



PHYSICS

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

Physics involves the study of properties and interactions of matter and energy. Problem-solving skills are stressed throughout the course as students investigate such topics as the historical development of physics, force and motion, work, heat, sound, light, electricity, magnetism, and physics applications in everyday activities.

COURSE GOALS

- Develop a foundation of physics concepts for understanding the laws of physics and for understanding the interrelationships of physics with all other sciences
- Develop investigative skills in order to explain real-life situations
- Develop proficiency in two-step problem solving
- Develop a sense of responsibility and contribution to the group
- Focus on the role of physics in modern life and explore the application of physics concepts
- Apply the processes of rational thought to make responsible decisions about issues resulting from the interactions of science, technology, and society

PREREQUISITE

Algebra II prerequisite or co-requisite

OPTIONS FOR NEXT COURSE

Advanced Placement Environmental Science (Biology and Chemistry prerequisite)

Advanced Placement Biology (Biology and Chemistry prerequisite)

Advanced Placement Chemistry (Chemistry prerequisite)

Advanced Placement Physics (Algebra II/Trigonometry prerequisite)

Earth Science

Biology

Chemistry (Algebra II prerequisite or co-requisite)

Oceanography (Earth Science prerequisite)

Astronomy (Earth Science prerequisite)

REQUIRED STUDENT TEXTBOOK

Physics, Serway, Faughn (Holt, Rinehart, Winston, 2009)

MINIMUM REQUIREMENTS

- Demonstrate knowledge and understanding of all core objectives via laboratory investigations, issue investigations, and oral and written quizzes, tests, and reports
- Participate in the core laboratory experiences and adhere to all safety procedures
- Prepare written reports for core laboratory experiences
- Investigate and report on career opportunities and areas of interest in physics
- Select, investigate, and report on a topic in nuclear physics, quantum physics, fiber optics, superconductivity, robotics, continuous electron beam acceleration, etc.

The Instructional Objectives That Comprise the Physics Course are Listed as Follows From the Prescribed Curriculum:

- Describe how applications of physics affect the world
- Evaluate the impact of discoveries of physics
- Identify proper safety and laboratory techniques and procedures
- Demonstrate an ability to use scientific notation and significant digits
- Demonstrate the appropriate use of the international metric system with emphasis on the MKS system
- Evaluate the validity of an equation of dimensional analysis
- Demonstrate a working knowledge of the use of trigonometry with triangles
- Demonstrate an ability to distinguish between accuracy and precision
- Interpret physical relationships between quantities from given graphs and data tables
- Predict and verify the interrelationships among mass, distance, and time using both experimental and mathematical processes
- Apply Newton's three laws of motion and Newton's law of universal gravitation
- Analyze forces using vector quantities
- Distinguish between the resolution and composition of forces
- Investigate and apply the principles of friction
- Explain the importance of torque in relationship with equilibrium
- Describe and identify motion in two dimensions
- Contrast rotary and circular motions
- Recognize simple harmonic motion as curved motion on one axis
- Demonstrate an understanding of the relationship between work and energy transfer
- Apply the law of conservation of momentum in solving motion problems
- Defend the kinetic-molecular theory of matter
- Explain the role of kinetic energy and of potential energy in the internal heat energy of matter
- Describe some of the applications of thermal expansion, the difficulties that expansion cases, and ways of overcoming these difficulties
- Demonstrate an understanding of the gas laws
- Demonstrate an understanding of conservation of heat
- Describe the principles and characteristics of various external and internal combustion engines utilizing the relationships between heat and work
- Demonstrate an understanding of the interaction of waves
- Demonstrate an understanding of the production and transmission of sound waves and their properties
- Demonstrate an understanding of the behavior of strings and a column of air when they produce musical sounds
- Demonstrate an understanding of the dual nature of light
- Demonstrate an understanding of the relationship between mass and energy
- Demonstrate an understanding of the wide range of electromagnetic radiation
- Explain the operation of a laser
- Demonstrate an understanding of the reflectance of light
- Explain the formation of images by curved mirrors
- Demonstrate an understanding of the refraction of light
- Explain the formation of images by lenses
- Demonstrate an understanding of the two-slit experiment and the constructive and destructive interference of light waves
- Explain the polarization of light
- Describe the basic concepts associated with the knowledge of electrostatics
- Describe potential difference in terms of work or energy created through the use of electric fields of force
- Explain the general aspects of a direct-current electric circuit
- Describe the transfer of energy in an electric circuit
- Describe the theory of magnetism

- Describe the link between an electric current and magnetism
- Describe the generation of electric currents by using magnetic fields
- Explain the basic concept of alternating current

CORE AREAS FOR LABORATORY SKILLS AND EXPERIENCE

- Safety
- Laboratory techniques
- Use of equipment
- Mathematical skills
- Measurements (e.g., length, mass, time)
- Acceleration
- Force (e.g., resolution of forces, coefficient of sliding friction, composition of forces, center of gravity, parallel forces, centripetal force, harmonic motion)
- Simple machines
- Elastic potential energy
- Momentum
- Thermal expansion (e.g., linear, liquid, gas)
- Specific heat
- Mechanical waves
- Speed of sound
- Image formation (e.g., plane, mirror, converging/diverging mirrors, converging/diverging lenses)
- Refraction
- Diffraction and interference
- Polarization
- Electrostatics
- Combination of cells
- Magnetic field about a conductor
- Electromagnetic induction
- Generator and motor



VIRGINIA BEACH CITY PUBLIC SCHOOLS

A H E A D O F T H E C U R V E

MISSION STATEMENT

The Virginia Beach City Public Schools, in partnership with the entire community, will empower every student to become a life-long learner who is a responsible, productive and engaged citizen within the global community.

DEPARTMENT OF CURRICULUM AND INSTRUCTION

2512 George Mason Drive P.O. Box 6038

Virginia Beach, VA 23456-0038

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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 Curriculum and Instruction, Director of Secondary Instructional Services, Virginia Beach City Public Schools, 2512 George Mason Drive, P.O. Box 6038, Virginia Beach, VA 23456-0038, Telephone (757) 263-1070 or (757) 263-1429, fax (757) 263-1412.