

MSE-333- Material Testing Techniques (3 CH)

Pre-requisites: None

COURSE OBJECTIVES:

1. The main objectives of the course are
 - a. Understanding of principles of basic material characterization techniques
 - b. To interpret the results obtained from different characterization techniques
 - c. Understanding to select a certain characterization technique based on type of material

Course contents

2. Mechanical testing; hardness, tensile, compression, torsion, fatigue, creeps and impact testing. Microscopy; metallography, optical microscopy, SEM
3. Nondestructive testing; Discontinuities, Visual testing, Penetrant Testing, Magnetic Testing, Radiographic Testing, Ultrasonic Testing, Eddy Current Testing, Thermal Infrared Testing, Acoustic Emission Testing

COURSE OUTCOMES:

4. Upon successful completion of the course, the student will be able to:
 - a. Understand the principles of basic material characterization techniques
 - b. Interpret the results obtained from various material characterization techniques
 - c. Selection a of suitable characterization technique and its parameters to characterize a certain type of material

Suggested Books

1. Elton N. Kaufmann, Characterization of Materials, Volume 1 and 2, Wiley, (2003)
2. George E. Dieter, Mechanical Metallurgy, 3rd Edition, SI Metric Edition, McGraw-Hill Book Company, (1986)
3. Norman E. Dowling, *Mechanical Behavior of Materials, 2nd Edition, Prentice Hall, 1999*
4. Charles J. Hellier, Handbook of Nondestructive Evaluation, 1st Edition, The McGraw-Hill Companies, Inc. (2001)
5. Robert E. Green, B. BoroDjordjevic, Manfred P. Hentschel, *Nondestructive Characterization of Materials XI, Springer-Verlag, Berlin, Germany, (2003)*

6. Robert Cahn, *Concise Encyclopedia of Materials Characterization, 2nd Edition*, Elsevier Science, (2005)