Course Syllabus

ELCT 361 – ELECTROMAGNETICS I

Course Coordinator – Undergraduate Program Committee

Course Description: This course introduces a basic concept of electric and magnetic fields including electrostatics, magnetostatics, and quasi-statics with computer applications. Topics covered include Vector Analysis, Time varying fields and Maxwell’s Equation, Energy and Potential, Poisson’s and Laplace’s Equations, Dielectrics and Capacitance etc.

Credit hours 3

Prerequisites by course MATH 241 and PHYS 212

Prerequisites by topics Vector calculus, electricity and magnetism part of physics


Other Materials Class notes posted on Blackboard

Course Outcomes:

Students who successfully complete the course will be able to:

a. Demonstrate competency in understanding the symbols, units and dimensions used in electromagnetics
b. Show ability in calculating, transforming, and converting vector quantities in spherical, cylindrical, and Cartesian coordinate systems. For instance, dot and cross products, gradient, divergence, curl, and the various electromagnetic theorems, such as the Divergence Theorem and Stokes Theorem
c. Demonstrate ability to calculate electric and magnetic fields and potentials arising from static sources (charges and current distributions), and the forces acting on particles as a result of those fields,
d. Demonstrate understanding of the conditions of continuity at boundaries between media with differing permeability, permittivity and conductivity, and relate field quantities to circuit quantities such as capacitance, inductance, and resistance.
e. Demonstrate understanding of dielectric, semiconductor, and magnetic materials
f. Understand the fundamentals of Maxwell’s equations, displacement current etc.,

Course Topics:

- Vector Analysis
- Coulomb’s Law and Electric Field Intensity
- Electric Flux Density, Gauss’s Law, and Divergence
- Energy and Potential
- Current and Conductors
• Dielectrics and Capacitance
• Poisson’s and Laplace’s Equations
• The Steady Magnetic Field
• Magnetic Forces, Materials, and Inductance
• Time Varying Fields and Maxwell’s Equations

Course Contribution to Program Outcomes:

ELCT 361 contributes to an achievement of:
Outcome A – an ability to apply knowledge of mathematics, science and engineering
Outcome E -- an ability to identify, formulate, and solve engineering problems

Overall Course Policies

Academic Integrity

Assignments and examination work must be the sole effort of the student submitting the work. Students are required to follow the University of South Carolina Honor Code and should note that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

Accommodating Disabilities

Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasds@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

Diversity

In addition to scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

Recommended Study Habits

☐ Study relevant materials before class
☐ Ask questions in class and participate in in-class problem solving
☐ Prepare for exams
☐ Take notes during class

Amending the Syllabus/Rules

Amendments and changes to the syllabus may occur upon review by the instructor and the undergraduate committee in subsequent semesters.

Previous version from Spring 2017
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