

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NGLD503	Rock Slope Engineering	3	0	0	3

Course Objective

The primary objective of the course is to introduce fundamental and advanced aspects of rock slope engineering through engineering geological investigation.

Learning Outcomes

Upon completion of the course, students will be able to: Understand the

- fundamentals of rock slope stability. Carry out different
- types of slope failure analysis.
- Apply the knowledge on instrument handling in landslides, both surface and sub-surface.
- Understand the application of AI/ML in rock slope engineering.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Landslide classification, Natural landslides in soils and rocks. Types and modes of slope failure, Mechanics of landslides.	9	Description of different kind of land (rock and soil) failure types and its causes. The mechanics of material movements.
2	Stability of slopes. Plane, wedge, and circular failures analyses. Hoek charts and graphical procedures. Hazard/Risk Zonation mapping of landslide prone areas. Kinematic and Rockfall analysis.	9	Understand about the structural aspects of rock slope and the methods to investigate different rock failure types using different methods.
3	Instrumentation in landslides investigations. Collection of data and analysis of geological data, Stereographic method etc. Slope analysis and factor of safety using limit equilibrium methods.	8	Concept of different techniques associated with geological data collection, map formation and probabilistic analysis of failure will be learned.
4	Application of RMR/RSR classification in slope stability evaluation. Predicting rock mass quality using AI/ML. Remedial measures for stabilizing slopes. Slope Mass Rating and its application. Computer programs for slope stability and computer aided design in rock slope engineering. Machine learning algorithms for slope stability prediction.	9	Exposure to different rock slope classification depending upon slope-joint relationship that shall help in field analysis; know about the application of AI/ML in rock mechanics, specifically, rock quality prediction; gain insights into the prediction of stability of slopes using machine learning methods.
5	Instrumentations for monitoring slope movements. Landslides in India. Case studies.	4	Concept of devices used to monitor landslide events with special consideration towards recent and previous landslide occurred in India with the help of some case studies.
6	Slope stability problems in opencast mines. Case studies.	3	Understand the causes of slope instability problem in mining areas. Causes and remedial measures required shall be considered.
	Total	42	

Text Books:

1. Hoek, E and Bray, J. (1981). Third Edition; Rock slope Engineering.
2. Duncan C. Wyllie and Chris Mah. (2005). Fourth Edition; Rock slope Engineering.

Reference Books:

1. Goodman R.E (1968). A model for the mechanics of jointed rock.