**Course Topics**

**EEE 536:** Semiconductor Characterization

**Catalog Course Description:** Measurement techniques for semiconductor materials and devices. Electrical, optical, physical, and chemical characterization methods.

**Prerequisites:** A basic introductory device physics course such as EEE 436 or equivalent.

## *Course Topics*

###  Electrical Characterization

 1. Resistivity

 2. Carrier/Doping Densities

 3. Contact Resistance

 4. Series Resistance

 5. Schottky Barriers

 6. MOSFET Channel Length

 7. Threshold Voltage

 8. Defects, Impurities

 9. MOS Capacitors

 10. Oxide Charges, Interface States

 11. Carrier Lifetime

 12. Mobility

 13. Charge-based Measurements

 14. Probe Microscopy

 15. Reliability

 Electromigration

 Hot Carriers

 Negative Bias Temperature Instability

 Gate Oxide Integrity

 16. Failure Analysis

 Emission Microscopy

 Voltage Contrast

 Liquid Crystal

 Optical Beam Induced Resistance

 Change

###  Optical Characterization

 1. Optical Microscopy

 2. Ellipsometry

 3. Transmission, Reflection

 4. Photoluminescence

 5. Emission Microscopy

###  Physical/Chemical Characterization

 1. Scanning Electron Microscopy

 2. Auger Electron Spectroscopy

 3. Transmission Electron Microscopy

 4. Voltage Contrast

 5. Secondary Ion Mass Spectrometry

 6. Rutherford Backscattering

 7. X-Ray Fluorescence

 8. X-Ray Photoelectron Spectroscopy