PHY 222 General Electricity and Magnetism

Winter 2024

Course Credits: 4
Contact Hours: 56 hours
Instructor: TBA
Email:TBA

COURSE OBJECTIVES

This course explores the fundamental principles of electricity and magnetism through this dynamic course. Covering vector analysis, Coulomb's law, Gauss's law, energy and potential, semiconductors, dielectrics, Poisson's and Laplace's equations, Magnetostatics, Ampere's and Biot-Savart laws, and Maxwell's equations, students gain a solid understanding of the interplay between electric and magnetic fields. The course integrates theoretical knowledge with practical applications, preparing students to analyze and solve complex problems in electromagnetism.

Upon Completion of this Course, students will be able to:

1. Gain proficiency in vector analysis, enabling a comprehensive understanding of electric and magnetic fields.

2. Apply Coulomb's law and Gauss's law to analyze electric fields, providing insights into the behavior of charges.

3. Investigate the relationship between energy, potential, and electric fields, understanding the dynamic nature of charged particle interactions.

4. Explore the practical applications of semiconductors and dielectrics, essential components in electronic devices and electric field modification.

5. Develop problem-solving skills in magnetostatics using Ampere's and Biot-Savart laws, expanding knowledge to include magnetic fields and their impact on current-carrying conductors.

PREREQUISITES

MAT 222 Multivariable Calculus

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
Quizzes	20 Points
Midterm 1	15 Points
Midterm 2	15 Points
Project	20 Points
Final Exam	30 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F$.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

David J. Griffiths, ***Introduction to Electrodynamics***, 5th Edition, Cambridge University Press.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Vector Analysis Topic 2: Gradient Topic 3: The Divergence Topic 4: Electrostatics **Assessments:**

	Quiz#1
Module 2	**Topics:** Topic 5: The Electric Field Topic 6: Coulomb's Law Topic 7: Field Lines, Flux, and Gauss's Law Topic 8: Electric Potential **Assessments:** Quiz#2 Project
Module 3	**Topics:** Topic 9: Poisson's Equation and Laplace's Equation Topic 10: Work and Energy in Electrostatics Topic 11: Conductors Topic 12: Potentials **Assessments:** Midterm#1 Project
Module 4	**Topics:** Topic 13: Laplace's Equation Topic 14: Electric Fields in Matter Topic 15: Dielectrics Topic 16: Magnetostatics **Assessments:** Midterm#2 Project due
Module 5	**Topics:** Topic 17: Magnetic Fields in Matter Topic 18: Maxwell's Equations Topic 19: Conservation Laws Topic 20: Potentials and Fields **Assessments:** Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow

University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.
2) Assignments submitted in the wrong format will be counted as not submitted.
3) Failure to submit or fulfill any required course component results in failure of the class.
4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.