

4th Grade Astronomy
2017 Science P.L.U.S. Institute
 Roper Mountain Science Center
 Greenville, South Carolina

Academic Course Description:

Hands-on, inquiry-based activities emphasizing science process skills will provide the vehicles for studying astronomy and space science concepts that correlate to the fourth grade South Carolina Science Academic Standards. Course topics will provide additional content to help develop a secure knowledge base for elementary space science teachers. Participants will observe and measure characteristic properties of the earth and space system components, and investigate their interaction and change. Participants receive a significant quantity of materials for performing the activities in their own classrooms.

Outline of Course Content:

Standard Header			
Standard 4.E.3: The student will demonstrate an understanding of the locations, movements, and patterns of stars and objects in the solar system.			
	Topics	Activities or Assignments	Correlation to SC Science Academic Standards
Monday	Introduction Pre-Test Developing a sense of scale for time/space	<ul style="list-style-type: none"> • Introduction to PLUS • Pre-test • Issues of scale (time and space) • Tour of the Universe • Student probes – science pedagogy 	4.P.1A.1 Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs. 4.P.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.
Tuesday	Sun Earth Moon	<ul style="list-style-type: none"> • Rotation and revolution of the Earth • Exploration of day/night • Demonstration of axis tilt and changing seasons • Using models for the phases of the Moon • Using a lunar log-journal • Planetarium show • Constellation models 	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.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.P.1A.1 Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs. 4.P.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. 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.P.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.

Wednesday	<ul style="list-style-type: none"> Solar System Model Planets Meteors Comets 	<ul style="list-style-type: none"> • Visit observatory for solar viewing • Create a scale model of the solar system, accurate in both size and distance • Create a comet (dry ice) • Build a telescope • Use a telescope • Examination of astronomy literature • Star Lab activities • Night viewing with telescopes and observatory 	<p>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.</p> <p>4.P.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.</p> <p>4.P.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.</p> <p>4.P.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.</p>
Thursday	<ul style="list-style-type: none"> Navigation Tools Constellations Asteroids and Craters 	<ul style="list-style-type: none"> • Engineering challenge – planetary lander • Student research projects • Locating position on Earth (compasses, astrolabes and sextants) • Conduct day viewing in the Daniel Observatory (weather permitting) • Rocket demonstrations 	<p>4.P.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.</p> <p>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.</p> <p>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.</p> <p>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).</p>
Friday	<ul style="list-style-type: none"> Review Participant activities Post Assessment 	<ul style="list-style-type: none"> • General overview of course material • Presentations of participant activities • Post-test assessment 	<p>Standard 4.E.3: The student will demonstrate an understanding of the locations, movements, and patterns of stars and objects in the solar system.</p>

Daily Activities:

- Modeling of science and engineering practices
- Peer discussions of activities, resources, and teaching methodology
- Science Reaction Notebooks
- Exploration of web resources
- Review of day’s events – questions and clarifications
- Discrepant events/engineering challenges
- Student probes (formative assessments)