Fall 2018

ECE 361 - Electromagnetic Fields I

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Department of Electrical and Computer Engineering
New Jersey Institute of Technology

ECE 361: Electromagnetic Fields I (3 credits, 3 contact hours, required course)

Instructor: Gerald Whitman; E-mail: whitman@njit.edu ; Phone: 973- 596 -3232

Text books:

Course Description:
This course introduces the student to the fundamentals of static electric and magnetic fields. Topics covered include: (1) electric force field due to elementary stationary charge, (2) the magnetic force field due to electric charge moving at uniform velocity, (3) electric and magnetic forces, (4) stored electric and magnetic energy, (5) potential, i.e., voltage, (6) power loss, (7) the meaning of capacitance, resistance, and inductance, (8) electrical properties and characterization of materials (conductors, insulators and magnetic materials), (9) mathematical formulation of the physical laws governing electromagnetic fields in the time-independent case, and (10) the mathematics of vector analysis: vector algebra, orthogonal coordinate systems (rectangular, cylindrical and spherical) and vector calculus.

Prerequisite: ECE students – ECE 231, Math 213, Phys 234  Co-requisite: none

Specific course learning outcomes (CLO): The student will be able to

1. understand the basic definitions and physical concepts of static electromagnetism
2. understand the mathematical formulation of the basic laws governing static electromagnetism
3. understand and analysis geometrical configurations in rectangular, cylindrical and spherical coordinate systems
4. understand how to formulate solutions to electromagnetic problems using basic principles
5. understand how to use analytical techniques to solve problems and interpret results physically

Relevant student outcomes (ABET criterion 3):

(a) an ability to apply knowledge of mathematics, science, and engineering (CLO 1, 2, 3,4,5)
(e) an ability to identify, formulate, and solve engineering problems (CLO 1,2,3, 4,5)
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (CLO 4)
(i) a recognition of the need for, and an ability to engage in life-long learning (CLO 4, 5)
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (CLO 5)

Computer assisted design and course specific software: none

This course outline serves to provide a big picture of the course. Instructional materials such as textbooks, individual topics, and grading policy are subject to revision and changes by individual instructors.
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