MTSE 3020: Microstructure and Characterization of Materials

Fall 2010 Syllabus

INSTRUCTOR
Professor El Bouanani
Office hrs: Tuesday (10:30-11:30 am); DP E111, Other times available on request via e-mail.
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CLASS TIME & LOCATION
Mondays & Wednesdays 1:00-2:20 p.m. Room: D 207A, Discovery Park
Attendance is mandatory

Suggested text books:

–C.R. Brundle, C. A. Evans, Jr., and S. Wilson, Encyclopedia of Materials Characterization, Butterworth-Heinemann, ISBN 0-7506-9168-9 (1992).

Microstructural Characterization of Materials, David Brandon and Wayne Kaplan, Wiley

–J.B. Wachtman, Characterization of Materials, Butterworth-Heinemann, ISBN 0-7506-9215-4 (1992).

–ASM Handbook, Materials Characterization, Vol. 10, ISBN 0-87170-007-7 (1986).

PLAN OF STUDY

Syllabus overview/General Introduction to Characterization
S/N, error analysis
Design of Experiments
Density, particle size
Gas adsorption, Archimedes Principle

Atomic Force Microscopy

Probe: Photons
X-Ray Fluorescence
TR-XRF
X-Ray Diffraction
X-ray Photoelectron Spectroscopy/UV Photoelectron Spectroscopy
Solid State Nuclear Magnetic Resonance
Fourier Transform Infra-Red
Photoluminescence
Raman

Probe: Electrons
Scanning Electron Microscopy
Transmission Electron Microscopy
Electron Energy Loss Spectroscopy
Auger Electron Spectroscopy
Energy Dispersive X-rays
Electron Diffraction (LEED, RHEED)
Scanning Tunneling Microscopy

Probe: Particles
Rutherford Backscattering Spectrometry
Nuclear Reaction Analysis
Nuclear Activation Analysis
Particle Induced X-ray Emission
Secondary Ion Mass Spectrometry

Exam's schedule:

Exam-1: October 6th
Exam-2: November 10th
Final (Comprehensive Exam): December 13th

GRADING:

A = 100-90, B = 89-80, C = 79-70, D = 69-60, F = <60
Homework……...15%
Student Project 15%
Exams 40%
Final 30%

This is a preliminary course outline. The instructor may change material, course content, and course pace or item sequence at any time.