ECE 6340
Intermediate EM Waves

Fall 2025

Class Section 12963

CLASS TIME: M, W 2:30 – 4:00 p.m., room E218-D3.

INSTRUCTOR: David R. Jackson. Office: W318-D3; phone: 713-743-4426; fax: 713-743-4444; email: djackson@uh.edu. Office-hours will be posted on the Canvas site and on the instructor's door.

PREREQUISITES: ECE 3317 or equivalent (or instructor's permission).

CLASS CANVAS SITE

This class will use Canvas as the official site for the distribution of all of the class material, including the class lecture notes, homework, project, handouts, and other material. In addition, any important announcements that pertain to the class will be put there in the "Announcements" section of the site. You are responsible for all messages that are placed there. Therefore, it is your responsibility to check the Canvas site often.

There is also a public-domain website for the course that has all of the class notes from the previous time the class was taught. The website is: http://courses.egr.uh.edu/ECE/ECE6340/.

TEXT AND CLASS MATERIALS

The official text is:

Time-Harmonic Electromagnetic Fields by R. F. Harrington, Wiley - IEEE Press, 2001.

This text is recommended, but not required. The class notes on the Canvas site are what will be presented in class during the lectures. The class notes are based on the textbook, but usually have more detail than the book does. The class notes also contain material that is not in the book. The class notes form the primary study aid for the course.

Additional textbooks that make good supplementary reading are listed below.

The Balanis book, in particular, has a lot of detail in it, and is somewhat of an "expanded" version of the Harrington text, which is somewhat condensed in nature. The Balanis book is a great resource to compliment the course.

Advanced Engineering Electromagnetics, C. A. Balanis, John Wiley & Sons, 2nd Ed., 2012.

Fields and Waves in Communication Electronics, S. Ramo, J. R. Whinnery, and T. Van Duzer, John Wiley & Sons, 3rd Ed., 1994.

Introduction to Electrodynamics, D. J. Griffiths, Prentice Hall, 4th Ed., 2012.

Classical Electrodynamics, J. D. Jackson, John Wiley & Sons, 3rd Ed., 1998.

TENTATIVE GRADING POLICY

Exam I	30%
Exam II	30%
Homework	30%
Project	10%

HOMEWORK

Homework will be given out regularly, usually about once every week or two. All homework will be posted on the Canvas site as standalone documents. It is not necessary to have the textbook on order to see the homework problems.

Students are expected to work on the homework individually. Please do not discuss the homework with anyone other than the instructor. Students should not try to obtain solutions from previous semesters, or from anywhere else. Any violation of these rules will be considered a violation of the UH Academic Honesty Policy.

COURSE GOALS

The main goal of this course is to give students a basic understanding of some of the most fundamental electromagnetic (EM) principles, at an intermediate level, that are commonly used to solve EM problems. This is useful for students who will use EM techniques as part of their research or job functions, or who wish to learn EM material for their general knowledge. This course also serves as a prerequisite for more advanced EM courses.

COURSE CONTENT

The scheduled agenda is chapters 1-4 of the Harrington text, plus some additional topics that are not in the text (which are in the class lecture notes).

- ◊ Maxwell's equations
- ◊ Properties of matter
- ◊ Poynting theorem and complex power
- ◊ Transmission lines
- ◊ Waveguides
- ◊ Plane waves
- ◊ Skin effect and surface impedance
- ◊ Radiation from antennas
- ◊ Duality
- ◊ Image methods
- ◊ Equivalence principle
- ◊ Reciprocity
- ◊ Far-field radiation from sources in layered media