

# **MTSE-3020: Microstructure and Characterization of Materials**

## **Fall 2011 Syllabus**

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### **INSTRUCTOR**

Professor El Bouanani

Office hrs: Tuesday (10:30-11:30 am); DP E111, Other times available on request via e-mail.

Phone: 369-8109 E-mail: [bouanani@unt.edu](mailto:bouanani@unt.edu)

### **CLASS TIME & LOCATION**

Mondays & Wednesdays 10:30-11:50 AM. 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).

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### **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

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### **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

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### **Exam's schedule:**

Exam-1: October 5<sup>th</sup>  
Exam-2: November 9<sup>th</sup>  
Final (Comprehensive Exam): December 12th

### **GRADING:**

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

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