

Physics

Credit – 1

Term(s) – 1 Year

Text: Conceptual Physics. Hewitt, Third Edition, 1999

Prerequisites: Algebra I, Chemistry

Course Description:

Physics studies questions related to matter and energy and utilizes mathematics to predict the behavior of matter and energy. Both qualitative and quantitative laboratory experience is provided in order that students can manipulate apparatus, make observations, gather data, process data, and interpret this data to form conclusions.

Course Content:

1. Fundamental Math
2. Measurement
3. Kinematics – the study of motion
4. Forces
5. Energy
6. Waves
7. Sound
8. Light
9. Electricity & Magnetism
10. Thermodynamics
11. Atomic/Nuclear physics

Course Format:

Most of the material will be covered through lecture and laboratory exercises. The course will cover the basic topics of physics from a conceptual and applied approach.

Course Expectations:

Students will be expected to describe and explain physics principles conceptually through tests, “hands-on” activities, formal laboratory reports and semester projects. There will be significantly less math computation and theoretical aspects than in the Honors Physics.

Grades:

- 40% Tests
- 40% Lab reports & Semester Projects
- 20% Homework

Course Objectives:

- 11A.601 - Evaluate data from experiments using graphs and other appropriate analytical tools at grade appropriate level
- 11A.602 - Apply problem-solving skills to scientific situations at grade appropriate level
- 11A.501 - Demonstrate appropriate laboratory skills and equipment usage, applying accepted practices at grade appropriate level
- 11A.502 - Demonstrate the use of appropriate scientific tools to measure accurately using the metric system at grade appropriate level
- 11A.603 - Conduct research on science topics using a variety of accepted sources at grade appropriate level
- 11A.604 - Communicate scientific understandings effectively in written and oral presentations at grade appropriate level
- 11A.701 - Conduct an appropriate controlled scientific investigation at grade appropriate level
- 11A.901 - Differentiate between a scientific theory, hypothesis, opinion and fact at grade appropriate level
- 11A.902 - Demonstrate an understanding of science as an ongoing process open to the collection of new data and the revaluation of existing data by critically analyzing scientific theories for supporting and non- supporting evidence or by explaining how theories are formulated, accepted, rejected, and changed over time at grade appropriate level
- 11B.903 - Design and conduct a controlled scientific investigation at grade appropriate level
- 12C.906 - Use the concepts of heat, temperature, thermal equilibrium, specific heat and thermal energy to solve thermal dynamic
- 12C.907 - Know and use the first and second law of thermal dynamics
- 12C.908 - Solve heat transfer problems
- 12C.909 - Explain at the atomic level what occurs during heat transfer and phase changes
- 12C.910 - Use the basic concepts of wave theory, such as amplitude, standing waves, frequency, period and wavelength to explain wave phenomenon
- 12C.911 - Demonstrate a knowledge of the basics of light and sound waves
- 12C.912 - Use the Doppler effect to explain wave certain phenomenon
- 12D.913 - Use terms as vectors, components of vectors, scalar, speed, displacement, velocity, and acceleration to solve kinematic situations
- 12D.914 - Solve motion in one dimension problems using given kinematic equations
- 12D.915 - Solve motion in two dimension problems using given kinematic equations.
- 12D.916 - Use terms such as force, coefficient of friction, static equilibrium, net force, centripetal force and centrifugal force to solve dynamic situations
- 12D.917 - Use Newton's three laws of motion to explain dynamic situations
- 12D.918 - Solve dynamic problems that are in static equilibrium
- 12D.919 - State the conservation of energy law, conservation of momentum law and the work-energy theorem
- 12D.920 - Using the conservation laws, impulse, momentum, energy, work, power, and the work-energy theorem, solve situations in a mechanical system
- 12D.921 - Determine how gravitational forces vary using Newton's Universal Law of Gravity

- 12D.922 - State the charge and location of all the elementary particles of an atom
- 12D.923 - Explain at the atomic level how polarization, charging by friction, charging by conduction and charging by induction occur
- 12D.924 - Use Coulomb's law to solve electrostatic problems
- 12D.925 - Solve problems involving electric fields
- 12D.926 - Use the concepts of voltage, resistance and current to answer questions with regard to electrical situations
- 12D.927 - Use Ohm's law and other circuit relationships to solve electrical circuit problems
- 12D.928 - Solve problem to show an understanding of magnetism
- 12D.929 - Solve problems involving electromagnetic induction
- 13A.904 - Demonstrate an understanding of ethical decision making in the sciences at grade appropriate level
- 13A.905 - Demonstrate an understanding of the proper development and use of scientific information at grade appropriate level
- 13B.702 - Demonstrate an understanding of the relationship between science and technology at grade appropriate level
- 13B.703 - Demonstrate an understanding of the impact of science on our society at grade appropriate level