

Modern Construction Materials - Video course

COURSE OUTLINE

The course will cover the fundamentals of materials science including the formation of chemical bonds, the properties of the states of matter, the development and the basic characteristics of the structure of materials, phase diagrams, concepts of rheology, mechanical behavior and simple failure models, deterministic and stochastic fracture mechanics, and the treatment of composites. The construction materials treated in the course will include bricks and stone, metals and alloys, wood and wood products, concrete and other cement-based materials, and asphalt.

COURSE DETAIL

No.	Topic	Hours
Module 1: Basics		
0	Prologue – Introduction to the course	01
1	Science, Engineering and Technology of Materials	02
Module 2: Microstructure		
2	Atomic Bonding	02
3	Structure of Solids	03
4	Movement of Atoms	01
5	Development of Microstructure	02
Module 3: Material Behaviour		
6	Surface Properties	01
7	Response to Stress	03
8	Failure Theories	01



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Civil Engineering

Additional Reading:

- Literature on Building Materials.

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9	Fracture Mechanics	02
10	Rheology	01
11	Thermal Properties	01
Module 4: Structural Materials		
12	Review of Construction Materials and Criteria for Selection	01
13	Wood and Wood Products	03
14	Polymers	02
15	Fibre Reinforced Polymers	02
16	Metals	03
17	Bituminous Materials	02
18	Concrete	05
19	Glass	01+01
Module 5: Non-structural materials, accessories and finishes		
20	Review of Non-structural Materials and Criteria for Selection	01
21	Waterproofing materials	01+01
22	Polymer Floor Finishes	01
23	Paints	01
24	Tiles	01
25	Acoustic Treatment	01
26	Dry walls	01

27	Anchors	01
Module 6: Closure		
28	Environmental Concerns	01
29	Social Perception of Construction Materials	01
30	Closure	01
Extra Videos and Reading Material		
	Visit to Showroom for Tiles, Fittings and Accessories	02
	Sanitary Fittings	03
	Pipes	01

References:

Text Book:

1. Building Materials, P.C. Varghese, Prentice-Hall India, 2005.

Reference Books:

1. *Materials Science and Engineering: An introduction*, W.D. Callister, John Wiley, 1994.
2. *Materials Science and Engineering*, V. Raghavan, Prentice Hall, 1990.
3. *Properties of Engineering Materials*, R.A. Higgins, Industrial Press, 1994.
4. *Construction materials: Their nature and behaviour*, Eds. J.M. Illston and P.L.J. Domone, 3rd ed., Spon Press, 2001.
5. *The Science and Technology of Civil Engineering Materials*, J.F. Young, S. Mindess, R.J. Gray & A. Bentur, Prentice Hall, 1998.
6. *Engineering Materials 1: An introduction to their properties & applications*, M.F. Ashby and D.R.H. Jones, Butterworth Heinemann, 2003.
7. *The Science and Design of Engineering Materials*, J.P. Schaffer, A. Saxena, S.D. Antolovich, T.H. Sanders and S.B. Warner, Irwin, 1995.
8. *Concrete: Microstructure, properties and materials*, P.K. Mehta and P.J.M. Monteiro, McGraw Hill, 2006.
9. *Properties of concrete*, A.M. Neville, Pearson, 2004.