

# ROCK MECHANICS: MODERN ADVANCES AND CHALLENGES FOR THE 21ST CENTURY

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## Overview

Rock mechanics forms part of the much broader subject of Geomechanics, which is concerned with the mechanical responses of all geological materials, including soils. Rock mechanics, as applied in engineering geology, mining, petroleum, and civil engineering practice, is concerned with the application of the principles of engineering mechanics to the design of the rock structures generated by mining, drilling, reservoir production, or civil construction activity such as tunnels, mining shafts, underground excavations, open pit mines, oil and gas wells, road cuts, waste repositories, and other structures built in or of rock. It also includes the design of reinforcement systems, such as rock bolting patterns.

Understanding the stress, strain, and failure mechanisms of rocks and their response to earth stresses can lead to enormous economic benefits in all phases of petroleum reservoir development. Over the last few decades, rock mechanics has emerged as a critical technology capable of lowering financial risk in drilling and well completions, qualifying exploration and development opportunities, and improving hydrocarbon productivity. Rock mechanics is a vital decision-making tool for high-angle and horizontal drilling, unconventional reservoirs, deep water drilling, massive hydraulic fracturing, and completing poorly cemented formations.

Designing excavations in rock mass with appropriate stability considerations in surface and underground mining is a challenge. It requires a good understanding of the principles of mechanics and rock mechanics. In last two decades mining and excavation activities in India have undergone major changes. India has an ambitious plan to produce 1.5 BT coal in the near future and hence sub-surface operations will dominate. Mining activities and civil construction excavations are being planned down to greater depths in weaker and complex rock masses. These pose tough challenges to engineers and geologists to design operations safely without compromising economics. Thus a sound knowledge of rock mechanics and ground/strata control is essential for understanding technical issues and engaging in appropriate design activities.

At the end of the course the participant would be developed a thorough understanding and insight on:

- Assessment and Evaluation of the Key Parameters that Govern Rock Mechanics
- Use of Modern Methods for Rock Joints Estimation, Concepts of Stereo Net and Understanding the Different Rock Mass Classification System
- Decision on the Fundamental Steps for Investigations of Slope mass Movement and Selection of Remedial Measures
- Modern Numerical Simulation Technique for Analysing Rock Mass Excavation
- Role of natural fractures in Rock Engineering projects.

<b>Modules</b>	21 October to 25 October, 2019 <b>Number of participants for the course will be limited to fifty.</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>• You are an engineer or research scientist interested in designing and implementing Rock Mechanics for Mining and Civil engineering application</li> <li>• You are geologist or geophysicist interested to learn application of Rock Mechanics in your profession.</li> <li>• You are a student or faculty from academic institution interested in learning how to do research on Rock Mechanics or want to work with Rock Mechanics for Mining and Civil engineering application.</li> </ul>
<b>Fees</b>	<p>The participation fees for taking the course is as follows:  <b>Participants from abroad : US \$500</b>  <b>Industry/ Research Organizations: Rs. 10,000</b>  <b>Academic Institutions/ Faculty: Rs. 5000</b>  <b>Students &amp; Research Scholars: Rs. 2000</b></p> <p>The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.</p>

## The Faculty



Professor Giovanni Grasselli is the NSERC-Energi Simulation Industrial Research Chair in Fundamental Rock Physics and Rock Mechanics at University of Toronto, Ontario, Canada. His research interests are Hydraulic fracturing, Rock mechanics, Influence of fractures on the hydro-mechanical behavior of rockmasses, Flow and transport in fractured porous media, Rock physics visualization techniques (i.e., x-ray microCT, confocal microscopy), Mining survey & 3D visualization and Rock supports.



**Dr. Radhakanta Koner** is an Assistant Professor of Indian Institute of Technology(ISM), Dhanbad. His research interest is Rock Mechanics, Discrete Element Modelling, Remote Sensing and Image Processing.

## Course Co-ordinator

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