

SC0228 JUNIOR PHYSICAL SCIENCE

This course is designed for students interested in an introduction to the fundamental concepts underlying the sciences of physics and chemistry. In addition to these fundamental concepts students will learn the laboratory skills essential to actively conducting experimental investigations within these fields of study.

Level: S

Credits: 1

Course Length: Full Year

Prerequisite: Students should have completed Earth Science and Biology

Course Type: Required

I. Learning Standards/Objectives:

Mechanics – Students will learn to:

1. Examine and characterize constant and changing motion.
2. Apply Newton's laws of motion to predicting the behavior of objects.
3. Describe the concepts of acceleration, momentum, work, and energy and use these concepts to describe the behaviors of moving objects.
4. Recognize the effect that gravity exerts on the behavior of moving objects.

Thermal Energy – Students will learn to:

1. Recognize the difference between temperature and thermal energy.
2. Identify the mechanisms by which thermal energy is transferred between objects.
3. Study heat transfer between objects and the changes of phase that can result from such transfers.

Electricity and Magnetism – Students will learn to:

1. Identify the fundamental characteristics of electrical circuits and the flow of electric charge within circuits.
2. Explain the concept of electrical resistance.
3. Use Ohm's Law to predict the current, voltage, and resistance relationships within electrical circuits.
4. Identify the common types of electrical circuits.

Waves: Sound and Light – Students will learn to:

1. Differentiate between and characterize the properties of transverse and longitudinal waves.
2. Predict the behavior of sound and light waves including reflection, refraction, interference, and resonance and identify practical applications of these behaviors.
3. Explain the similarities and differences between sound and light waves.

Atomic Theory – Students will learn to:

1. Differentiate between elements, compounds, and mixtures.
2. Identify the fundamental concepts of atomic theory.
3. Explain the experimental results of Dalton, Thompson, Rutherford and Bohr and their impact on atomic theory.
4. Explain the concept of radioactivity and the different forms of radioactivity.
5. Differentiate between fusion and fission and identify practical applications of these concepts.

Chemistry – Students will learn to:

1. Explain how chemical bonding leads to the formation of molecules and compounds.
2. Explain the process of dissolution and the function of soaps.
3. Characterize substances as acids or bases based upon their chemical behaviors.
4. Use the pH scale to estimate the acidity or basicity of a solution.
5. Differentiate between several fundamental categories of organic compounds based upon structure function relationships. (ie. Functional groups)
6. Describe the chemical composition of common polymers and explain how the structure of a polymer determines its function.

II. Learning Experiences:

In this course students will:

1. Learn through engagement in authentic scientific investigations.
2. Engage in written and mathematical problem solving.
3. Participate in group discussions and work collectively to demonstrate acquired skills.
4. Listen to class presentations and observe examples of chemistry and physics from their everyday lives.
5. Write about the results of their investigations and what they have learned.

III. Course Outline:

1. Motion
2. Newton's Laws
3. Electricity and Circuits
4. Magnetism
5. Waves
6. Sound
7. Light
8. Atomic Theory
9. Fission and Fusion
10. Thermal Energy
11. Chemical Bonding
12. Solutions

13. Acids and Bases
14. Organic Chemistry
15. Polymers

IV. Course Materials:

The following lists the texts and resources used. Teachers will implement supplementary materials that they believe will enrich the curriculum and extend student learning.

Text: Conceptual Physical Science Explorations: Hewitt, first edition, 2003

Current periodical literature.

Technology:

- a. Internet
- b. Microsoft Word
- c. Microsoft Excel

V. Formative Assessments:

1. Chapter Quizzes
2. Notebook Checks
3. Collins type I, II, and III writing (Includes laboratory reports.)
4. Class problem sets
5. Homework problem sets
6. Unit tests

VI. Summative Assessments

1. Mid-term examination (January of Junior Year)
2. Final examination (June of Junior Year)