

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE7014 - Structural safety of historical monuments

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

Course Type: Theory

Description: To study evolution of structural form by analysing behaviour; - To identify factors leading to structural distress; - To identify scientific tools for data acquisition; - To perform structural analysis; - To examine structural repair and strengthening strategies.

Course Content:

- Introduction to Conservation Engineering: International principles/guidelines for heritage conservation;
- Evolution of Various Structural Forms and Historical Materials
- Factors for Deterioration of Materials and Structural Distress: Climatic causes, biological causes, natural disasters (earthquakes/fire), manmade causes; Study of crack patterns and damages in structural elements;
- Scientific Tools for Data Acquisition: Methodology - diagnostic investigations; Historical research, geometric surveys, in-situ and laboratory experimental testing (NDT); Dynamic identification;
- Mechanics of Historical Masonry;
- Numerical Modelling Approaches: detailed micro-modelling, simplified micro-modelling, macromodelling, Structural analysis approaches: structural component modelling, continuum and discontinuum modelling; Idealisation of structural behaviour: Linear elastic analyses, non-linear analyses and limit analysis, dynamic analysis, soil-structure interaction;
- Repair and Strengthening Strategies and Techniques.

Text Books: NIL

Reference Books:

- Como, M., Statics of Historic Masonry Constructions, Springer, 2012.
- Heyman, J., The Stone Skeleton: Structural Engineering of Masonry Architecture, Cambridge University Press, 1995.
- Feilden, B.M., Conservation of Historic Buildings, Butterworth-Heinemann Ltd., 1994.
- Croci, G., The Conservation and Structural Restoration of Architectural Heritage, Computational Mechanics Publications, 1998.
- Tomaževič, M., Earthquake-resistant Design of Masonry Buildings, Imperial College Press, 1999.
- Mathews, M.S., Conservation Engineering, Restoration of Historical Monuments - Suggestions for Practice, SBF 315, University of Karlsruhe, 1998.
- ICOMOS 1964 International charter for the Conservation and Restoration of Monuments and Sites (Venice Charter), International Council on Monuments and Sites.
- ICOMOS 2003 Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage, International Council on Monuments and Sites.

Prerequisite: NIL