

Applied Science and Technology (AST)

AST C210/EL ENG C213 Soft X-rays and Extreme Ultraviolet**Radiation 3 Units**

Department: Applied Science and Technology; Electrical Engineering

Course level: Graduate

Term course may be offered: Spring

Grading: Letter grade.

Hours and format: 3 hours of Lecture per week for 15 weeks.

Prerequisites: Physics 110, 137, and Mathematics 53, 54 or equivalent.

This course will explore modern developments in the physics and applications of soft x-rays. It begins with a review of electromagnetic radiation at short wavelengths including dipole radiation, scattering and refractive index, using a semi-classical atomic model. Subject matter will include the generation of x-rays with laboratory tubes, synchrotron radiation, laser-plasma sources, x-ray lasers, and black body radiation. Concepts of spatial and temporal coherence will be discussed. Formerly known as EI Engineering 290G.

AST C225/MAT SCI C225 Thin-Film Science and Technology 3 Units

Department: Applied Science and Technology; Materials Science and Engineering

Course level: Graduate

Term course may be offered: Spring

Grading: Letter grade.

Hours and format: 3 hours of Lecture per week for 15 weeks.

Prerequisites: Graduate standing in engineering, physics, chemistry, or chemical engineering.

Thin-film nucleation and growth, microstructural evolution and reactions. Comparison of thin-film deposition techniques. Characterization techniques. Processing of thin films by ion implantation and rapid annealing. Processing-microstructure-property-performance relationships in the context of applications in information storage, ICs, micro-electromechanical systems and optoelectronics.

Instructor: Wu

AST C239/EL ENG C239 Partially Ionized Plasmas 3 Units

Department: Applied Science and Technology; Electrical Engineering

Course level: Graduate

Term course may be offered: Spring. Offered alternate years.

Grading: Letter grade.

Hours and format: Forty-5 hours of lecture per term.

Prerequisites: An upper division course in electromagnetics or fluid dynamics.

Introduction to partially ionized, chemically reactive plasmas, including collisional processes, diffusion, sources, sheaths, boundaries, and diagnostics. DC, RF, and microwave discharges. Applications to plasma-assisted materials processing and to plasma wall interactions.

Formerly known as 239.

AST C295R/CHM ENG C295R Applied Spectroscopy 3 Units

Department: Applied Science and Technology; Chemical & Biomolecular Engineering

Course level: Graduate

Term course may be offered: Spring

Grading: Letter grade.

Hours and format: 3 hours of Lecture per week for 15 weeks.

Prerequisites: Graduate standing in engineering, physics, chemistry, or chemical engineering; courses: quantum mechanics, linear vector space theory.

After a brief review of quantum mechanics and semi-classical theories for the interaction of radiation with matter, this course will survey the various spectroscopies associated with the electromagnetic spectrum, from