

Physical Science

COURSE DESCRIPTION:

This course provides students with instruction in the nature of science, including scientific processes, the scientific method, and scientific inquiry. It covers safety in the lab and the field, principles for conducting experiments, and the need for scientific communication. The course then covers the atomic nature of matter, classification of the elements, the periodic table, acids, and bases. Next, students are introduced to energy. They learn what energy is and the various forms of energy. They explore energy transformations and specifically discuss the production of electricity. The course discusses energy in motion, with emphasis on defining work, power, velocity, acceleration, forces, and gravity. Students learn about Newton's laws of motion and simple machines and have the opportunity to design their own machine using the basic principles of physics. Finally, the course discusses the composition and structure of the universe, the life cycles of stars, and space exploration.

COURSE OBJECTIVES:

After completing the course, students will be able to:

- Describe the nature of science and apply knowledge of the nature of science
- Conduct scientific experiments and communicate the results in appropriate ways
- Describe and apply the processes of science, such as making observations, asking questions, formulating hypotheses, analyzing data, and making inferences
- Describe the atomic nature of matter and explain how elements are classified
- Define and give examples of acids, bases, solutions, mixtures, and compounds
- Define energy and differentiate various forms of energy
- Explain energy in motion and describe forces, velocity, acceleration, work, power, and the use of simple machines
- Describe how energy travels in waves and describe wave phenomena
- Describe chemical reactions and discuss them in terms of conservation of mass and energy
- Describe nuclear reactions, forms of energy transformation, and the energy crisis
- Explain the generation of electricity and magnetism
- Describe the composition and structure of the universe
- Describe the life cycle of a star
- Explain past achievements and future goals for space exploration

PREREQUISITES: None

COURSE LENGTH: Two semesters

REQUIRED TEXT: None

COURSE OUTLINE:

Scientific Nature

- What is Science?
- Scientific Process
- THE Scientific Method
- Characteristics of Science
- Laws and Principles

Physical Science (continued)

COURSE OUTLINE (continued):

Scientific Inquiry

- Experimental and Technological Design
- Safety
- Performing an Experiment
- Drawing Conclusions
- Communicate Findings
- Evaluating and Redesigning

Matter

- Atomic Nature of Matter
- Classification of Elements
- Patterns and the Periodic Table
- Compounds and Bonds
- Acids and Bases
- Solutions and Mixtures

Energy and Change

- What is Energy?
- Identifying Matter
- Properties of Matter (Mass, State)
- Changes in Matter (Change of State, Gas Laws)
- Energy Conservation
- Transformation of energy

Energy in Motion

- Motion and Speed
- Velocity and Acceleration
- Mass v Weight
- Types of Forces
- Newton's Laws
- Gravity
- Fluids

Machines

- Simple Machines
- Work and Power
- The Human Body
- Complex Machines and Toys

Electricity and Magnetism

- Electrical Safety
- Circuits
- Magnets
- Electromagnet: Motors/Generators

Waves

- Modeling waves
- Interactions
- Electromagnetic Spectrum
- Sound
- Light

Chemical Reactions

- Types of Reactions
- Conservation of Matter and Energy
- Nuclear Reactions

The Universe

- Composition and Structure
- Structures Within
- Life Cycle of a Star
- Measuring Distance
- Space Exploration