MTSE-5610 | Fundamentals of Surface and Thin Film Analysis

**Syllabus: Spring 2018**

Thursdays: 2:00-5:00 P.M.

**Class:** Discovery Park, Room: D207B

**Lab:** CART and MTSE at Discovery Park and IBMAL on main campus.

**Instructor:** Professor El Bouanani

Office hours: open door policy (or appointment via e-mail)

E-mail: bouanani@unt.edu, Phone: (940) 369-8109

**Suggested Text Book:**

*Fundamentals of Surface and Thin Film Analysis*

*L.C. Feldman and J.W. Mayer*

**ISBN:** 0-444-00989-2

The Instructor will supply additional references and handouts

**SYNOPSIS**

This course will cover the fundamental physical processes governing ion, electron and photon matter interactions. Materials characterization techniques relevant to surface and thin film analysis will be covered. An important component of this course will be dedicated to hands on experience in XPS, AES, XRF, RBS, NRA, PIXE, ERDA, FTIR,…to solve real world and state of the art material science problems

**GRADES**

- 30% Homework; 30% Midterm Exam; 40% Comprehensive Final
- Projects related to XRF, XPS and RBS constitute major parts of the homework and exams

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<th>Date</th>
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<tr>
<td>03/22/2018</td>
<td>MIDTERM EXAM</td>
<td>DP; D207B</td>
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<td>05/11/2018</td>
<td>FINAL EXAM, Comprehensive</td>
<td>DP; D207B</td>
<td>2:00-5:00 PM</td>
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**PLAN OF STUDY**
• Overview / Introduction / Tour of Characterization Facilities
• Vacuum Technology in Material Science
• Growth of thin films based structures and Deposition Methods
• Statistical data analysis
• Photon Absorption in Solids
• X-Ray Fluorescence
• X-ray Photoelectron Spectroscopy
• Ion-matter interactions: Atomic Collisions, Energy Loss, Sputtering
• Ion beam based Materials Analysis Techniques: Rutherford Backscattering spectrometry, Ion Channeling, Particle Induced X-ray emission and Nuclear reactions analysis
• Sputter Depth Profiles and SIMS
• Electron-Electron Interactions
• Diffraction and Surface Structure
• Radiative Transitions and the Electron Microprobe
• Non-Radiative Transitions and Auger Spectroscopy

Hands on experience in using characterization tools such as: XRF, XPS, AES, RBS, NRA, PIXE, ERDA, FTIR, etc.

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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.
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