College of Engineering

Department of Civil Engineering

CE 585 Applied Rock Mechanics

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Elective for a MSCE degree
Course Description	This course is designed to exposure 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	Students completing this course successfully will be able to

Course Learning Outcomes	***Related Program Outcomes***
CLO1: Recognize the nature and in-situ rock conditions as well as recent rock classification systems including issues affecting the function and design of related projects.	**K1**
CLO2: Evaluate engineering parameters used in designing underground tunnels and other facilities and develop alternatives that satisfy integrity and stability.	**C2**
CLO3 : Select and compare appropriate techniques for excavation and tunneling works (Jack hammers, tunnel boring machines, horizontal drilling, etc.)	**C2**
CLO4: Propose and design rock improvement technique for slope stability (e.g. rock bolting, shotcreting, etc.)	**C2**
CLO5: Design a tunnel or other similar structure for a selected type of rock formation.	**C2**

Student Outcomes related to this Course	**K1**. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems. **C2**. Design novel advanced Civil Engineering systems and evaluate its performance and effectiveness for engineering practice and its impact on society.

<table>
<tr><td>Topics Covered</td><td>
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<tr><th>List of Topics</th><th>Related CLOs</th></tr>
<tr><td>1. Scope and applications of rock mechanics, Rock Mass Classification methods, Issues and problems in rocks mechanics.</td><td>CLO1</td></tr>
<tr><td>2. Founding on rocks, Presumptive bearing capacity for a range of different rock types.</td><td>CLO1</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>CLO2</td></tr>
<tr><td>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.</td><td>CLO3</td></tr>
<tr><td>5. Insitu testing review; Flat jack and hydraulic fracturing techniques, pressure tunnel test, , shear strength test, radial jack est, Goodman Jack Test and Dilatometer Test.</td><td>CLO5</td></tr>
<tr><td>6. Study and review of an applied rock mechanics project</td><td>CLO4</td></tr>
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<tr><td>Textbook(s) and Other Required Material</td><td>

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 SpringerBerlin 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.

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<tr><td>Grading System</td><td>Assignments 20%
Project Work 20%
Midterm Exam 20%
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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