

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5950- Characterization of Construction Materials

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

Course Type: Theory

Description: To introduce students to the characterization of construction materials and their behavior, with a view of developing their understanding of the mechanisms that govern the performance of these materials

Course Content: The course will be focused primarily on concrete, with some discussion on steel, composites and asphalt. The course will be treated in two broad parts: 1. Material characterization using macroscopic and microscopic techniques (visual examination, optical and scanning electron microscopy), chemical and mineralogical analysis techniques (X-ray diffraction, spectroscopic techniques), strain measurement, surface properties and pore structure, electrical and ultrasonic NDT; the fundamental principles of the techniques and their application to construction materials; demonstration of some techniques. 2. Characterization of material behavior: Rheology and viscoelasticity, engineering properties.

Text Books: No prescribed text

Reference Books

- V. S. Ramachandran and James J. Beaudoin, Eds., Handbook of Analytical Techniques in Concrete Science and Technology, William Andrew Publishing, New York, 2001.
- D A St. John, A. W. Poole, and I. Sims, Concrete Petrography "A Handbook of Investigative Techniques", Arnold Publishing. London, 1998.
- William D. Callister, Materials Science and Engineering: An Introduction, Sixth Edition, John Wiley and Sons, 2003.
- Jan Skalny, Editor, Materials Science of Concrete, Volumes I "VII, American Ceramic Society, 1989 "2005.
- J. M. Illston and P. L. J. Domone, Construction Materials "Their Nature and Behaviour, Third Edition, Spon Press, 2001.
- J.F. Young, S. Mindess, R.J. Gray and A. Bentur, The Science and Technology of Civil Engineering Materials, Prentice Hall, 1998

Prerequisite: NIL