<b>SO1</b>												
<b>CLO2.</b> Determine the appropriate sampling techniques, appropriate testing methods and measurement techniques. S1	<b>SO2</b>												
<b>CLO3.</b> Determine the appropriate number, depth of boreholes and method of boring. S1	<b>SO2</b>												
<b>CLO4.</b> Interpret and evaluate field data for planning and design. S4	<b>SO5</b>												
<b>CLO5.</b> Plan, manage and execute subsurface exploration with a high level of autonomy and responsibility. V2	<b>SO7</b>												
<b>Student Outcomes related to this Course</b>	<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 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> <p>SO 7 Effectively manage, individually or in groups, specialized tasks and activities in coursework, projects, assignments, and research work with a high level of autonomy and responsibility.</p>												

Topics Covered	List of Topics	Related CLOs
	1. Introduction to soil mechanics: Index properties, consolidation tests, direct shear tests, Triaxial tests. Subsurface exploration: Subsurface exploration, planning, drilling and sampling techniques	CLO 1
	2. <u>Field tests</u> : Field testing and laboratory investigation of soil, including advanced equipment, instrumentation, data acquisition, and measurement techniques: SPT, CPT, DCPT, Pressuremeter, Dilatometer, Vane shear, etc	CLO 2
	3. Geophysical field testing methods	CLO 2,3
	4. <u>Data Interpretation</u> : Data interpretations for determination of engineering properties of soils, and their application to geotechnical design.	CLO 3,4
	5. Preparation of site-investigation reports	CLO 4,5
	6. Case studies for subsurface exploration	CLO 1-3
	7. Introduction to soil mechanics: Index properties, consolidation tests , direct shear tests, Triaxial tests,	CLO 1,4
	8. Subsurface exploration: Subsurface exploration, planning, drilling and sampling techniques <u>Field tests</u> : Field testing and laboratory investigation of soil, including advanced equipment, instrumentation, data acquisition, and measurement techniques: SPT, CPT, DCPT, Pressuremeter, Dilatometer, Vane shear, etc	CLO 3
	9. Geophysical field testing methods	CLO 3,4
	10. Data Interpretation: Data interpretations for determination of engineering properties of soils, and their application to geotechnical design.	CLO 4
	11. Preparation of site-investigation reports	CLO 1,5
	12. Case studies for subsurface exploration	CLO 1-3
Textbook(s) and Other Required Material	<ul style="list-style-type: none"> <li>Hand Book of Geotechnical Investigation and Design Tables 2007, Burt G. Look</li> <li>Students are supplied with and encouraged to read excerpts from different numerical analysis books and technical papers relevant to some of the covered topics</li> </ul>	
Grading System	Midterm Exam	30%
	Assignments	15%
	Term Project	15%
	Final Exam	40%
Instructors	Dr. Abdullah Hamad Alsabhan	
Date of Review	November, 2024	