Physics 4B: Electricity and Magnetism - Spring 2021 Syllabus

Instructor Peter Ho **CRN# 47498** & **47501**

Contact hopeter@fhda.edu **Sections 3Z** & **4Z**

Days: Lecture Monday through Fridays from 1:30 PM to 2:30 PM
Labs Monday or Thursdays from 2:30 PM to 5:30 PM

Location Online, Zoom meetings to be scheduled on Canvas with link.

Office Hour See Canvas for available office hours.

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 I*, 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 required reading will however be assigned from OpenStax. But all three texts would help with solving problems and assignments.

Required Materials

A scientific calculator and a computer with access to Python Programming Language. One must be able to compile Python scripts with all its necessary modules loaded.

Prerequisites

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

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 engineering. Our discussions in this course will first approach theoretical aspects of electricity and magnetism followed by applications. More specifically, we will first approach electric potential and electrostatics. Then we will work through its applications with understanding resistance, capacitance, and circuits. Then complimenting electrostatics comes magnetostatics, which works with magnetic fields and forces. Along with that are its applications through Direct Current (DC) and Alternating Current (AC) type circuits. The final piece comes together as electricity and magnetism come together to produce electromagnetic waves, which combines both ideas together.

Lastly, in addition to lecture, we will be analyzing real-world problems through a lab component of the course. For the labs, we will be applying our knowledge further analyze our understanding of electricity and magnetism through data, graphical, and statistical methods using applied computational methods (programming).

Grading Criteria and Lab Requirements

The lecture will consist three exams, a final, quizzes, and weekly homework assignments each with their assigned grade points. The lab portion of the class will be out of 100 points. **Students must pass the lab with at least a 70% to pass the course. Attendance is mandatory for the Lab section.**

Homework $\times 10$	20% $\Leftrightarrow$ 100 points total
Quizzes $\times 7$	20% $\Leftrightarrow$ 105 points total
Exams $\times 3$	15% each $\Leftrightarrow$ 75 points each
Final	15% $\Leftrightarrow$ 75 points
Lecture Total	505 points
Lab Report $\times 10$	10 points each
Lab Total	100 points

This course will not be graded on a curved scale. Therefore, the grade distribution follows the standard grading scheme (A: 90-100%, B: 80-90%, etc.)

On Student Commitment

Learning physics, especially electricity and magnetism, can both be rewarding and demanding for its abstract concepts. But, for every reward, there is an equal amount in work to meet the demand, and maintaining an understanding of the material. A recommendation is to commit at least eight hours per week, or double the amount in class time outside of the classroom to complete assignments and prepare for the exams. In addition, and to some level of abstraction, the ability to connect physics concepts to mathematical formulation is a necessary component to this course. Solving problems through the means of linear expressions, and through means of calculus are necessary to solving problems in this course.

Exams

There will be three exams for the quarter followed by a final exam at the end. Exam coverage comes for all previous homework and quiz topics leading up to the exam (i.e. cumulative).

On the format of the exam: exams will be an open note and open book type of exam due within an hour time limit. Students must show all work with reasoning that guides the reader to the desired solution. *Simple math work will not be sufficient as a solution.*

Quizzes

There are a total of seven quizzes to be given on Thursdays at the end of lecture as a take-home assignment due in 24 hours (end of lecture Fridays). Quizzes are graded out of 15 points each with each problem (three) worth five points each. Quizzes are open book and open note, and students may collaborate.

Homework

Homework will be assigned at the start of each week, meaning that there will be an assignment **due every Monday at 2:30 PM**, NO LATE work accepted.

Classroom Policy and Participation with Extra Credit:

While there is no requirement to turn on your camera during class, it is also courteous to have all microphones muted except for the instructor. Please be present as possible with some classroom participation. Participation lends to bonus and/or extra credit applied to the final grade. So, contributing to class discussion would only improve your grade, really.

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 of The Week	Assignments	Exam/Quiz/Review
4/5 - 4/9	Electrostatics	HW #1 / Lab #1	Quiz 1
4/12 - 4/16	Electric Potential	HW #2 / Lab #2	Quiz 2
4/19 - 4/23	Resistance & Capacitance	HW #3 / Lab #3	**Exam 1**
4/26 - 4/30	DC Circuits	HW #4 / Lab #4	Quiz 3
5/3 - 5/7	Magnetic Fields	HW #5 / Lab #5	Quiz 4
5/10 - 5/14	Magnetic Induction	HW #6 / Lab #6	**Exam 2**
5/17 - 5/21	Inductors	HW #7 / Lab #7	Quiz 5
5/24 - 5/28	LRC Circuits	HW #8 / Lab #8	Quiz 6
5/31 - 6/4	AC Circuits	HW #9 / Lab #9	**Exam 3**
6/7 - 6/11	Maxwell Equations	HW #10 / Lab #10	Quiz 7
6/14 - 6/18	Electromagnetic Waves	Extra Credit	Review
June 22nd	**1:45 PM - 3:45 PM**	**Tuesday**	**Final Exam**

On Academic Integrity

Physics 4B will be held online for the entirety of Spring '21 quarter. This means that academic integrity is at the forefront of leading issues for students and instructors taking classes online today. We are committed to upholding the values of De Anza College as a community college to ensure the integrity of student work and personal effort in their academic role. As an agreement to these terms each student must abide to their role upholding the values of academic integrity.

In otherwords, as an enrolled student of De Anza college in Physics 4B, one must agree to upholding the values put forward by De Anza's statement on academic integrity. A student will accept that by taking on the risk of copying the work of others without credit, that he or she accept a zero for the assignment or exam. In addition to the risks, there are online services and forums where students may post questions for answers. Therefore, **one will not rely** on these resources other than for understanding course material leading up to a test. Other resources include, and are not limited to working with others over communication applications during an exam.

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.