ENMA 440: Introduction to Plasma Processing (Elective) – 3 credits

Class Schedule: Tuesdays and Thursdays 11:00am-12:15pm

Instructor: Professor Gottlieb S. Oehrlein


Catalog/Course Description: Sustaining mechanisms of plasmas are covered, especially low-pressure electrical gas discharges, fundamental plasma physics, sheath formation, electric and magnetic field effects, plasma-surface interactions in chemically reactive systems, plasma diagnostic techniques and selected industrial applications of low pressure plasmas, pressure electrical gas discharges, fundamental plasma physics, sheath formation, electric and magnetic field effects, plasma-surface interactions in chemically reactive systems, plasma diagnostic techniques and selected industrial applications of low pressure plasmas.

Prerequisites: permission of the Department

Student Outcomes covered by the Course:
ABET A: Ability to apply mathematics, science and engineering principles;
ABET E: Ability to identify, formulate and solve engineering problems.
ABET K: Ability to use the techniques, skills and modern engineering tools necessary for engineering practice

Topics Covered:

Introduction
Plasma Physics
Plasma Production and Substrate Biasing
Plasma Chemistry: Gas Phase and Surface Processes
Plasma Measurements (Diagnostics)
Basic Patterning: Approaches to Produce Micro- and Nanostructures
Plasma-Based Patterning of Conductors and Insulators
Plasma-Assisted and Directional Materials Synthesis; Nanofibers and Nanorods
Special Methods for Nanostructures and Nanomaterials
Charge-Free, Neutral Beam and Atomic Layer Processing
Energy Problem & Applications
Emerging Applications and Outlook