THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Surfaces and Interfaces of Electronic Materials

ECE 5033

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Provides the fundamental and practical basis for designing, processing, and characterizing the interfaces controlling the next generations of microelectronic and optoelectronic device structures.

Prerequisites and Co-requisites:
Prereq: 3030 or MATSCENG 3271; or Grad standing in Engineering, Biological Science, or Math and Physical Sciences.

Course Goals / Objectives:
- Acquire a physical understanding of the fundamental electronic properties of semiconductor surfaces and interfaces
- Learn to communicate in essay form the role of surfaces and interfaces in electrical engineering
- Provide students with necessary background to understand the principle of new devices as new technologies develop

Course Topics:

- Overview, motivation, and historical background
- Electrical measurements of semiconductor-metal contacts
- Interface states
- Ultrahigh vacuum technology
- Surface analysis: Electron, photon and ion spectroscopy overview
- Photoemission spectroscopy
- Particle-solid scattering: electrons, Auger electron spectroscopy, & electron energy loss spectroscopy
- Particle-solid scattering: ions, Rutherford backscattering spectrometry & secondary ion mass spectrometery
- Electron diffraction
- Scanned probe microscopy and spectroscopy
- Optical spectroscopies: modulation, ellipsometry, Raman, surface photovoltage, cathodoluminescence
- Electronic materials surfaces: growth, diffusion, etching, bonding, epitaxy
- Adsorbates on semiconductors
- Metals on semiconductors
- Semiconductor heterojunctions
- Future electronic interfaces & new directions

Designation:

Elective