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 calculus, electricity and magnetism part of physics


Other Materials Class notes posted on Blackboard

Learning Outcomes:

Students who successfully complete the course will be able to:

1. Show ability in transforming vector quantities from one coordinate system to another e.g. rectangular to cylindrical. Show ability to perform line, surface, and volume integrals and demonstrate competency in calculating the divergence and gradient of fields and potentials. Demonstrate understanding of the divergence theorem and Stokes’ theorem.

2. Demonstrate ability to calculate electric and magnetic fields, potentials, and energy. Demonstrate understanding of the conditions of field and flux density boundary conditions at boundaries between different media.

3. Demonstrate understanding of dielectric and magnetic materials. Show ability to formulate expressions for capacitance and inductance from fields for relevant geometries.

4. Understand the fundamentals of Maxwell’s equations, displacement current etc.,

5. Show ability to understand basic transmission line theory, reflection, Voltage Standing Wave Ratio (VSWR) and impedance and also demonstrate understanding of plane wave propagation.

6. Show preliminary understanding of electromagnetic radiation and antennas.

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
- Transmission Lines
- The Uniform Plane Wave
- Antennas and Waveguides

Course Contribution to Program Outcomes:

ELCT 361 contributes to an achievement of:

- Outcome 1 – an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
General 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.