

CP Physics

This course is designed for juniors and seniors intending to major in a Liberal Arts field at college rather than a Science, Math or Engineering program. In this course, there is a focus on the understanding of the concepts with less emphasis on Mathematics.

- Interpret and apply Newton's first law, second law of motion, and the third law of motion
- Predict how friction affects motion and how to solve problems with friction
- Apply Newton's laws of motion to gravitational fields throughout the universe
- Apply the laws of conservation of energy as relates to kinetic and potential energy
- Build and apply the laws of conservation of mechanical energy with simple machines
- Apply the laws of energy, work, and power to moving objects
- List properties of different types of waves and give examples of each type
- Apply the laws of reflection and refraction to water, sound, and light waves
- Build wind chimes and explain how they work. Do all related math
- Make and observe static electric charges in a Van Der Graaff generator
- Apply electromagnetic wave theory to include: spectrum, relationship between electromagnetism, and electricity
- Explain the electromagnetic spectrum as it relates to: radio, visible light, heat, ultraviolet, etc. and then draw the spectrum

Honor Physics

This course will introduce a student to the many topics of study seen in a college Introduction to Physics course. The course is highly recommended for students considering engineering, physical sciences, and biomedical fields. Prerequisite: Trigonometry or Calculus.

- Develop an understanding of Newtonian mechanics
- Investigate waves- mechanical and electromagnetic
- Investigate optics and develop an understanding in application
- Develop an understanding of electricity and circuits
- Discuss magnetism and gain a thorough understanding of it as it relates to the earth's magnetic poles and electron repulsion

Advanced Placement Physics

This course will introduce a student to the many topics of study seen in a college Introduction to Physics course. Prerequisite: Trigonometry or Calculus.

- Review all topics discussed in Honor Physics

WESTFORD PUBLIC SCHOOLS



CURRICULUM BENCHMARKS

GRADES 9-12

PHYSICAL SCIENCE

Westford Academy

Compiled by the
Science Technology and Engineering
Curriculum Task Committee
under the direction of
Director of Curriculum and Instruction
Lorraine Tacconi-Moore

"Shaping the future one child at a time"
<http://westford.mec.edu/schools>

Geophysical Science

This course builds an understanding of the world around us and reinforces analytical and laboratory skills providing an excellent foundation on which to continue the study of science.

- Investigate the primary internal sources of internal energy generated through radioactive decay, calculate the amount of radioactive substance remaining after a time based on its half-life and relate it to the process of radioactive dating
- Investigate the primary external source of energy and identify factors that affect the availability of energy and the distribution of energy above and below the equator
- Apply knowledge of global wind patterns to compare and contrast cloud formation and resulting weather conditions resulting from differing frontal systems
- Identify the processes that result in the phase change of water as it moves through the water cycle while correlating precipitation and availability of groundwater
- Identify the potential causes of groundwater pollution and investigate Massachusetts Title V regulations as it relates to protecting groundwater and our natural resources
- Investigate rift formations as it relates to the flow of energy and the creation of hydrothermal vents
- Interpret the electromagnetic spectrum based on wavelength and frequency, identifying the visible light spectrum and correlate the color of the visible light spectrum with wavelength

Chemistry

This course is designed to present the basic principles of chemistry while developing problem solving strategies.

- Identify metals, nonmetals, metalloids, families, periods, valence electrons and reactivity with other elements using the periodic table
- Predict the trends in the periodic table for ionization energy, electronegativity, electron affinity, relative size of atoms and ions
- Write balance chemical equations by applying the law of conservation of mass
- Relate everyday chemicals and chemistry in the community

CP Chemistry

This course is designed for the college bound student in the investigation of the basic principles.

- Identify metals, nonmetals, metalloids, families, periods, valence electrons and reactivity with other elements using the periodic table
- Predict the trends in the periodic table for ionization energy, electronegativity, electron affinity, relative size of atoms and ions
- Write balance chemical equations by applying the law of conservation of mass
- Calculate mass-mass, mass-volume, volume-volume, and limiting reactant problems for chemical reactions.
- Describe the kinetic molecular theory and explain the relationship between pressure, volume, temperature and number of particles
- Calculate the concentration in terms of molarity, molality and percent by mass
- Explain Arrhenius, theory of acids and bases in terms of the presence of hydronium and hydroxide ions, and Bronsted's theory of acids and bases in terms of proton acceptors, relate their concentration to the pH scale
- Interpret the law of conservation of energy and compare the relationship between energy transfer and disorder in the universe
- Explain the structure and properties of carbon especially in reference to organic chemistry

Honor Chemistry

This course is designed to familiarize students with the major concepts of modern atomic chemical theory. The concepts in CP Chemistry will be addressed

- Develop a greater understanding of the fundamental particles of matter
- Understand the architecture of the particles of matter
- Interpret the quantitative and qualitative changes that the particles undergo due to energy change
- Develop of an appreciation of the modern theories through an historical approach to their development
- Gain facility in the handling of quantitative data in problem solving

Advanced Placement Chemistry

This course is designed to prepare the student for taking the Advanced Placement (AP) test in chemistry and to develop the student's interest beyond what is covered in a first year chemistry course.

- Study in-depth the major areas in a first year Chemistry course
- Research specific topics in detail and discuss their findings in a seminar situation
- Complete required AP chemistry labs