Physics 122: Electromagnetism (5 credits)

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.

- **60 %:** two midterms and one final exam. A better option is chosen from the two below.
    1. 40 % midterms and 20 % final
    2. 20 % midterm (better of 2) and 40 % final
- **12 %:** Weekly lab component
- **8 %:** Tutorial section homework
- **3 %:** Tutorial in-class participation (once per week)
- **1%:** Tutorial pre-test
- **8%:** Lecture homework after lectures per week
- **4 %:** Pre-lecture reading quizzes before each lecture
- **4 %:** In-class quizzes during lectures

A grade of 0 for the entire course would be given if a student receives less than 2/3 of the possible points on the lab assignments. Otherwise, the final weighted percentage is converted to a grade point using the following thresholds.

grade point	course score	grade point	course score	grade point	course score	grade point	course score
4.0	91	3.0	74	2.0	57	1.0	40
3.9	89.3	2.9	72.3	1.9	55.3	0.9	38.3
3.8	87.6	2.8	70.6	1.8	53.6	0.8	36.6
3.7	85.9	2.7	68.9	1.7	51.9	0.7	34.9
3.6	84.2	2.6	67.2	1.6	50.2		
3.5	82.5	2.5	65.5	1.5	48.5		
3.4	80.8	2.4	63.8	1.4	46.8		
3.3	79.1	2.3	62.1	1.3	45.1		
3.2	77.4	2.2	60.4	1.2	43.4		
3.1	75.7	2.1	58.7	1.1	41.7		

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 (7, 8, or 9 of the following depending on the quarter)

- Mathematical reasoning
- Charge
- Electric field and flux
- Gauss's law
- 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

Lab

The lab component of this course focuses on experimental design and data analysis techniques in the context of electromagnetism.