Advanced Placement Physics C: Mechanics
(SC 4541)
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: Mechanics 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
Algebra II/Trigonometry and Calculus

OPTIONS FOR NEXT COURSE
Advanced Placement Environmental Science (Biology and Chemistry prerequisite)
Advanced Placement Biology (Biology and Chemistry prerequisite)
Advanced Placement Chemistry (Chemistry prerequisite)
Oceanography (Earth Science prerequisite)

REQUIRED TEXTBOOK

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: Mechanics Course are Summarized as Follows From the Prescribed Curriculum:

COURSE TOPICS

• Kinematics (including vectors, vector algebra, components of vectors, coordinate systems, displacement, velocity and acceleration)
  o Motion in one dimension
  o Motion in two dimensions, including projective motion
• Newton’s laws of motion
  o Static equilibrium (first law)
  o Dynamics of a single particle (second law)
  o Systems of two or more objects (third law)
• Work, energy and power
  o Work and work-energy theorem
  o Forces and potential energy
  o Conservation of energy
  o Power
• Systems of particles and linear momentum
  o Center of mass
  o Impulse and momentum
  o Conservation of linear momentum, collisions
• Circular motion and rotation
  o Uniform circular motion
  o Torque and rotational statics
  o Rotational kinematics and dynamics
  o Angular momentum and its conservation
• Oscillations and gravitations
  o Simple harmonic motion (dynamics and energy relationships)
  o Mass on a spring
  o Pendulum and other oscillations
  o Newton’s law of gravity
  o Orbits of planets and satellites
    ▪ Circular
    ▪ General

LABORATORY EXPERIENCES

A minimum of twenty percent (20%) 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: Mechanics course as equivalent to the corresponding college course. Most college placement policies presume that students have had laboratory experience.
Notice of Non-Discrimination Policy

Virginia Beach City Public Schools does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation/gender identity, pregnancy, childbirth or related medical condition, disability, marital status, age, genetic information or veteran status in its programs and activities and provides equal access to the Boy Scouts and other designated youth groups. School Board policies and regulations (including, but not limited to, Policies 2-33, 4-4, 4-6, 4-43, 5-7, 5-19, 5-20, 5-44, 6-7, 7-48, 7-49, 7-57 and Regulations 4-4.1, 4-4.2, 4-6.1, 4-43.1, 5-44.1, 7-11.1, 7-17.1 and 7-57.1) provide equal access to courses, programs, counseling services, physical education and athletic, vocational education, instructional materials and extracurricular activities.

To seek resolution of grievances resulting from alleged discrimination or to report violations of these policies, please contact the Title VI/Title IX Coordinator/Director of Student Leadership at (757) 263-2020, 1413 Laskin Road, Virginia Beach, Virginia, 23451 (for student complaints) or the Section 504/ADA Coordinator/Chief Human Resources Officer at (757) 263-1133, 2512 George Mason Drive, Municipal Center, Building 6, Virginia Beach, Virginia, 23456 (for employees or other citizens). Concerns about the application of Section 504 of the Rehabilitation Act should be addressed to the Section 504 Coordinator/Executive Director of Student Support Services at (757) 263-1980, 2512 George Mason Drive, Virginia Beach, Virginia, 23456 or the Section 504 Coordinator at the student’s school. For students who are eligible or suspected of being eligible for special education or related services under IDEA, please contact the Office of Programs for Exceptional Children at (757) 263-2400, Laskin Road Annex, 1413 Laskin Road, Virginia Beach, Virginia, 23451.

Alternative formats of this publication which may include taped, Braille, or large print materials are available upon request for individuals with disabilities. Call or write The Department of Teaching and Learning, Virginia Beach City Public Schools, 2512 George Mason Drive, P.O. Box 6038, Virginia Beach, VA 23456-0038. Telephone 263-1070 (voice); fax 263-1424; 263-1240 (TDD) or email her at Amanda.Malbon@VBSchools.com

vbschools.com
your virtual link to Hampton Roads’ largest school system

VIRGINIA BEACH CITY PUBLIC SCHOOLS
CHARTING THE COURSE

No part of this publication may be produced or shared in any form without giving specific credit to Virginia Beach City Public Schools.

(Revised August 2017)