Department of Electrical and Computer Engineering  
San Diego State University  
Fall 2016 Semester

EE 340: Electric and Magnetic Fields

Course Description: Electrostatic and magnetostatic field theory using vector notation; Coulomb’s law, Gauss’ law and potential theory. Solutions to Poisson’s and Laplace’s equation; capacitance and inductance. Time-Varying fields; Maxwell’s equations.

Course Instructor: Dr. Madhu S. Gupta  
Office: E 403C, Engineering Building  
Office Hours: Mondays, Wednesdays, 2 – 4 p.m., or by appointment

Schedule: Classes: Sec. 1: M-W-F, 1:00 – 1:50 p.m. (E-328), Room Eng- 423B.  
Classes: Sec. 2: M-W-F, 12:00 – 12:50 p.m. (E-328), Room Eng- 423B.  
Combined Final Examination Date: Saturday, December 17, 2016; 9:30 – 11:30 a.m.

Prerequisites: EE 210 [and hence Math 151 (Calculus II), and Physics 196 (Freshman Physics)], with ≥ C  
Aerospace Engg. 280 (Methods of Analysis), with ≥C


Workload: Readings from the textbook. Examples and exercises from the book.  
Homework problems assigned on each topic, collected and graded, & discussed in the class.  
Attempting solution of homework problems independently is essential to success in the course.  
Quizzes and final examination, requiring problem solution.

Grading: Letter grades (A through F) assigned, based on a composite of:  
Homework: 20%  
2 Quizzes (1 hour each) 40%  
Final Examination 40%

Policies 1. On Homework: Essential for learning, and to prepare for problem solving on quizzes and exam.

2. On Quizzes / Exams: There are no makeup quizzes or exams.  
All quizzes and exams are open-book.  
Cell phones, laptops, and other wireless devices may not be used during quizzes and exams.

3. On Plagiarism: The University policies define plagiarism as deliberate misrepresentation of others’ work, whether published or unpublished, as one’s own.  
Attempts of plagiarism automatically result in a grade of “F” in the course, as a minimum.  
Substantiated or egregious incidents of plagiarism are reported to campus judiciary.

Objectives: 1. Learning computational methods employing vector algebra and vector calculus.  
2. Computation of fields and potentials due to point, line, surface, and volume charges.  
3. Computation of magnetic fields due to current, current sheet, or current density.  
4. Modeling of fields in materials; circuit models of energy storage as capacitors and inductors.

Topics: 1. Review of vector algebra and calculus; gradient, divergence, curl; Divergence & Stokes’ theorem.  
2. Rectangular Cartesian, cylindrical, and spherical coordinate systems and transformations.  
3. Electrostatic fields, potential, and energy; electrical conductors and capacitors.  
4. Electrostatic fields in materials; polarization, boundary conditions; boundary value problems.  
5. Static magnetic fields; Biot-Savart’s and Ampere’s laws.  
6. Forces due to magnetic fields, magnetization in materials, classification of magnetic materials.  
7. Magnetic energy; induction, and inductors.