

## 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:

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

**PREREQUISITES:** None

**COURSE LENGTH:** Two Semesters

**REQUIRED TEXT:** None

**COURSE OUTLINE:**

- I. Scientific Nature
  - A. What is Science?
  - B. Scientific Process
  - C. The Scientific Method
  - D. Characteristics of Science
  - E. Scientific Beliefs, Laws, and Theories
- II. Scientific Inquiry
  - A. Experimental Design
  - B. Technological Design
  - C. Organizing Data
  - D. Drawing Conclusions
  - E. Evaluating Experiments and Communicating Results

## III. Matter, Energy and Change

- A. The Properties of Matter
- B. Changes in Matter
- C. What is Energy
- D. Energy Transformation and Conservation

## IV. Elements, Compounds, and Mixtures

- A. Atomic Theory
- B. Classification of Elements
- C. Compounds and Bonds
- D. Acids and Bases
- E. Solutions and Mixtures

## V. Energy in Motion

- A. Motion
- B. Forces and the Force of Gravity
- C. Newton's Laws of Motion
- D. Fluids

## VI. Machines

- A. Work and Power
- B. Simple Machines
- C. Complex Machines and the Human Body

## VII. Electricity and Magnetism

- A. Electricity
- B. Electric Current and Circuits
- C. Magnets and Electromagnets
- D. Electromagnetic Induction

## VIII. Waves

- A. Modeling waves
- B. The Behavior of Waves
- C. Sound
- D. The Electromagnetic Spectrum and Light

## IX. Chemical Reactions

- A. Types of Reactions
- B. Conservation of Matter and Energy
- C. Nuclear Reactions

## X. The Universe

- A. Composition and Structure
- B. Life Cycle of a Star
- C. Measuring Distance
- D. Space Exploration