Course Syllabus

ELCT 361 – Electromagnetics

Course Coordinator: Undergraduate Program Committee

Catalog Description: Basic concepts of electric and magnetic fields, including electrostatics, magnetostatics, and quasi-statics with computer applications

Credit Hours 3

Prerequisite(s) by course PHYS 212 and MATH 241

Prerequisite by topics Vector functions, Dot Product, Equations of lines and planes, Arc length & curvature, Limits & Continuity, Triple integrals in Cartesian, Cylindrical and Spherical coordinates

Required Textbook Paul Huray, Maxwell’s Equations, John Wiley & Sons, Hoboken, NJ, 2010

Other Materials Class notes posted on Blackboard

Course Outcomes: Students who successfully complete the course will be able to:

- Understand the history of the development of Maxwell’s Equations
- Understand the duality of source/response formulations of electromagnetic propagation in various materials and how propagation behaves for media with different properties
- Develop the formulations of electric scalar potential, magnetic scalar potential, magnetic vector potential, electric vector potential
- Use Green’s function techniques to find particular solutions to the inhomogeneous wave equation and to express solutions in terms of retarded potentials
- Develop analytic solutions to Maxwell’s Equations for time varying fields
- Tie together physical, chemical and mathematical concepts with electrical engineering
- Analyze the propagation of plane waves in free space and in materials
- Investigate reflection and transmission of orthogonal plane wave at material boundaries
- Review the classic RLGC model of transmission lines

Course Topics:

- Maxwell’s Equations
- Vector Analysis
- Static electric fields
- Solution of electrostatic problems
- Steady electric currents
- Static magnet fields
- Time varying fields

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
- Outcome H -- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
Overall Course Policies

Academic Integrity
Unless otherwise stated, assignments and examination work are expected to be the sole effort of the student submitting the work. Students are expected to follow the University of South Carolina Honor Code and they should expect 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
- Read the assigned material before each class. Read from supplementary sources, especially for difficult topics.
- Bring thoughtful questions to class for discussion.
- Prepare for the exams individually and in study groups.
- Take notes during class discussions and while completing reading assignments.

Deviations
Minor deviations from the syllabus are a normal part of any adaptive teaching and learning process.