MSE 1058: Electromagnetic Properties of Materials
Spring 2023

Instructor

Dr. Liwei Geng
Zone 3-322B
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Meeting Time & Location

Tuesday 13:50-16:25 at RM 4-201

Office Hour

Wednesday-Thursday: 13:00-17:00

TA Information

Florence Zhao: florencezwy@163.com
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Textbook

Jerrold Franklin, "Classical Electromagnetism", Dover, 2nd edition, 2017.

Course Description

This course provides an introduction to electromagnetic properties of materials at the undergraduate student level. The course begins with Coulomb's & Gauss's laws, proceeds to Ampere's & Faraday's laws, and culminates with Maxwell's equations and electromagnetic waves. Mathematical concepts are reviewed as needed for the physics.

Course Objectives

Upon successful completion of this course, students will learn the fundamental theories and mathematical formulations of classical electromagnetism. Lectures will be structured to help student understand the conceptual basis of electromagnetism and examples will be given to reinforce those concepts. Homework and Exams will be designed to assess the mathematical skills.

Prerequisite

Physics for Science and Engineering
Differential Equations

Grading

Homework	25%
Attendance	5%
Midterm Exam	35%
Final Exam	35%

Grade Policy

A: 90 – 100	A−: 85 – 89	B+: 80 – 84	B: 76 – 79	B−: 73 – 75
C+: 70 – 72	C: 66 – 69	C−: 63 – 65	D: 60 – 62	F: < 60

Course Topics

1. Foundations of Electrostatics
2. Further Development of Electrostatics
3. Methods of Solution in Electrostatics
4. Spherical and Cylindrical Coordinates
5. Green's Functions
6. Electrostatics in Matter
7. Magnetostatics
8. Magnetization and Ferromagnetism
9. Time Varying Fields, Maxwell's Equations
10. Electromagnetic Plane Waves
11. Electromagnetic Waves in Matter

Late Assignment Policy

10% deduction/day

Evaluation Policy

Partial credit will be awarded to recognize that some portion of the work is correct. However, partial credit grading is only practical if the work is clearly developed, with clear and well-marked diagrams when fitting, with the appropriate equations prominently displayed, where the substitutions into the equations are quite clear, and the assumptions used are obvious to the grader. That is, it is the student's responsibility to present her/his work so clearly that the grader can quickly ascertain the location and nature of the error(s) and can follow the subsequent work through. If this is not clear on the work submitted, credit cannot be given (then or later). ***Partial credit is assigned at the discretion of the grader.*** It is therefore always in your best interest to practice clarity and completeness in your solutions when working homework problems. This is applicable to exam problems as well.

Copyrights

Academic Integrity

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include but is not limited to the confiscation of the examination of any individual suspected of violating the University Policy.