

Integrated Science Curriculum Alignment Earth Science

Timeline	Strand/Concept	Performance Objective	Resources	Lessons/Objectives - Materials & Supplies	Linkages
<p>Introduction to a Holistic Science (2 week unit)</p>	<p>Strand 1: Inquiry Process Concept 1: Observations, Questions, and Hypotheses</p>	<p>PO 1. Evaluate scientific information for relevance to a given problem.</p> <p>PO 2. Develop questions from observations that transition into testable hypotheses.</p> <p>PO 3. Formulate a testable hypothesis.</p> <p>PO 4. Predict the probable outcome of an investigation based on the hypothesis using statistical evidence, probability, and modeling (not guessing or inferring).</p>	<p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p>	<p>Activities 2.0-3.9</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Activities 2.0-3.9</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Activities 2.0-3.9</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Activities 2.0-3.9</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens 	

	<p>Strand 1: Inquiry Process Concept 2: Scientific Testing (Investigating and Modeling)</p>	<p>PO 1. Demonstrate safe and ethical procedures (e.g., use and care of technology, materials, and organisms) and behavior in all science inquiry.</p> <p>PO 2. Identify the resources needed to conduct an investigation.</p> <p>PO 3. Design an appropriate protocol (written plan of action) for testing a hypothesis.</p> <ul style="list-style-type: none"> • Identify dependent and independent variables in a controlled investigation. • Determine an appropriate method for data collection (e.g., using balances, thermometers, microscopes, spectrophotometer, using qualitative changes). • Determine an appropriate method for recording data (e.g., notes, sketches, photographs, videos, journals (logs), charts, computers/ calculators). 	<p>State & National Rules for Animals in the Classroom Instructor-generated materials</p> <p>State & National Rules for Animals in the Classroom Instructor-generated materials</p> <p>State & National Rules for Animals in the Classroom Instructor-generated materials</p>	<p>Activity: Fish Gill-plate pumping</p> <ul style="list-style-type: none"> • goldfish • beakers • thermometers hot plates • ice <p>Activity 4.0: Design & Implement an Experiment</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Activity 4.0: Design & Implement an Experiment</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens 	
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	<p>Strand 1: Inquiry Process Concept 3: Analysis, Conclusions, & Refinement</p>	<p>PO 4. Conduct a scientific investigation that is based on a research design.</p> <p>PO 5. Record observations, notes, sketches, questions, and ideas using tools such as journals, charts, graphs, and computers.</p> <p>PO 1. Interpret data that show a variety of possible relationships between variables, including:</p> <ul style="list-style-type: none"> • positive relationship • negative relationship • no relationship <p>PO 2. Evaluate whether investigational data support or do not support the proposed hypothesis.</p> <p>PO 3. Critique reports of scientific studies (e.g. published papers, student reports).</p> <p>PO 4. Evaluate the design of an investigation to identify possible sources of procedural error, including:</p> <ul style="list-style-type: none"> • sample size • trials • controls • analyses 	<p>State & National Rules for Animals in the Classroom Instructor-generated materials</p> <p>State & National Rules for Animals in the Classroom Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p>	<p>Activity 4.0: Design & Implement an Experiment</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Activities 2.0-3.9</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Activities 2.0-3.9</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons</p>	
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	<p>Strand 1: Inquiry Process Concept 4: Communication</p>	<p>PO 5. Design models (conceptual or physical) of the following to represent "real world" scenarios:</p> <ul style="list-style-type: none"> • carbon cycle • water cycle • phase change • collisions <p>PO 7. Propose further investigations based on the findings of a conducted investigation.</p> <p>PO 1. For a specific investigation, choose an appropriate method for communicating the results.</p> <p>PO 2. Produce graphs of data that communicate data.</p> <p>PO 3. Communicate results clearly and logically.</p> <p>PO 4. Support conclusions with logical scientific arguments.</p>	<p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p>	<p>throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Activity 4.0: Design & Implement an Experiment</p> <ul style="list-style-type: none"> • Copier paper • Transparencies • Dry erase pens <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p>	
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	<p>Strand 2: History & Nature of Science Concept 1: History of Science as a Human Endeavor</p>	<p>PO 1. Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide.</p> <p>PO 2. Describe how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.</p> <p>PO 3. Evaluate the contributions of early cultures to scientific knowledge and technological inventions.</p> <p>PO 4. Analyze how specific changes in science have affected society.</p> <p>PO 5. Analyze how specific cultural and/or societal issues promote or hinder scientific advancements.</p>	<p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p>	<p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p>	
	<p>Strand 2: History & Nature of Science Concept 2: Nature of Scientific Knowledge</p>	<p>PO 1. Specify the requirements of a valid, scientific explanation (theory), including that it be:</p> <ul style="list-style-type: none"> • logical • subject to peer review • public • respectful of rules of evidence <p>PO 2. Explain the process by which accepted ideas are challenged or extended by scientific innovation.</p>	<p>Instructor-generated materials</p> <p>Instructor-generated materials</p>	<p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p>	

