

Physics 122: Electromagnetism

Overview

Phys 122 is the second of a three-quarter sequence of introductory calculus-based physics. Upon successful completion of this course, you will be able to develop calculus-based models to describe the physical world pertaining to electric and magnetic interactions, electric circuits, and electromagnetic waves.

The course consists of lecture (3 hours per week), tutorial (1 hour per week), and laboratory (2 hours per week) components.

Evaluation

The final course grade is based on the following grade weightings. The exams are curved, but all other aspects of the course are graded on an absolute scale. The average grade in the course will be set to around 2.8 to 3.0, with top 5 to 10 % of students getting a grade point of 3.9 or 4.0.

- **66 %:** Closed-book exams: two midterms and one final exam. A better option is chosen from the two below.
 1. 44 % midterms and 22 % final
 2. 22 % midterm (better of 2) and 44 % final
- **5 %:** Lab homework before and after labs
- **5 %:** Lab in-class participation
- **8 %:** Tutorial section, in-class participation and homework after tutorials
- **8%:** Lecture homework after lectures per week
- **4 %:** Pre-lecture reading quizzes before each lecture
- **4 %:** In-class quizzes during lectures

Texts

- **Required:** *Principles and practice of Physics*, Mazur (Pearson, 1st edition, 2015)

Lecture Topics (Textbook chapters)

- **Ch. 22 (2 lectures):** Electric interactions
- **Ch. 23 (3 lectures)** The electric field
- **Ch. 24 (3 lectures):** Gauss's law
- **Ch. 25 (2 lectures):** Work and energy in electrostatics
- **Ch. 26 (3 lectures):** Charge separation and storage
- **Ch. 31 (2 lectures):** Electric circuits
- **Ch. 27 (2 lectures):** Magnetic interactions
- **Ch. 14 (2 lectures):** Special relativity
- **Ch. 28 (2 lectures):** Magnetic fields of charged particles in motion
- **Ch. 29 (3 lectures):** Changing magnetic fields

- **Ch. 30 (1 lecture):** Changing electric fields
- **Ch. 32 (4 lectures):** Electronics

Tutorial Topics (8 of the following)

- Mathematical reasoning
- Charge and electric field
- Flux and Gauss' law
- Electric potential difference
- Electric properties and conductors
- A model for circuits: Multi batteries
- Magnetic interactions
- Ampere's law
- Lenz's law
- EM waves

Lab Topics

- Electrostatics
- Electric fields
- Electric Circuits: current
- Electric circuits: voltage and resistance
- Capacitors and RC circuits
- Magnetic fields and forces
- Electromagnetic induction
- IV curves and diodes