



UNDERGROUND EXCAVATIONS: GEOLOGICAL ASPECTS, MONITORING AND RISK ANALYSIS

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APPLICATION FORM <https://forms.gle/9Gi6iHP61a7E17zdA>

DESCRIPTION

This course focuses on the engineering geology aspects of the underground excavations. The students will face the essential aspects of the preliminary design phase, analysis of the construction sequences and excavation monitoring during construction and operational phases. Specific attention will be dedicated to the monitoring of underground openings and their proximity, as well as to the use of the observational method during each phase of the underground construction process. A final brief exercise activity will summarize the course contents.

At the end of the course, the students will have consolidated advanced knowledge and skills in the field of underground excavations that will allow them to deepen subsequently the theoretical and technical knowledge useful for the applications of their PhD activity.

COURSE PROGRAM

Lesson 1 – 17/01/2023 15.00-18.00 (Online)

Main geomechanical classifications: Description of the main classifications for the rock mass mechanical characterization to be used as base for design analyses

Elastic Isotropic medium and stress state around a tunnel: Description and analysis of the stress modification around an underground excavation under different hypothesis.

Lesson 2 – 20/01/2023 09.00-12.00 (Online)

Characteristic lines method: Presentation and description of the characteristic lines method. Application of the methodology for the design of excavation reinforcements. Working hypothesis and application fields

Excavation wall stability: Analysis methods and examples, Limit equilibrium methods for the excavation wall stability analysis. Application fields.

Lesson 3 – 24/01/2023 15.00-18.00 (Online)

Excavation methods and reinforcement types: Traditional and mechanized excavations

Monitoring systems for underground excavation and structures: Description of the main monitoring systems used in the underground field

Risk analysis methods for underground works: Description of the Risk analysis methodology applied to the tunnels and underground constructions

Lesson 4 – 27/01/2023 09.00-12.00 (Online)

Practical examples and exercises: Application of the characteristic lines method

Numerical analysis of underground excavations: procedure and hypothesis.

Finite element modeling (FEM) of an underground excavation.

Reinforcement design and verification.