

CE 585 Applied Rock Mechanics

Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)												
Required, or Elective	Elective												
Course Description	This course is designed to expose the student to the applications of rock mechanics in engineering practice and to develop his skills with regard to assessment and evaluation of rock mechanics related projects.												
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 the nature, in-situ rock conditions and classification systems showing issues affecting the function and design of rocks. K1</td><td>SO1</td></tr> <tr> <td>CLO2. Recognize appropriate technique for excavation and tunneling works (Jack hammers, tunnel boring machines, and horizontal drilling). K1</td><td>SO1</td></tr> <tr> <td>CLO3. Assess engineering parameters used in the design of underground tunnels and facilities for integrity and stability. S4</td><td>SO5</td></tr> <tr> <td>CLO4. Apply gathered information to design and develop creative solutions for underground tunnels and facilities. S4</td><td>SO5</td></tr> <tr> <td>CLO5. Propose and design a rock improvement technique for integrity or slope stability in tunnels presenting the analysis for all relevant parameters. S4</td><td>SO5</td></tr> </tbody> </table>	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)	CLO1. Recognize the nature, in-situ rock conditions and classification systems showing issues affecting the function and design of rocks. K1	SO1	CLO2. Recognize appropriate technique for excavation and tunneling works (Jack hammers, tunnel boring machines, and horizontal drilling). K1	SO1	CLO3. Assess engineering parameters used in the design of underground tunnels and facilities for integrity and stability. S4	SO5	CLO4. Apply gathered information to design and develop creative solutions for underground tunnels and facilities. S4	SO5	CLO5. Propose and design a rock improvement technique for integrity or slope stability in tunnels presenting the analysis for all relevant parameters. 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 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	<table> <thead> <tr> <th>List of Topics</th><th>Related CLOs</th></tr> </thead> <tbody> <tr> <td>1. Scope and applications of rock mechanics, Rock Mass Classification methods, Issues and problems in rocks mechanics.</td><td>CLO 1</td></tr> <tr> <td>2. Founding on rocks, Presumptive bearing capacity for a range of different rock types.</td><td>CLO 1,2</td></tr> <tr> <td>3. Methods to improving rock mass properties: Rock Reinforcement – Rock bolting – Mechanism of Rock bolting – Principles of design for rock bolting. Pressure grouting and grout curtains.</td><td>CLO 2,3</td></tr> </tbody> </table>	List of Topics	Related CLOs	1. Scope and applications of rock mechanics, Rock Mass Classification methods, Issues and problems in rocks mechanics.	CLO 1	2. Founding on rocks, Presumptive bearing capacity for a range of different rock types.	CLO 1,2	3. Methods to improving rock mass properties: Rock Reinforcement – Rock bolting – Mechanism of Rock bolting – Principles of design for rock bolting. Pressure grouting and grout curtains.	CLO 2,3				
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	4. Stability of Rock Slopes: Causes of landslides, Modes of failure, Methods of analysis, Prevention and control of rock slope failure, Instrumentation for Monitoring and Maintenance of Landslides. CLO 2-4								
	5. In situ testing review; Flat jack and hydraulic fracturing techniques, pressure tunnel test, shear strength test, radial jack test, Goodman Jack Test and Dilatometer Test. CLO 4,5								
	6. Study and review of an applied rock mechanics project CLO 1,2,5								
Textbook(s) and Other Required Material	<ul style="list-style-type: none"> • INTRODUCTION TO ROCK MECHANICS. Second Edition, Goodman, Richard E., Published by John Wiley & Sons, 1989, ISBN 10: 0471617180 / ISBN 13: 9780471617181 • ROCK MECHANICS: theory and applications with case histories Wittke, W. 1990 Springer Berlin Heidelberg New York Tokyo • EXPERIMENTAL ROCK MECHANICS 1st Edition -Kiyoo Mogi, Reference - 361 Pages ISBN 9780367390006 - CAT# K448418. • ENGINEERING ROCKS FOR SLOPES, FOUNDATIONS AND TUNNELS, Ramamurthy, PHI Learning Pvt. Limited, 2010. 								
Grading System	<table> <tr> <td>Midterm Exam</td><td>20%</td></tr> <tr> <td>Assignments</td><td>20%</td></tr> <tr> <td>Term Project</td><td>20%</td></tr> <tr> <td>Final Exam</td><td>40%</td></tr> </table>	Midterm Exam	20%	Assignments	20%	Term Project	20%	Final Exam	40%
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Instructors	Prof. Muawia Dafalla								
Date of Review	November, 2024								