	<p>Strand 3: Science in Personal & Social Perspectives Concept 2: Science and Technology in Society</p>	<p>PO 3. Distinguish between pure and applied science.</p> <p>PO 4. Describe how scientists continue to investigate and critically analyze aspects of theories.</p> <p>PO 2. Recognize the importance of basing arguments on a thorough understanding of the core concepts and principles of science and technology.</p> <p>PO 3. Support a position on a science or technology issue.</p>	<p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p> <p>Instructor-generated materials</p>	<p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p> <p>Embedded in lessons throughout semester</p>	
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<p>The Big Picture: The Universe & Solar System (3 week unit)</p>	<p>Strand 6: Earth & Space Science Concept 4: Origin and Evolution of the Universe</p>	<p>PO 1. Describe the Big Bang Theory as an explanation for the origin of the universe.</p> <p>PO 2. Discuss the fusion process that takes place in stars.</p> <p>PO 3. Analyze the evolution of various types of stars using the Hertzsprung-Russell (HR) diagram.</p> <p>PO 4. Compare the evolution (life cycles) of stars of different masses (low and high mass).</p> <p>PO 5. Explain the formation of the light elements in stars and the heavier elements (what astronomers call “metals”) in supernova explosions.</p> <p>PO 6. Explain the evolution and life cycles of galaxies.</p>	<p>Text: <i>Explorations</i></p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p>	<p>Lecture/Class Discussion Balloon Universe Activity</p> <ul style="list-style-type: none"> • Balloons • Markers <p>Lecture/Class Discussion Molecular Model Activity</p> <ul style="list-style-type: none"> • Molecular Model Set <p>Activity: Diagram the Stars of Orion Using the H-R Diagram</p> <p>Stardust Model</p> <p>Lecture/Class Discussion Video</p> <p>Lecture/Class Discussion Video</p>	
	<p>Strand 6: Earth & Space Science Concept 3: Origin & Evolution of the Earth System</p>	<p>Earth Origin/System: PO 1. Describe the scientific theory of the origin of the solar system (solar nebular hypothesis).</p>	<p>Text: <i>Explorations</i></p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p>	<p>Activity: Diagram the Steps to Solar System Formation</p>	

		<p>PO 2. Describe the characteristics, location, and motions of the various kinds of objects in our solar system, including the Sun, planets, satellites, comets, meteors, and asteroids.</p> <p>PO 3. Explain the phases of the moon, eclipses (lunar and solar), and the interaction of the Sun, Moon and Earth (tidal effect).</p>	<p>Text: <i>Explorations</i></p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p> <p>Text: <i>Explorations</i></p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p>	<p>Activity: Diagram the Steps to Solar System Formation</p> <p>Activity: Diagram the Steps to Solar System Formation</p>	
<p>The Invisible Envelope: Weather & Climate (3 week unit)</p>	<p>Strand 6: Earth & Space Science</p> <p>Concept 2: Energy in the Earth System (Both Internal and External)</p>	<p>PO 9. Explain the effect of heat transfer on climate and weather.</p> <p>PO 10. Demonstrate the effect of the Earth's rotation (i.e., Coriolis Effect) on the movement of water and air.</p> <p>PO 11. Describe the origin, life cycle, and behavior of weather systems (i.e., air mass, front, high and low systems, pressure gradients).</p> <p>PO 12. Describe the conditions that cause severe weather (e.g., hurricanes, tornadoes, thunderstorms).</p> <p>PO 13. Propose appropriate safety measures that can be taken in preparation for severe weather.</p>	<p>Text: <i>Geosystems</i></p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p>	<p>Vortex in a Bottle Activity</p> <p>Weather Map Activity</p> <p>Lecture, Video</p> <p>Group Brainstorm Activity</p>	

		<p>PO 14. Analyze how weather is influenced by both natural and artificial Earth features (e.g., mountain ranges, bodies of water, cities, air pollution).</p> <p>PO 15. List the factors that determine climate (e.g., altitude, latitude, water bodies, precipitation, prevailing winds, topography).</p> <p>PO 16. Explain the causes and/or effects of climate changes over long periods of time (e.g., glaciation, desertification, solar activity, greenhouse effect).</p> <p>PO 17. Investigate the effects of acid rain, smoke, volcanic dust, urban development, and greenhouse gases, on climate change over various periods of time.</p>		Lab: Dry Ice/Topography	
<p>Geological Composition & Processes (3 week unit)</p>	<p>Strand 6: Earth & Space Science Concept 2: Energy in the Earth System (Both Internal and External)</p>	<p>PO 1. Describe the flow of energy to and from the Earth.</p> <p>PO 2. Explain the mechanisms of heat transfer (convection, conduction, radiation) among the atmosphere, land masses, and oceans.</p> <p>PO 4. Demonstrate the relationship between the Earth's internal convective heat flow and plate tectonics.</p>	<p>Text: <i>Geosystems</i></p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p>	<p>Heat Transfer Lab</p> <p>Hot Plates Activity (Earth Science p 138)</p>	

