

AP Physics C Electricity and Magnetism

Textbook

Halliday, Resnick, Walker. *Fundamentals of Physics 9th ed.* John Wiley and sons.

Course Description

AP Physics is the equivalent of an introductory-level college course. It is very demanding of a student's time and intellect. The emphasis on theoretical topics, critical thinking and problem solving makes this class challenging. Mathematics is used to illuminate physical situations rather than to show off a student's manipulative abilities. Students must be strong in both math and science to be successful in this course.

AP Physics C Electricity and Magnetism is a semester long, calculus-based course. The class meets five days a week for 55 minutes per class. Although fewer topics are covered in Physics C than in Physics 1, they are covered in greater depth in Physics C, and with greater analytical and mathematical sophistication including differential and integral calculus. It is strongly recommended that AP Calculus BC be completed (with an A or B) prior to enrollment in AP Physics C. However, concurrent enrollment in BC Calculus is acceptable.

C8 - Evidence of Curricular Requirement:
Introductory differential and integral calculus is used throughout the course

Evaluation

Category	Percent
Homework	10%
Lab	35%
Tests	35%
Midterm	20%

Course Strategies

Students work in the lab and on assignments in 2-4 person groups. They design and perform labs that allow discovery of the graphical and mathematical models they use throughout the course. Group members make oral presentations before the whole class illuminating and defending experimental findings and conclusions. The emphasis is on the general understanding of the principles involved and how problems are solved rather than on the answer. This approach requires students to be actively engaged in their own learning

C7 - Evidence of Curricular Requirement:
The course utilizes guided inquiry and student-centered learning to foster the development of critical thinking skills.

Students, working in 2-4 person groups, prepare and present class work and homework problems on whiteboards. Whiteboarding is an active learning process in which the teacher's role is to probe student understanding of the material being presented and to construct strategies to bring the students to a more complete comprehension of this material. Fellow students are encouraged to participate in the whiteboard discussions, but it is a teacher directed process. In addition to the benefits of the teacher guiding the learning process as it takes place, whiteboarding allows students to clarify and define their understanding through verbalization.

C9 - Evidence of Curricular Requirement:
The course includes a laboratory component

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Course Outline

Electricity and Magnetism	
A.	Electrostatics <ul style="list-style-type: none">1. Charge and coulomb's law2. Electric field and electric potential3. Gaus's law4. Fields and potentials of other charge distributions
B.	Conductors, capacitors, dielectrics <ul style="list-style-type: none">1. Electrostatics with conductors2. Capacitors<ul style="list-style-type: none">a. Capacitanceb. Parallel platec. Spherical and cylindrical3. dielectrics
C.	Electric Circuits <ul style="list-style-type: none">1. Current, resistance, power2. Steady-state direct current circuits3. Capacitors in circuits<ul style="list-style-type: none">a. Steady stateb. Transients in RC circuits
D.	Magnetic Fields <ul style="list-style-type: none">1. Forces on moving charges in magnetic fields2. Forces on current-carrying wires in magnetic fields3. Fields of long current-carrying wires4. Biot-Savart law and Ampere's law
E.	Electromagnetism <ul style="list-style-type: none">1. Electromagnetic induction2. Inductance3. Maxwell's equations

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Laboratory

<p>Labs are an integral component of this class. On average, students spend one day a week performing and analyzing lab activities. Students work in the lab in 2-4 person groups. They design and perform labs that allow discovery of the graphical and mathematical models they use throughout the course. Group members make oral presentations before the whole class illuminating and defending experimental findings and conclusions. Students are required to keep a record of all lab activities and conclusions in a digital portfolio.</p>	<p>C9 - Evidence of Curricular Requirement: The course includes a laboratory component comparable to a semester long, college-level physics laboratory. Students spend a minimum of 20 percent instructional time engaged in laboratory work. A hands-on laboratory component is required. Each student should complete a lab notebook or portfolio of lab reports.</p>
<p>ELECTRICITY AND MAGNETISM LABS</p> <p>Electrostatics Electric field mapping Ohm's Law Properties of parallel and series circuits RC circuits: determining the time constant Predicting and plotting magnetic field lines Ampere's Law Magnetic Field due to a slinky Determination of BH for Earth's magnetic field</p>	