Department of Civil Engineering
IIT Madras

Modern Construction Materials

Prologue – Lecture 0
Prof. Ravindra Gettu
IIT Madras

Teaching Philosophy

The teacher and the course should help the student in:

- Developing comprehension
- Practising analysis
- Becoming confident in decision making
- Improvement of communication skills
- Get the right attitude for learning and being an engineer

Course Objectives

- To provide the scientific basis for understanding and development of construction materials.
- To give an overview of the fundamentals needed to understand material structure and behaviour.
- To discuss the important materials used today in construction.

Course Objectives (continued)

- For researchers, the course aims to provide a review of basics and a unified approach to materials based on the chemistry, physical phenomena and mechanics.
- For engineers, the course will help understand why materials behave the way they do and how one can go about selecting the right material for a certain application.

Course Outline / Modules

1. *Introduction:* Course Outline; Motivation for studying the science and technology of construction materials

2. *Microstructure:* Atomic bonding; Structure of solids; Movement of atoms; Development of microstructure

3. *Material behaviour:* Surface properties; Response to stress; Failure theories; Fracture mechanics; Rheology; Thermal properties

Course Outline (continued)

4. *Structural materials:* Overview of construction materials and criteria for selection; Metals; Timber and wood products; Polymers and polymer composites; Bituminous materials; Masonry; Concrete; Glass

5. *Non-structural materials, accessories and finishes:* Waterproofing materials; Tiles; Paints; Polymer floor finishes; Fittings; Anchors; Other materials

6. *Closure:* Environmental and Social Concerns, Details of extra lectures; Closing remarks

Course Viewing and Downloading

- *Web site:* nptel.iitm.ac.in/
- *Viewing:* on NPTEL web site or YouTube (lower resolution)
- *Downloading:* from NPTEL site (high and lower resolution formats)

Reading Material

- *Building Materials*, P.C. Varghese, Prentice-Hall India, 2005
- *The Science and Technology of Civil Engineering Materials*, J.F. Young, S. Mindess, R.J. Gray and A. Bentur, Prentice-Hall, 1998.
- *Construction Materials: Their nature and behaviour*, Eds. J.M. Illston and P.L.J. Domone, Spon Press, 2001.
- *Engineering Materials 1, An introduction to their properties & applications*, M.F. Ashby and D.R.H. Jones, Butterworth Hienemann Publishers, 2003.
- *Materials Science and Engineering: An introduction*, W.D. Callister, John Wiley, 1994.
- *Civil Engineering Materials*, S. Somayaji, Prentice Hall, 2001.