



蘇州大學  
Soochow University

# PHY 320 Fundamentals of Electromagnetics

Fall 2023

**Course Credits:** 4

**Contact Hours:** 55 hours

**Instructor:** TBA

**Email:** TBA

## COURSE OBJECTIVES

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This is an introductory course designed to provide students with a comprehensive understanding of the fundamental principles governing electromagnetic fields and their interactions. The course explores the essential concepts, mathematical formulations, and practical applications of electromagnetics, covering topics such as electric and magnetic fields, Maxwell's equations, electromagnetic waves, and transmission lines. Through theoretical discussions, problem-solving exercises, and laboratory demonstrations, students will develop a strong foundation in electromagnetics, enabling them to analyze and design various electromagnetic systems.

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

1. Understand fundamentals of Electromagnetic fields;
2. Acquire knowledge on wave propagation in a guided structure;
3. Practice the use of Maxwell's equations and their applications;
4. Describe the characteristics of static and dynamic electromagnetic fields;
5. Practice boundary conditions for analyzing and interpreting electric and magnetic fields.

## PREREQUISITES

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MAT 337 Differential Equations for Engineers

## GRADING

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



ITEM	POINTS
2 Assignments	20 Points
2 Quizzes	20 Points
Midterm	25 Points
Final Exam	35 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:

F. T. Ulaby and U. Ravaioli, *Fundamentals of Applied Electromagnetics*, 7th Ed., Pearson, 2015.

### Recommended (Optional) Texts or Other Materials:

M. N. O. Sadiku, *Elements of Electromagnetics*, 5th Ed., Oxford University Press, 2010.

## COURSE TOPICS

MODULE	TASKS
Module 1	<b>Topics:</b> Topic 1: Introduction: Waves and Phasors Topic 2: Transmission Lines Topic 3: Wave Propagation on a Transmission Line Topic 4: Power Flow on a Lossless Transmission Line <b>Assessments:</b> Assignment #1



Module 2	<b>Topics:</b> Topic 5: Orthogonal Coordinate Systems Topic 6: Transformations between Coordinate Systems Topic 7: Divergence of a Vector Field Topic 8: Laplacian Operator <b>Assessments:</b> Quiz #1
Module 3	<b>Topics:</b> Topic 9: Maxwell's Equations Topic 10: Charge and Current Distributions Topic 11: Coulomb's Law/Gauss's Law Topic 12: Electrostatic Potential Energy <b>Assessments:</b> Assignment #2 Midterm Exam
Module 4	<b>Topics:</b> Topic 13: Magnetic Forces and Torques Topic 14: Vector Magnetic Potential Topic 15: Inductance Topic 16: Magnetic Energy <b>Assessments:</b> Quiz #2
Module 5	<b>Topics:</b> Topic 17: Maxwell's Equations for Time-Varying Fields Topic 18: Plane-Wave Propagation Topic 19: Wave Reflection and Transmission Topic 20: Radiation and Antennas <b>Assessments:</b> 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**



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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.