ECE 31100 - Electric and Magnetic Fields

Type of Course

Required for the EE Program; Elective for the CmpE Program

Catalog Description

Continued study of vector calculus, electrostatics, and magnetostatics. Maxwell's equations. Introduction to electromagnetic waves, transmission lines, and radiation from antennas.

Credits

3

Contact Hours

3

Prerequisite Courses

MA 36300, PHYS 25100

Corequisite Courses

None

Prerequisites by Topics

Knowledge of elementary electrostatics, current electricity, electromagnetism, magnetic properties of matter, geometrical and physical optics. Knowledge of first and higher order differential equations, systems of first order equations, series solutions, integral transforms. Introduction to partial differential equations: separation of variables, Fourier series, Sturm-Liouville equations.

Textbook

David K. Cheng, Fundamentals of Engineering Electromagnetics, Prentice Hall; 1993.

Course Objectives

Introduce students to a fundamental knowledge of electromagnetic fields, and help them to develop problem solving skills in the area of electromagnetics by applying mathematics, science, and engineering knowledge, to identify, formulate and solve engineering problems.

Course Outcomes

Students who successfully complete this course will have demonstrated

1. an ability to work with electrostatic fields and to be able to find electric and potential fields from charge distributions including the presence of dielectric materials [1]

2. an ability to work with magnetostatics fields and to be able to find magnetic fields from current distributions including the presence of magnetic materials [1]
3. an ability to work with time varying fields including wave propagation [1]
4. an ability to work with transmission lines in the time and frequency domains [1]

Lecture Topics

1. Complex vector algebra and calculus
2. Static electric field
3. Static magnetic field
4. Time varying fields and Maxwell's equations
5. Plane wave in lossless and lossy media
6. Wave Polarization
7. Transmission line theory

Computer Usage

Medium

Laboratory Experience

None

Design Experience

None

Coordinator

Todor Cooklev

Date

September 30, 2018