

## Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

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### CE5338 – Underground Space Technology

**Credit Distribution:** C:9 L:3 T:0 P:0 E:0 O:6 TH:0

**Course Type:** Theory

**Description:** To introduce the basic concept, design principles and excavations procedures for different underground structures and interpret behavior under different loading conditions.

**Course Content:**

Introduction to underground space and tunnelling, history, tunnelling challenges. Rock and rock mass behaviour, physico-mechanical properties, rock mass classification. Underground openings, stresses around different shapes, initial state of stresses. Tunnel driving techniques, Underground supports, theory of arching, rock loads and loads on tunnel linings. Surface settlement due to underground works, ground subsidence study. Underground instrumentation and monitoring. Tunnelling in difficult ground condition, ventilation, de-watering, drainage/uplift, health and safety issues, fire safety and design.

**Text Books :**

Kolymbas, D. (2008) "Tunneling and tunnel mechanics: A rational approach to tunneling", Springer Publications. Goodman, R. E. (1989) "Introduction to Rock Mechanics", John Wiley & Sons. Hoek, E. and Brown, E. T. (2005) "Underground excavations in rock", The Institute of mining and metallurgy. Brady, B. H. G. and Brown, E. T. (2006), "Rock mechanics for underground mining", Springer Publication. Obert, L. and Duvall, W.I. (1967), "Rock mechanics and the design of structures in rock", John Wiley and Sons, Inc. Chapman D, Metje, N and Stark A (2010) "Introduction to tunnel construction" Spon Press, Taylor and Francis.

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Kolymbas, D. (2008) "Tunneling and tunnel mechanics: A rational approach to tunneling", Springer Publications. Goodman, R. E. (1989) "Introduction to Rock Mechanics", John Wiley & Sons. Hoek, E. and Brown, E. T. (2005) "Underground excavations in rock", The Institute of mining and metallurgy. Brady, B. H. G. and Brown, E. T. (2006), "Rock mechanics for underground mining", Springer Publication. Obert, L. and Duvall, W.I. (1967), "Rock mechanics and the design of structures in rock", John Wiley and Sons, Inc. Chapman D, Metje, N and Stark A (2010) "Introduction to tunnel construction" Spon Press, Taylor and Francis.

**Prerequisite:** NIL