

Department of Electrical and Computer Engineering
520.219 Fields, Matter and Waves
Fall 2009

2009-2011 Catalog: Vector analysis, electrostatic fields in vacuum and material media, stationary currents in conducting media, magnetostatic fields in vacuum and material media. Maxwell's equations and time-dependent electric and magnetic fields, electromagnetic waves and radiation, transmission lines, wave guides, applications. (3 credit hours/Required)

Prerequisite(s): 110.108 – 9 Calculus I, II
171.101 – 102 General Physics for Physical Science Majors

Corequisite: 110.202 Calculus III

Textbook: *Fundamentals of Applied Electromagnetics*, 5th Edition, [Fawwaz Ulaby](#)

Course Objectives: To provide both the mathematical and physical background needed for more advanced study in areas such as material properties, electronics and quantum electronics

- Topics Covered:
1. Vector Analysis
 2. Coulomb's Law and Electric Field Intensity
 3. Electric Flux Density, Gauss Law, and Divergence
 4. Energy and Potential
 5. Conductors, Dielectrics, and Capacitance
 6. Poisson's and Laplace's Equations
 7. The Steady Magnetic Field
 8. Time varying fields

Class Schedule: Two – one and one-half hour classes/week

Contribution of Course to Meeting the Professional Component (credit hours):

Engineering Science	Engineering Science and Design
3	

Relationship of Course to Program Educational Outcomes (✓ those that apply):

x	Apply mathematics, probability and statistics, basic science, and computer science
	Design and conduct experiments, analyze and interpret data
x	Identify, formulate and solve electrical engineering problems
	Use technical skills and modern engineering tools to design to meet needs
	Communicate effectively and work on multidisciplinary teams
	Contemporary issues, ethical responsibilities, environmental, health, safety issues
	Engage in life-long learning

Updated April 1, 2009 by: Alexander Kaplan