

# Applied Science and Technology (AST)

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## Courses

### AST C210 Soft X-rays and Extreme Ultraviolet Radiation 3 Units

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.

#### Rules & Requirements

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

#### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

#### Additional Details

**Subject/Course Level:** Applied Science and Technology/Graduate

**Grading:** Letter grade.

**Formerly known as:** EI Engineering 290G

**Also listed as:** EL ENG C213

### AST C225 Thin-Film Science and Technology 3 Units

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.

#### Rules & Requirements

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

#### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

#### Additional Details

**Subject/Course Level:** Applied Science and Technology/Graduate

**Grading:** Letter grade.

**Instructors:** Wu, Dubon

**Also listed as:** MAT SCI C225

### AST C239 Partially Ionized Plasmas 3 Units

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.

#### Rules & Requirements

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

#### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

#### Additional Details

**Subject/Course Level:** Applied Science and Technology/Graduate

**Grading:** Letter grade.

**Formerly known as:** 239

**Also listed as:** EL ENG C239

### AST C295R Applied Spectroscopy 3 Units

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 gamma rays to radio waves. Special emphasis is placed on application to research problems in applied and engineering sciences. Graduate researchers interested in systematic in situ process characterization, analysis, or discovery are best served by this course.

#### Rules & Requirements

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

#### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

#### Additional Details

**Subject/Course Level:** Applied Science and Technology/Graduate

**Grading:** Letter grade.

**Instructor:** Reimer

**Also listed as:** CHM ENG C295R

AST 299 Individual Study or Research 1 - 12 Units

Investigations of advanced problems in applied science and technology.

Sponsored by Engineering Interdisciplinary Studies Center.

**Rules & Requirements**

**Prerequisites:** Consent of instructor; graduate standing

**Repeat rules:** Course may be repeated for credit. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1-12 hours of independent study per week

**Summer:**

3 weeks - 5-60 hours of independent study per week

8 weeks - 1-12 hours of independent study per week

**Additional Details**

**Subject/Course Level:** Applied Science and Technology/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.