

## ELL Physical and Earth Science 4400

**Description** This is a general science course with an emphasis on the integration of physical science and earth science. The course will provide students the opportunity to discover major science concepts while developing critical thinking skills and an emphasis on developing English communication skills and vocabulary relevant to science content. Laboratory work will be an integral part of this course. Students will explore many of the fascinating and exciting aspects of science that allow them to gain knowledge useful to functioning as a citizen in our technological world.

**Credits** 1

**Prerequisites** Eighth Grade Science or Center Science

**Textbooks/Resources** *Foundations of Physical Science with Earth and Space Science*. Hsu, Tom. 2003. CPO Science. ISBN 1-58892-059-3  
*Foundations of Physical Science with Earth and Space Science Investigations*. Hsu, Tom. 2003. CPO Science. ISBN 1-58892-060-7

**Required Assessments** District-Wide Standards-Based Assessment  
**Board Approved** October, 2005  
**Revised**

### AASD Science Goals for K-12 Students

- *Students will know about science themes and connect and integrate them into what they know about themselves and the world around them.*
- *Students will realize that scientific knowledge is public, replicable, and continually undergoing revision and refinement based on new experiments and data.*
- *Students will realize that science includes questioning, forming hypotheses, collecting and analyzing data, reaching conclusions, evaluating results, and communicating procedures and findings to others.*
- *Students will use science to explain and predict changes that occur around them.*
- *Students will use science to evaluate consequences in order to make responsible choices.*
- *Students will use their knowledge of science concepts and processes in making informed choices regarding their lifestyles and the impact they have on their environment, and enhance their natural curiosity about their environment.*
- *Students will understand that science and technology affect Earth's systems and provide solutions to human problems.*
- *Students will use science to analyze topics related to personal health, environment, and management of resources; they will help evaluate the merits of alternative courses of action.*

## AASD Science Standards for Grades 5-12 Students

- |                        |   |
|------------------------|---|
| I. Science Connections | <ul style="list-style-type: none"><li>A. Apply the underlying themes of science to develop defensible visions of the future.</li><li>B. Show how conflicting assumptions about science themes lead to different opinions and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future.</li><li>C. Give examples that show how partial systems, models, and explanations are used to give quick and reasonable solutions that are accurate enough for basic needs.</li><li>D. Construct arguments that show how conflicting models and explanations of events can start with similar evidence.</li><li>E. Show how the ideas and themes of science can be used to make real-life decisions about careers, work places, life-styles, and use of resources.</li><li>F. Identify and replace inaccurate personal models and explanations of science-related phenomena using evidence learned or discovered.</li><li>G. Re-examine the evidence and reasoning that lead to conclusions drawn from investigations.</li></ul> |
| II. Nature of Science  | <ul style="list-style-type: none"><li>A. Show how cultures and individuals have contributed to the development of major ideas in science.</li><li>B. Identify the cultural conditions that are usually present during great periods of discovery, scientific development, and inventions.</li><li>C. Relate the major themes of science to human progress in understanding science and the world.</li><li>D. Show how basic research and applied research contribute to new discoveries, inventions, and applications.</li><li>E. Explain how science is based on assumptions about the natural world and themes that describe the natural world.</li></ul>   |
| III. Science Inquiry   | <ul style="list-style-type: none"><li>A. Ask and write questions suggested by current social issues, scientific literature, and observations of phenomena.</li><li>B. Review previous research on questions, build hypotheses that might answer the questions, design possible investigations, and describe results that might emerge from investigations.</li><li>C. Design and conduct responsible and safe investigations to help answer questions.</li><li>D. Choose the best data collection procedures and materials available, and use them competently.</li><li>E. Calculate the degree of precision of the resulting data from data collection.</li><li>F. Use explanations and models from science to develop likely explanations for the results of investigations.</li><li>G. Present the results of investigations to groups concerned with the issues being investigated.</li><li>H. Evaluate articles and reports from a variety of sources using criteria related to standards of experimental design.</li></ul>  |

## AASD Science Standards for Grades 5-12 Students (continued)

### IV. Physical Science

- A. Observe, describe, and measure physical and chemical properties of elements and other substances.
- B. Use the major ideas of atomic theory and molecular theory to describe physical and chemical interactions.
- C. Conduct investigations and use the science themes to develop explanations of physical and chemical interactions and energy exchanges.
- D. Explain how models of the atomic structure of matter have changed over time.
- E. Describe the forces acting on objects in motion.
- F. Explain motion in relation to real-life situations.
- G. Define energy and conservation of energy.
- H. Describe and investigate the properties of electromagnetic radiation, gravity, and sound as they interact with material objects.
- I. Use models to explain the behaviors of various forms of energy transmission.
- J. Summarize how chemical interactions and behaviors lead to new substances.

