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 %:** Lab assignments
- **12 %:** Tutorial assignments
- **16 %:** Lecture assignments

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 or participates in less than 6 out of 8 labs. 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:** *Physics for scientists and engineers, a strategic approach*, Knight (Pearson, 5th edition, 2022)

Lecture Topics (Textbook chapters)

- **Ch. 22 (3 lectures):** Electric charges and forces
- **Ch. 23 (3 lectures):** The electric field
- **Ch. 24 (3 lectures):** Gauss's law
- **Ch. 25 (2 lectures):** The electric potential
- **Ch. 26 (3 lectures):** Potential and field (capacitors)
- **Ch. 27 (1 lecture):** Current and resistance
- **Ch. 29 (3 lectures):** The magnetic field
- **Ch. 30 (5 lectures):** Electromagnetic induction
- **Ch. 31 (1 lecture):** Electromagnetic fields and waves
- **Ch. 28 (2 lectures):** Fundamentals of circuits
- **Ch. 32 (2 lectures):** AC circuits

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

- Charge
- Electric field and flux
- Gauss's law
- Electric potential difference
- Electric properties and conductors
- Ampere's law
- Magnetic interactions
- Lenz's law
- A model for circuits: Multi batteries

Lab

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