



VIRGINIA BEACH CITY PUBLIC SCHOOLS
CHARTING THE COURSE

Department of Teaching & Learning
Parent/Student Course Information

Advanced Placement Physics C: Electricity & Magnetism
(SC 4543)
One credit, one year
Grades 11-12

Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.

COURSE DESCRIPTION

Advanced Placement Physics C: Electricity & Magnetism is a calculus-based college-level course that examines the principles of physics in detail. This course is designed in accord with the requirements of the College Board. Students are expected to take the appropriate Advanced Placement Physics C Examination at the end of the course.

COURSE GOALS

- Develop an in-depth understanding of the concepts, principles and processes of physics and applying these principles in the solution of problems
- Develop an understanding of the means by which information about physics is collected, how it is recorded and interpreted, how hypotheses are formulated from available data and how further predictions are made
- Develop the ability to think clearly and to express ideas orally and in writing with clarity and logic
- Engage in science practices, such as asking investigative questions, designing experiments, analyzing data and constructing arguments
- Develop an understanding that science is a human endeavor with social consequences

PREREQUISITE

Physics or AP Physics 1

COREQUISITE

Calculus and AP Physics C: Mechanics

OPTIONS FOR NEXT COURSE

Advanced Placement Environmental Science (Biology and Chemistry prerequisite)

Advanced Placement Biology (Biology and Chemistry prerequisite)

Advanced Placement Chemistry (Chemistry prerequisite)

REQUIRED TEXTBOOK

University Physics Volume 2, OpenStax (2016)

MINIMUM REQUIREMENTS

- Demonstrate knowledge and understanding of all core objectives through laboratory investigations, projects, oral and/or written tests, quizzes and reports
- Read and study assigned chapters in the textbook

- Participate in the laboratory activities, prepare written laboratory reports and adhere to all safety procedures
- Read science journals, magazines and books to expand the ideas and topics presented in class

The Knowledge, Skills and Attitudes that Comprise the Advanced Placement Physics C: Electricity & Magnetism Course are summarized as follows from the prescribed curriculum:

COURSE TOPICS

- Electrostatics
 - Charge and Coulomb's Law
 - Electric Field and Electric Potential
 - Electric Potential Due to Point Charges and Uniform Fields
 - Gauss's Law
 - Fields and Potentials of Other Charge Distributions
- Conductors, Capacitors, Dielectrics
 - Electrostatics with Conductors
 - Capacitors
 - Dielectrics
- Electric Circuits
 - Current and Resistance
 - Current, Resistance, and Power
 - Steady-State Direct Current Circuits with Batteries and Resistors Only
 - Gauss's Law
- Magnetic Fields
 - Forces on Moving Charges in Magnetic Fields
 - Forces on Current Carrying Wires in Magnetic Fields
 - Fields of Long Current Carrying Wires
 - Biot-Savart Law and Ampere's Law
- Electromagnetism
 - Electromagnetic Induction (Including Faraday's Law and Lenz's Law)
 - Inductance (Including LR Circuits)
 - Maxwell's Equations

LABORATORY EXPERIENCES

A minimum of twenty-five percent (25%) of a student's time should be spent conducting hands-on laboratory work. Great emphasis is placed on inquiry-based investigations that provide students with rich opportunities to apply the science practices. The objectives for laboratory and experimental simulations are:

- Design experiments
- Observe and measure real phenomena
- Organize, display and critically analyze data
- Analyze sources of error and determine uncertainties in measurement
- Draw inferences from observations and data
- Communicate results, including suggested ways to improve experiments and proposed questions for further study

SCIENCE PRACTICES

Students will focus on these disciplinary practices in a rigorous and engaging environment. Students will use evidence to develop and revise explanations and predictions of natural phenomena. Such practices require that students:

- Use representations and models to communicate scientific phenomena and solve scientific problems
- Use mathematics appropriately
- Engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course
- Plan and implement data collection strategies in relation to a particular scientific question
- Perform data analysis and evaluation of evidence
- Work with scientific explanations and theories
- Connect and relate knowledge across various scales, concepts and representations in and across domains

NOTE: Students should keep a record of their laboratory work so they will be in a position to validate their AP Physics C: Electricity & Magnetism course as equivalent to the corresponding college course. Most college placement policies presume that students have had laboratory experience.

Aaron C. Spence, Ed.D., Superintendent
Virginia Beach City Public Schools
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Produced by the Department of Teaching and Learning.
For further information, please call (757) 263-1070.

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