De Anza College **Physics 4B: Electricity and Magnetism** **Winter 2023**

Instructor Peter Ho **CRN# 37818**

Contact hopeter@fhda.edu **Section 60**

Lecture Monday and Wednesdays from 5:30 PM to 7:45 PM

Lab Mondays from 7:55 PM to 10:45 PM

Location In-person, De Anza College

Lecture: Room S-32
Lab: Room S-11

Office Hour

See course Canvas page for availability.

Textbook

The textbooks we will be using will be used primarily as references, but not a necessary component or required for the course. We will be referencing the following texts in no particular order:

1. OpenStax: *University Physics II*, is free to access online!
2. Fundamentals of Physics by Halliday and Resnick (any edition)
3. Physics for Scientists and Engineers by Serway and Jewett (any edition)

The primary required reading will be assigned from OpenStax. However, all sources are equally important and a component to solving problems in assignments. There are free versions to download online.

Required Materials

A scientific calculator and a computer with internet access and data processing software (Microsoft Excel or Python). If using Python, one must be able to compile Python scripts with all its necessary modules loaded, in particular the Matplotlib Python module.

Prerequisites

Physics 4A: *Mechanics* and Math 1B: *Calculus*, or concurrent enrollment in Math 1C: *Calculus*

Course Description and Objectives

In this course, we will build upon concepts from Newtonian mechanics to develop an understanding of the electromagnetic world and its applications to science and engineering. Our discussion begins with an approach to the theoretical aspects of electricity and magnetism followed by its applications. More specifically, we introduce the concept of electrostatics and electric potential. Afterward we introduce applications of electric fields through understanding resistance, capacitance, and Direct-current circuits. Complimenting electrostatics is the idea of magnetostatics where we see magnetic forces and fields, and with that are its applications through studying Alternating Current (AC) circuits. The final piece comes together as electricity and magnetism come together to produce electromagnetic waves, which combines both ideas together. Supplemental to lecture, is analyzing real-world problems through a lab component of the course. Thus fortifying our knowledge through analyzing the understanding of electricity and magnetism through data, graphical, and statistical methods.

On Student Commitment

Learning physics especially for electricity and magnetism is a rewarding experience, but also demanding for its abstract principles. In short, for every reward there is an equal amount in work which demands time. Maintaining an understanding of the material is necessary to succeed. A recommendation is to commit at least double the amount in class time outside of the classroom to complete assignments and understand the ideas fully. In addition, we do exercise some level of abstraction, and the ability to connect physics concepts to mathematical formulation is a necessary component. Solving problems through the means of linear expressions, and through means of calculus are applied throughout the course.

Grading Criteria

The lecture will consist of a midterm, a final, weekly quizzes, and weekly homework assignments each with their designated grade points. The lab portion of the class will be out of 100 points. The assignment point distribution is as follows:

Assignment	Point Distribution	Weight
Homework ×10	200 points total ⇔ 20 points each	32%
Quizzes ×9	225 points total ⇔ 25 points each	36%
Lab ×10	100 points total ⇔ 10 points each	16%
Midterm	50 points	8%
Final	50 points	8%
Course Total	625 points	100%

This course will not be graded on a curved scale. Therefore, the grade distribution follows the standard grading scheme, meaning that A+: 96-100%, A: 93-96%, A-: 90-93%, and so forth....

Exams

There will be two exams for the quarter, which are the midterm and final. Exam coverage comes for all previous homework and quiz topics leading up to the exam (i.e. cumulative).

Quizzes

There are a total of 9 quizzes to be given on **Wednesdays at the end of lecture**. Quizzes are graded out of 25 points covering topics from homework and lecture topics of the week.

Homework

Homework will be assigned at the start of each week; to be **due the following Monday at 5:30 PM**.

Classroom Participation

While there is no required attendance for class, being present in class lecture is a large proponent to the learning physics. Please be present as much as possible to gain some classroom participation. This is to say. participation lends to bonus extra credit when determining final grades. Ultimately, the contribution to class discussion would only be toward the student's benefit.

Tentative Class Schedule

The general agenda for the class goes as listed on a weekly basis. Please keep in mind that this is tentative and is subject to change throughout the quarter.

Week	Topic	Assignments	Assessment
Jan 9 / Jan 11	Review of Math	HW #1 / Lab #1	Quiz 1
Jan 16 / Jan 18	Electrostatics	HW #2 / Lab #2	Quiz 2
Jan 23 / Jan 25	The Electric Field	HW #3 / Lab #3	Quiz 3
Jan 30 / Feb 1	Gauss's Law	HW #4 / Lab #4	Quiz 4
Feb 6 / Feb 8	Circuits	HW #5 / Lab #5	Quiz 5
Feb 13 / Feb 15	Magnetostatics	HW #6 / Lab #6	**Midterm**
Feb 20 / Feb 22	The Magenetic Field	HW #7 / Lab #7	Quiz 6
Feb 27 / Mar 1	Induction	HW #8 / Lab #8	Quiz 7
Mar 6 / Mar 8	Alternating Current	HW #9 / Lab #9	Quiz 8
Mar 13 / Mar 15	Maxwell Equations	HW #10 / Lab #10	Quiz 9
Mar 20 / Mar 22	Electromagnetic Waves	Extra Credit / Lab Final	None
March 27th	**Monday**	**6:15 PM - 8:15 PM**	**Final Exam**

Finally, in fairness to all students in the class, the grading policy is to be in agreement to terms below:

1. Emails regarding final grade will be ignored after the final – there will be no response to emails.
2. NO assignments including extra credit will be accepted after the final exam.
3. Course grades are posted as accurate and up-to-date on Canvas; we follow the standard grading scheme.

Student Learning Outcome(s):

*Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of electricity and magnetism.
*Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories.

Office Hours:

In-Person,By Appointment	S42	W,M	4:00 PM	5:00 PM