



Course	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	Have knowledge of Heat, kinetic theory, elementary thermodynamics, heat transfer. Electrostatics, current electricity, electromagnetism, magnetic properties of matter; geometrical and physical optics and Have knowledge of first order differential equations, higher order linear 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 the fundamental knowledge of electromagnetic field study, and help them to develop problem solving skills in the area of electromagnetics by applying mathematics, science, and engineering knowledge, and ability to identify, formulate and solve engineering problems.
Course Outcomes	Students who successfully complete this course will have demonstrated: <ol style="list-style-type: none"><li>1. An ability to perform vector algebra and calculus. (a, e)</li><li>2. An understanding of the static electric field and Coulomb's law, Gauss' law, and potential field, and capacitors. (a, e)</li><li>3. An understanding of the steady magnetic fields and Biot-savart</li></ol>

- law, Ampers's law, and inductors. (a, e)
4. An understanding of Maxwell's equations, Faraday's law and displacement current. (a, e)
  5. An understanding of the nature of lossless uniform plane wave propagation. (a, e)
  6. An understanding of transmission line and its related engineering problems. (a, c, e)

Lecture Topics

- Complex vector algebra and calculus
- Static electric field
- Static magnetic field
- Time varying fields and Maxwell's equations
- Transmission line theory
- Plane wave in lossless media
- Wave Polarization

Computer Usage

None

Laboratory Experience

None

Design Experience

None

Coordinator

Abdullah Eroglu, Ph.D.

Date

31/3/11