

**BE 7909 Special Topic: Introduction to Advanced Surface Characterization Techniques,**  
**Spring 2007.**

**Catalog Description of Course:** 3 credits hours: 2 hours lecture and 3 hours lab. Surface characterization techniques including optical & electron microscopy; X-ray and Infra-Red spectroscopy; roughness measurement techniques including AFM.

**Objectives:**

- To understand the various advanced surface characterization techniques.
- To become familiar with the working of these techniques
- To obtain hands on experience with different type of techniques.
- To apply these techniques for research/project.
- To exemplify through project a thorough analysis of at least one of these techniques used in the research, biotechnology or healthcare fields.

**Instructor:** Dr. Varshni Singh  
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**Text Book:** None. Most of the material covered will be from the reference books and other required material will be provided in class and through the course website.

**Reference Books:** Students are encouraged to consult the reference books listed below and/or books available in library as well as electronically and other material available online.

1. Polymer Surface Modification and Characterization by Chi-Ming Chan.
2. Encyclopedia of Materials Characterization: Surfaces, Interfaces, Thin Films (Materials Characterization Series) by Charles Evans, Richard Brundle, and Wilson
3. Surface Characterization: A User's Sourcebook (Hardcover) by Dag Brune, Ragnar Hellborg, Ola Hunderi
4. Introduction to Spectroscopy (Saunders Golden Sunburst Series) by Donald L. Pavia, Gary M. Lampman, and George S. Kriz
5. An Introduction to Surface Analysis by XPS and AES by John F. Watts and John Wolstenholme.
6. Surface Analysis - The Principal Techniques by John C. Vickerman

**Grading Policy:**

Home Work & Quiz	20%
Project	20%
Midterm Exam	30%
Final Exam	30%

A = (100 - 90)%, B = (89 - 80)%, C = (79 - 70)%, D = (69 - 60)%, F = ( $\leq$  59%)

**Surface Characterization Techniques that will be covered:**

1. Scanning Electron Microscopy/ Energy Dispersive Spectroscopy
2. Optical Microscopy (Fluorescence & Confocal)
3. Optical Profiler
4. Probe Profiler
5. X-ray absorption spectroscopy (XANES/EXAFS)
6. Infra red spectroscopy (FTIR)
7. Micro hardness and atomic force microscopy (AFM/SPM)
8. X-ray Diffraction (Bulk and thin film)
9. X-ray Photoelectron Spectroscopy (XPS)/ Auger Electron Spectroscopy (AES)