Course Description:

This course provides an introduction to the world of physics. The course starts out by building a foundation of what it means to be scientific by describing the ways scientists think, communicate, and do their jobs. Next, students cover important aspects of motion and force, including the motion of fluids and how motion relates to Newton's laws. Building up from these fundamentals, students then explore the topics of thermodynamics, energy, work, and machines. The nature and properties of waves are covered next, and the course ends by examining electricity and magnetism. Throughout the course, students parallel their investigation into the scientific method with a course project that introduces them to the field and processes of engineering.

Course Objectives:

- Apply scientific processes to conduct investigations.
- Use logical thinking to identify relationships and draw conclusions.
- Examine how investigations in physics are important to gaining historical perspective and understanding the societal value of scientific advances.
- Evaluate topics in physics to better understand motion, force, work, energy, the structure and behavior of waves, and electromagnetism.

Required Materials:

In course.

Course Overview:

Unit 1: Scientific Thinking and Motion

In this unit, students will examine some information about scientists: how they think, how they make and test hypotheses, and how they share their findings with each other and the public. Students will also study motion, including the differences between speed and velocity, and interpret a simple graph. The project for this unit involves using the scientific method to construct and test a hypothesis about the speed at which an object falls.

Unit 2: Force

In this unit, students will learn the concept of forces and their relationship to motion. Students will explore the findings of Sir Isaac Newton including the three laws of motion. Students will also explore the discoveries of several other scientists to learn about motion related to fluids. The project for this unit involves applying information about forces to both falling objects and floating objects.

Unit 3: Energy

In this unit, students will explore the ideas of energy, work, force, and power. Students will then work on the simple calculations behind these concepts as they explore simple machines. The project for this unit involves building a trebuchet and using it to launch projectiles, therefore discovering the amount of work done.

Unit 4: Waves

In this unit, students will learn about waves. Students will discover properties of waves, sound, and light. The project for this unit involves building a spectroscope—a device that reveals the different wavelengths present in light.

Unit 5: Electricity

In this unit, students will discover the concepts of electricity and magnetism. Students will start by learning the basics of electrical forces and charges, and then move into Ohm's law and simple electric circuits. Then students will explore magnets and magnetism. The project for this unit involves building an electromagnet.

Unit 6: Connections and Review

In this unit, students will apply what they have learned about the Engineering Design process to the redesign of a spectroscope. The project for this unit involves building the spectroscope students have planned, testing the prototype, and reporting on its performance. Students will also review for and then take the Vocabulary Exam and the Final Exam.