

ECE 406 – ELECTROMAGNETIC FIELD THEORY

Type (check one): Required: X Elective: _____

2005-2006 Catalog Data: ECE 406. Electromagnetic Field Theory. (Formerly EE 405 and ECE 405) Field and vector operations. Electrostatic and magnetostatic fields. Time varying fields and electrodynamics. Plane waves. Transmission lines, transient and steady state. Prerequisites: ECE 221, MATH 232 and PHYS 251. Offered in the Fall semester. *One semester; four credits.*

Prerequisites: ECE 221, MATH 232, and PHYS 251

Co-Requisites: None

Textbook: Ulaby, F. T., *Fundamentals of Applied Electromagnetics*, 2004 Media Edition, Pearson Prentice Hall: Upper Saddle River, NJ, ISBN 0-13-185089-X

Other Required Materials: None

Other References: None

Instructor: Dr. Fred H. Terry, Professor of Electrical and Computer Engineering

Course Objectives:

1. Basic competence in solving problems involving three dimensional fields
2. Facility with the uses of fundamental concepts of electromagnetic fields and application to devices of engineering significance
3. Use of engineering software such as PSPICE and MathCAD[®] to supplement more traditional methods of problem solving
4. Applications to circuits, power, communications, and computer systems

Prerequisites by Topics:

1. Vector algebra and vector calculus
2. Differential and integral calculus
3. Differential equations
4. Electricity and magnetism

Topics:

1. Waves and Phasors
2. Transmission Lines
3. Vector Analysis
4. Electrostatics
5. Magnetostatics
6. Time-Varying Fields and Maxwell's Equations
7. Uniform Plane Waves
8. Applications

Class Schedule: Two 75-minute and one 50-minute sessions per week

Prepared by: Dr. Fred H. Terry **Date:** October 2005

Professional Component:
ECE 406 – ELECTROMAGNETIC FIELD THEORY

Category (check one)	<input type="checkbox"/> Math/Basic Science <input checked="" type="checkbox"/> Engineering <input type="checkbox"/> General Education <input type="checkbox"/> Other
Design (check one)	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Some <input type="checkbox"/> None
Realistic Constraints (check all that apply)	<input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input type="checkbox"/> Sustainability <input type="checkbox"/> Manufacturability <input type="checkbox"/> Ethical <input checked="" type="checkbox"/> Health & Safety <input type="checkbox"/> Social <input type="checkbox"/> Political

Relationship to Program Outcomes:

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice