



PHY 321 Advanced Electromagnetic Theory

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This course goes deeper into electricity and magnetism. It covers various topics, including Maxwell's equations, stress, energy, plane waves in isotropic media, cylindrical waves, spherical waves, radiation, and problems like the Skin Effect. Some focus stays on fundamental principles and advanced concepts. Students in this course are required to have basic knowledge of electromagnetism.

Upon completion of this course, students will be able to:

1. Have a systematic and comprehensive understanding of advanced concepts of electromagnetism.
2. Gain the knowledge of fundamental principles behind electromagnetic phenomena.
3. Develop a deeper understanding of electromagnetic theory.
4. Improve proficiency in analyzing electromagnetic problems.
5. Critically apply the knowledge in identifying and explaining related electromagnetic phenomena.

PREREQUISITES

PHY 320 Fundamentals of Electromagnetics

GRADING

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



ITEM	POINTS
Quizzes	20 Points
Assignments	30 Points
Midterm Exam	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:

Julius Adams Stratton, *Electromagnetic Theory*, Wiley-IEEE Press, 2007.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	<p>Topics: Topic 1: Overview of Maxwell's Equations Topic 2: Orthogonal Transformations and Their Invariants Topic 3: Stress and Energy Topic 4: Energy Flow: Poynting's Theorem and Complex Poynting Vector</p> <p>Assessments: Quiz#1</p>
Module 2	<p>Topics: Topic 5: The Electrostatic Field Topic 6: The Magnetostatic Field Topic 7: Plane Waves in Unbounded, Isotropic Media Topic 8: Propagation in an Ionized Atmosphere</p> <p>Assessments: Quiz#2 Assignment#1</p>



Module 3	Topics: Topic 9: Cylindrical Waves Topic 10: Equations and Wave Functions Topic 11: Spherical Waves Topic 12: The Scalar Wave Equation and the Vector Wave Equation in Spherical Coordinates. Assessments: Midterm Exam Assignment#2
Module 4	Topics: Topic 13: Radiation Topic 14: A Multipole Expansion Topic 15: Radiation Theory Of linear Antenna System Topic 16: Field of a Moving Point Charge Assessments: Assignment#3
Module 5	Topics: Topic 17: Boundary-Value Problems Topic 18: Dielectric Media Topic 19: Application to Dielectric Media, Absorbing Layers Topic 20: Skin Effect, Propagation Along A Circular Cylinder 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).

ACADEMIC 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:



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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.