	<p>Strand 6: Earth and Space Science Concept 1: Geochemical Cycles</p>	<p>PO 5. Demonstrate the relationships among earthquakes, volcanoes, mountain ranges, mid-oceanic ridges, deep sea trenches, and tectonic plates.</p> <p>PO 6. Distinguish among seismic S, P, and surface waves.</p> <p>PO 7. Analyze seismic evidence (S and P waves) used to determine the structure of the Earth.</p> <p>PO 8. Describe how radioactive decay maintains the Earth's internal temperature.</p> <p>PO 1. Identify ways materials are cycled within the Earth system (i.e., carbon cycle, water cycle, rock cycle).</p> <p>PO 2. Demonstrate how dynamic processes such as weathering, erosion, sedimentation, metamorphism, and orogenesis relate to redistribution of materials within the Earth system.</p>	<p>Text: <i>Geosystems</i></p> <p>Pamphlet: Geology of the Verde Valley</p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p> <p>Field Activities</p>	<p>Modeling Sea Floor Spreading Activity (Earth Science p 130) Chocolate Bar Activity (Earth Science p 135)</p> <ul style="list-style-type: none"> • Copier paper • Markers • Scissors • Chocolate bars <p>Activity: Modeling S & P Waves</p> <ul style="list-style-type: none"> • Ripple Tank • Slinkies <p>Activity: Diagram S & P Waves</p> <p>Interactive Discussion Video</p> <p>Activity: Diagram CWR Cycles</p> <p>Schuermann Mountain Hike</p> <ul style="list-style-type: none"> • Field trip forms <p>Activity: Stream Table</p> <ul style="list-style-type: none"> • Stream Table Kit 	
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		PO 1. Evaluate how the	Text:		

<p>Applying the Earth Sciences (3 week unit)</p>	<p>Strand 3: Science in Personal and Social Perspectives Concept 1: Changes in Environments</p>	<p>processes of natural ecosystems affect, and are affected by, humans.</p> <p>PO 2. Describe the environmental effects of the following natural and/or human-caused hazards:</p> <ul style="list-style-type: none"> • flooding • drought • earthquakes • fires • pollution • extreme weather <p>PO 3. Assess how human activities (e.g., clear cutting, water management, tree thinning) can affect the potential for hazards.</p> <p>PO 4. Evaluate the following factors that affect the quality of the environment:</p> <ul style="list-style-type: none"> • urban development • smoke • volcanic dust <p>PO 5. Evaluate the effectiveness of conservation practices and preservation techniques on environmental quality and biodiversity.</p> <p>PO 1. Analyze the costs, benefits,</p>	<p><i>Environmental Science</i></p> <p>Instructor-generated materials</p> <p>Videos</p> <p>Online Resources</p>	<p>Project: Anthropogenic & Natural Effects on the Environment</p> <p>Project: Anthropogenic & Natural Effects on the Environment</p> <p>Project: Anthropogenic & Natural Effects on the Environment</p> <p>Project: Anthropogenic & Natural Effects on the Environment</p> <p>Project: Anthropogenic & Natural Effects on the Environment</p>	
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	<p>Strand 3: Science in Personal and Social Perspectives Concept 2: Science and Technology in Society</p>	<p>and risks of various ways of dealing with the following needs or problems</p> <ul style="list-style-type: none"> • various forms of alternative energy • storage of nuclear waste • abandoned mines • greenhouse gases • hazardous wastes <p>PO 2. Recognize the importance of basing arguments on a thorough understanding of the core concepts and principles of science and technology.</p> <p>PO 3. Support a position on a science or technology issue.</p> <p>PO 4. Analyze the use of renewable and nonrenewable resources in Arizona:</p> <ul style="list-style-type: none"> • water • land • soil • minerals • air <p>PO 5. Evaluate methods used to manage natural resources (e.g., reintroduction of wildlife, fire ecology).</p>		<p>Project: Best Management Practices: Are Humans Sustainable?</p> <p>Project: Best Management Practices: Are Humans Sustainable?</p> <p>Project: Best Management Practices: Are Humans Sustainable?</p> <p>Project: Best Management Practices: Are Humans Sustainable?</p> <p>Project: Best Management Practices: Are Humans Sustainable?</p>	
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