PHY 121 Introduction to Electricity and Magnetism

Summer 2024

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

COURSE OBJECTIVES

"Introduction to Electricity and Magnetism" introduces fundamental principles in electromagnetism. Students delve into Coulomb's law, electric fields, magnetic fields, and circuits, alongside laboratory sessions emphasizing scientific reasoning and mathematical modeling. Topics include electric charge concepts, potential energy, circuit analysis principles, and capacitance. Through this course, students gain a solid foundation in electromagnetism, enabling them to comprehend real-world applications and phenomena.

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

1. Understand the principles of electricity and magnetism;
2. Apply mathematical models to analyze electromagnetic phenomena;
3. Develop critical thinking skills through laboratory experiments and scientific reasoning;
4. Gain proficiency in uncertainty analysis in experimental measurements;
5. Apply electromagnetism principles to real-world problems.

PREREQUISITES

PHY 112 Introduction to Physics I; MAT 110 Calculus I

GRADING

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

ITEM	POINTS
5 Laboratory experiments	20 Points
3 Quizzes	30 Points
Midterm Exam	25 Points
Final Exam	25 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:

1. ***Introduction to Electricity, Magnetism, and Circuits*** by Daryl Janzen;
2. ***University Physics with Modern Physics*** by Hugh D. Young, Roger A. Freedman, Addison-Wesley.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Introduction to Electric Charge and Coulomb's Law Topic 2: Electric Fields and Gauss's Law Topic 3: Electric Potential and Potential Energy Topic 4: Capacitance and Dielectrics **Assessments:** Laboratory experiment #1: Measurement of Electric Field Intensity Quiz #1
Module 2	**Topics:** Topic 5: Current and Resistance Topic 6: Ohm's Law and DC Circuits Topic 7: Kirchhoff's Laws Topic 8: Series and Parallel Circuits

	Assessments: Laboratory experiment #2: Temperature Dependence of Resistance Quiz #2
Module 3	**Topics:** Topic 9: RC Circuits Topic 10: Magnetic Fields Topic 11: Magnetic Forces on Moving Charges Topic 12: Magnetic Forces on Current-Carrying Wires **Assessments:** Laboratory experiment #3: Investigation of RC Circuit Transients Midterm Exam
Module 4	**Topics:** Topic 13: Electromagnetic Induction Topic 14:Faraday's Law and Lenz's Law Topic 15: Inductance and Inductors Topic 16: AC Circuits **Assessments:** Laboratory experiment #4: Analysis of AC Circuits Quiz #3
Module 5	**Topics:** Topic 17: Maxwell's Equations Topic 18: Electromagnetic Waves Topic 19: Optics Topic 20: Polarization **Assessments:** Laboratory experiment #5: Optical Spectroscopy 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.