

Instructor: Andrea Alù

Class meets MW 11am to 12.30pm in ENS 127; Final exam: to be decided

Office hours: Th 10am to 11.30am, or by appointment

Office: ENS 616

E-mail : alu@mail.utexas.edu, URL: <http://users.ece.utexas.edu/~aalu/>

Textbooks: C. A. Balanis, Advanced Engineering Electromagnetics; C. H. Papas, Theory of electromagnetic wave propagation; A. Sihvola, Electromagnetic mixing formulas and applications; C. F. Bohren, D. R. Huffman, Absorption and scattering of light by small particles

Additional course material will be distributed in class

Prerequisites: EE 383L Electromagnetic Field Theory, or the equivalent

Grading: 2 x 75-min. tests 50%
 Homeworks (~5) 20%
 Take-home final 30%

Course Outline: This is an advanced graduate course in electromagnetic field theory, with particular emphasis on electromagnetic metamaterials, artificial materials and plasmonics. We will discuss the physics and engineering applications of special materials, involving guidance, imaging and scattering phenomena. The following topics are planned:

1. Introduction and Motivation: Electromagnetic spectrum; Maxwell's equations; Constitutive relations; Poynting's theorem.
2. Electromagnetic Materials: Transmission-line model; Frequency and spatial dispersion; Kramers-Kronig; Plane waves; Phase, energy and group velocities; Plasmas and wire media.
3. Sub-diffraction imaging: Reflection and refraction; Negative refraction; Veselago-Pendry lens.
4. Electromagnetic scattering and homogenization: Polarizability; Multipole expansion; Clausius-Mosotti and Maxwell-Garnett; Anomalous scattering; Plasmonic cloaking and invisibility.
5. Sub-diffraction propagation: Sub-wavelength cavities; Closed and open waveguides; Supercoupling.

Drop/Add Policy: A graduate ECE student must have the approval of the Graduate ECE Advisor (Prof. Dean Neikirk) to add or drop a graduate ECE course after the fourth class day of the semester.

Departmental Statement on Academic Integrity: Faculty in the ECE Department are committed to detecting and responding to all instances of scholastic dishonesty and will pursue cases of scholastic dishonesty in accordance with university policy. Scholastic dishonesty, in all its forms, is a blight on our entire academic community. All parties in our community -- faculty, staff, and students -- are responsible for creating an environment that educates outstanding engineers, and this goal entails excellence in technical skills, self-giving citizenry, and ethical integrity. Industry wants engineers who are competent and fully trustworthy, and both qualities must be developed day by day throughout an entire lifetime. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, or any act designed to give an unfair academic advantage to the student. The fact that you are in this class as an engineering student is testament to your abilities. Penalties for scholastic dishonesty are severe and can include, but are not limited to, a written reprimand, a zero on the assignment/exam, re-taking the exam in question, an F in the course, or expulsion from the University. Don't jeopardize your career by an act of scholastic dishonesty. Details about academic integrity and what constitutes scholastic dishonesty can be found at the website for the UT Dean of Students Office and the General Information Catalog, Section 11-802.

Privacy Statement: Web-based, password-protected class sites are associated with all academic courses taught at The University. Syllabi, handouts, assignments and other resources are types of information that may be available within these sites. Site activities could include exchanging e-mail, engaging in class discussions and chats, and exchanging files. In addition, electronic class rosters will be a component of the sites. Students who do not want their names included in these electronic class rosters must restrict their directory information in the Office of the Registrar, Main Building, Room 1.

The University of Texas at Austin provides, upon request, appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TTY or the College of Engineering Director of Students with Disabilities at 471-4382.