Course Objectives

The course participant will:

• Investigate strategies for integrating the hands-on, inquiry-based approach of science instruction into the elementary classroom.
• Use computer software and probes to measure and display temperature.
• Deepen his/her understanding of physical science concepts and their applications to our world.
• Demonstrate understanding of light as a form of energy through class activities, projects, and demonstrations.
• Understand the properties of electricity as a form of energy and how it can be transformed into other types of energy.
• Build circuit boards to illustrate series and parallel circuits.
• Explain the properties of magnets and electromagnets through small-group activities and demonstrations.
• Demonstrate the correct use of grade-appropriate tools and devices in conducting scientific investigations.
• Build and launch a model rocket as an inquiry project.
• Develop a physical science unit correlated with the appropriate South Carolina Science Academic Standards that will utilize the activities, materials, displays, and projects obtained through the Science P.L.U.S. Institute.

Any student with a documented disability needing academic accommodations should contact the Science P.L.U.S. Office at 864.355.8916 prior to arriving at the Institute. All discussions will remain confidential.

Outline of Course Content

(Inquiry standards for fourth grade are incorporated into each day’s activities.)

<table>
<thead>
<tr>
<th>Inquiry Skills:</th>
<th>Activities or Assignments</th>
<th>Correlation to SC Science Academic Standards</th>
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<tbody>
<tr>
<td>• Pretest</td>
<td>4.S.1A. Conceptual Understanding: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.</td>
<td>4.S.1A.1. Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs.</td>
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<td>• Team building</td>
<td>4.S.1A.2. Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.</td>
<td>4.S.1A.3. Plan and conduct scientific investigations to answer questions, test predictions and develop explanations: (1) formulate scientific questions and predict possible outcomes, (2) identify materials, procedures, and variables, (3) select and use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.</td>
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<td>• Color Changing Milk Activity</td>
<td>4.S.1A.4. Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support explanations, claims, or designs.</td>
<td>4.S.1A.4. Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support explanations, claims, or designs.</td>
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<td>• Paper Towel Testing</td>
<td>4.S.1A.5. Use mathematical and computational thinking to (1) express quantitative observations using appropriate English or metric units, (2) collect and analyze data, or (3) understand patterns, trends and relationships between variables.</td>
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<td>• Bubble Gum Testing</td>
<td>4.S.1A.6. Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.</td>
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<tr>
<td>• Prediction/Observation/Inference</td>
<td>4.S.1A.7. Construct scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts.</td>
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<td>• Elephant Toothpaste</td>
<td>4.S.1A.8. Use mathematical and computational thinking to (1) express quantitative observations using appropriate English or metric units, (2) collect and analyze data, or (3) understand patterns, trends and relationships between variables.</td>
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Standard 4.E.2: The student will demonstrate an understanding of the water cycle and weather and climate patterns.

4.E.2A. Conceptual Understanding: Earth’s atmosphere is a mixture of gases, including water vapor and oxygen. The movement of water, which is found almost everywhere on Earth including the atmosphere, changes form and cycles between Earth’s surface and the air and back again. This cycling of water is driven by energy from the Sun. The movement of water in the water cycle is a major pattern that influences weather conditions. Clouds form during this cycle and various types of precipitation result.

4.E.2A.1. Obtain and communicate information about some of the gases in the atmosphere (including oxygen, nitrogen, and water vapor) to develop models that exemplify the composition of Earth’s atmosphere where weather takes place.

4.E.2A.2. Develop and use models to explain how water changes as it moves between the atmosphere and Earth’s surface during each phase of the water cycle (including evaporation, condensation, precipitation, and runoff).

4.E.2B. Conceptual Understanding: Scientists record patterns in weather conditions across time and place to make predictions about what kind of weather might occur next. Climate describes the range of an area’s typical weather conditions and the extent to which those conditions vary over long periods of time. Some weather conditions lead to severe weather phenomena that have different effects and safety concerns.

4.E.2B.1. Analyze and interpret data from observations, measurements, and weather maps to describe patterns in local weather conditions (including temperature, precipitation, wind speed/direction, relative humidity, and cloud types) and predict changes in weather over time.

4.E.2B.2. Observe and communicate information about severe weather phenomena (including thunderstorms, hurricanes, and tornadoes) to explain steps humans can take to reduce the impact of severe weather phenomena.
4.E.3A. Conceptual Understanding: Astronomy is the study of objects in our solar system and beyond. A solar system includes a sun, (star), and all other objects that orbit that sun. Planets in our night sky change positions and are not always visible from Earth as they orbit our Sun. Stars that are beyond the solar system can be seen in the night sky in patterns called constellations. Constellations can be used for navigation and appear to move together across the sky because of Earth’s rotation.

4.E.3A.1 Develop and use models of Earth’s solar system to exemplify the location and order of the planets as they orbit the Sun and the main composition (rock or gas) of the planets.

4.E.3B.2 Construct explanations of how day and night result from Earth’s rotation on its axis.

4.E.3B.3 Construct explanations of how the Sun appears to move throughout the day using observations of shadows.

4.E.3B.4 Develop and use models to describe the factors (including tilt, revolution, and angle of sunlight) that result in Earth’s seasonal changes.

4.E.3A.2 Obtain and communicate information to describe how constellations (including Ursa Major, Ursa Minor, and Orion) appear to move from Earth’s perspective throughout the seasons.

4.E.3A.3 Construct scientific arguments to support claims about the importance of astronomy in navigation and exploration (including the use of telescopes, astrolabes, compasses, and sextants).

4.E.3B. Conceptual Understanding: Earth orbits around the Sun and the Moon orbits around Earth. These movements together with the rotation of Earth on a tilted axis result in patterns that can be observed and predicted.

4.E.3B.1 Analyze and interpret data from observations to describe patterns in the (1) location, (2) movement, and (3) appearance of the Moon throughout the year.

4.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.