



Rock Mechanics

Principles and Application(Ersc- 644)

Rock Mechanics Principles and Application builds on knowledge and understanding in applying rock mechanics principles in different civil works projects; defining rock engineering properties in different engineering projects; applying stress-strain theories to solve practical problems relevant to different loading conditions; making a design for successful rock support. Have experience in starting, performing, completing and reporting a relevant project.



Quartzite – prominent three sets of joints, North eastern Himalayas, India

Module Aim/Rationle

'Rock mechanics' is the theoretical and applied science of the mechanical behavior of rock and rock masses; it is that branch of mechanics concerned with the response of rock and rock masses to the force fields of their physical environment. It is an important science to understand rock response when it is subjected to various kinds of forces. Thus, it is important for engineering design of various structures on rocks.

Learning Outcomes

You will be able to translate rock behavior findings into forms applicable to engineering needs and will be capable of providing sound judgment with independent decisions on engineering considerations, particularly for civil structures.

Module outline

- On rock properties determination and its engineering significance

- Behavioral characteristic of rock foundation material
- Methods of assessing engineering characterization
- Rock Foundation Engineering
- Rock slope stability and Engineering

Topics to be covered

Topics
Introduction to Rock Mechanics
Engineering Properties of Rocks
Engineering Classification of Rocks
Rock Strength and Failure Criteria
Deformability of Rocks
Rock Slope Stability
Application of Rock Mechanics in Underground Openings
Insitu and Induced Stresses
Application of Rock Mechanics in Building Foundations

How you will learn

- ✓ Online Concept Lectures at Google Meet
- ✓ Handouts for Each Lecture
- ✓ Assignments
- ✓ Presentations
- ✓ Technical Discussions

Total Duration and Days of Class

Total Duration – **12 classes**; Days of Class – Wednesday (10:00am – 1:00 pm)

How the Performance will be Assessed

- ✓ Regularity
- ✓ Assignments
- ✓ Presentations
- ✓ Technical Discussion
- ✓ Final written Exam

How you will get the Handouts and other study Material

In softcopy handouts and other study material will be available on my Web page; (<http://tkraghu.tripod.com>). These will be 'pdf' files and password protected*.

(* Password will be provided to the class representative)

Activity Schedule

Date	Time	Activity
2.12.2021 (Thursday)	10:00 – 1:00	Welcome Note
		Introduction to Rock Mechanics
8.12.2021 (Wednesday)	10:00 – 1:00	Engineering Properties of Rocks
15.12.2021 (Wednesday)	10:00 – 1:00	Engineering Classification of Rocks
22.12.2021 (Wednesday)	10:00 – 1:00	Rock Slope Stability
29.12.2021 (Wednesday)	10:00 – 1:00	Software Training
5.1.2022 (Wednesday)	10:00 – 15:00	Long Assignment Presentation
12.1.2022 (Wednesday)	10:00 – 1:00	Final Written Exam
19.1.2022 (Monday)	10:00– 12:30	FEED BACK ON EXAM AND ASSIGNMENTS

Brief Introduction to Module Instructor

Dr. Tarun K. Raghuvanshi

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Dr. Tarun, an Indian by nationality is a consulting Engineering Geologist. Previously he has worked with School of Earth sciences (SES), for more than 18 years (2003 – 2021). He got his PhD (1999) from Indian Institute of Technology (IIT), Roorkee, India. He has also worked with Alternate Hydro Energy Centre (Now Department of Hydro and Renewal Energy, IIT Roorkee, India in various research positions for about 7 years. He is quite capable of managing academic and research affairs in a dynamic and complex educational and research environment. In addition to his involvement in wide spectrum of academic teaching and research he was engaged in School administrative affairs, professional research and consultancy services. Dr. Tarun has a very rich experience in the areas of Engineering Geology for hydro power projects and landslide studies. Dr. Tarun has been working for small and micro hydro power for over 25 years both in India and Ethiopia. He has prepared over 90 Technical Reports mainly for small and micro hydro projects. He has a research interest in Engineering Geological investigations for civil engineering projects with special interest for Hydropower projects and landslide studies. At SES he was actively participating in teaching and research at undergraduate and post-graduate level. He has independently handled Post-graduate program in Engineering Geology for about 10 years. He has advised 92 MSc Thesis from Engineering Geology, Urban Geology, Geo Hazards, Environmental Geology and Remote Sensing & GIS Streams. Also, he has advised a PhD Research work and presently advising 2 PhD research works.

Contact details

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December, 2021