

Course Name:
Tunnel Engineering

Course Number:
20400

Credit:
3

Course Content (outline):

1. Introduction

- 1.1 Importance of Underground Spaces in Sustainable Development
- 1.2 Use of Underground Spaces
- 1.3 Design and Construction Stages in Tunnel Engineering

2. Review of Geotechnical Engineering and Rock Mechanics

- 2.1 Geotechnical Exploration for Underground Spaces
- 2.2 Ground Stresses
- 2.3 Discontinuities in Rock Masses
- 2.4 Rock Mass Classification
- 2.5 Strength Criteria

3. Methods of Stability Analysis

- 3.1 Geo-Structural Analysis
- 3.2 Closed Form Solutions
- 3.3 Numerical Methods

4. Supporting Systems in Underground Structures

5. Design Methods

- 5.1 Empirical Methods
- 5.2 Observational Methods
- 5.3 Analytical Methods
- 5.4 Combined Methods

6. Ground-Structure Interaction

- 6.1 Hoek - Brown Methods
- 6.2 Convergence - Confinement Methods

7. Construction Methods

- 7.1 Drill and Blast Methods
- 7.2 Semi-Mechanized Tunneling
- 7.3 Mechanized Tunneling

8. Monitoring and Instrumentation

9. Construction and Project Management

10. Special Cases in Design and Construction

References:

- Hoek, E. and Brown, E. T. (1980), Underground Excavation in Rock, The Institution of Mining and Metallurgy, London
- Kuessel, T.R. and King, E.H. (2011), Tunnel Engineering Handbook, Springer
- Maidl, B. (2014), Handbook of Tunnel Engineering, Ernst & Sohn
- Bickel, J.O. (2004), Tunnel Engineering Handbook, Cbs
- Hoek, E. (1990), Rock Slope Engineering, SPON