### V. Earth and Space Science

- A. Explain and predict changes in major features of (a) land, (b) water, and (c) atmospheric systems.
- B. Describe underlying structures of the Earth that cause changes in the Earth's surface.
- C. Describe climate, weather, ocean currents, soil movements and changes in the forces acting on the earth.
- D. Analyze the influence living organisms have had on the earth's systems, including their impact on the composition of the atmosphere and the weathering of rocks.
- E. Investigate and understand that many aspects of the history and evolution of the Earth and life can be inferred by studying rocks and fossils.
- F. Investigate human use of the Earth's resources over the past 100 years. Explain that the basis for efforts to conserve and recycle renewable and nonrenewable resources are a result of past use.
- G. Describe the general structure of the solar system, galaxies, and the universe, explaining the nature of the evidence used to develop current models of the universe.
- H. Using past and current models of the structure of the solar system, explain the daily, monthly, yearly, and long-term cycles of the earth.

## AASD Science Standards for Grades 5-12 Students (continued)

- |                                    |  |
|------------------------------------|--|
| VI. Life and Environmental Science | <ul style="list-style-type: none"><li>A. Explain how heredity is comprised of the characteristic traits found in genes within the cells of an organism.</li><li>B. Understand how organisms both reproduce and pass on characteristics of their species.</li><li>C. Understand that organisms are capable of regulating internal body conditions in response to internal and external stimuli.</li><li>D. Distinguish between cell structures and their underlying functions.</li><li>E. Explain that cell functions involve chemical reactions.</li><li>F. Explain how cell differentiation and reproduction is regulated through the expression of different genes.</li><li>G. Investigate how the instructions for specifying the characteristics of the organism are carried in the DNA in all organisms.</li><li>H. Determine that most cells contain chromosomes that allow for variation between generations.</li><li>I. Model the spontaneous process of changes in DNA (mutations).</li><li>J. Explain that species variation allows for variable levels of survival based upon principles of natural selection.</li><li>K. Diagram a biological classification scheme based upon evolutionary relationships between organisms.</li><li>L. Summarize how matter affects earth cycles among the living and nonliving components of the biosphere.</li><li>M. Explain that energy flows through ecosystems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers.</li><li>N. Investigate how organisms both cooperate and compete in ecosystems.</li><li>O. Explain that population size is dependent upon the amount of resources and environments available.</li><li>P. Explain how biological evolution accounts for the diversity of a species.</li><li>Q. Summarize how the evidence of common ancestry, chemical processes, and internal structures demonstrate unity among organisms.</li><li>R. Trace how the sensory and nervous systems of various organisms react to changes in internal and external environment and transmit survival or learning stimuli to cause changes in behavior or responses.</li></ul> |
| VII. Science Applications          | <ul style="list-style-type: none"><li>A. Design, build, evaluate, and revise models and explanations related to the earth and space, life and environmental, and physical sciences.</li><li>B. Analyze the costs, benefits, or problems resulting from a scientific or technological innovation, including implications for the individual in the community.</li><li>C. Choose a specific problem in our society, identify alternative scientific or technological solutions to that problem and argue its merits.</li><li>D. Show how a major scientific or technological change has had an impact on work, leisure, or the home.</li><li>E. Identify personal interests in science and technology; account for implications that these interests might have for future education, and options to be considered.</li></ul>  |

**AASD Science Standards for Grades 5-12 Students (continued)****VIII. Science in Social  
and Personal  
Perspectives**

- A. Construct a plan for making decisions that includes the use of current scientific knowledge and scientific reasoning.
- B. Show how policy decisions in science depend on many factors, including social values, ethics, beliefs, timeframes, and considerations of science and technology.
- C. Advocate a solution or combination of solutions to a problem in science or technology.
- D. Analyze the costs, risks, benefits, and consequences of a proposal concerning resource management in the community and determine the potential impact of the proposal on life in the community and the region.
- E. Evaluate proposed policy recommendations in science and technology for validity, evidence, reasoning, and short- and long-term implications.
- F. Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment or community.
- G. Evaluate data and sources of information when using scientific information to make decisions.

### WIDA English Language Proficiency Standards (Grades 9-12)

Domain	Level 1 Entering	Level 2 Beginning	Level 3 Developing	Level 4 Expanding	Level 5 Bridging
<b>Listening</b>	<ul style="list-style-type: none"> <li>locate physical, biological, chemical, or earth/space structures from pictures and oral statements (such as cells, organs, magnetism, atoms, or constellations)</li> <li>collect and prepare real-life materials needed for <b>scientific</b> experiments based on oral directions</li> </ul>	<ul style="list-style-type: none"> <li>differentiate types of physical, biological, chemical, or earth/space structures from pictures and oral statements (such as plant cells, kidneys and liver, compounds, or solar systems)</li> <li>replicate <b>scientific</b> experiments using real-life materials based on oral directions</li> </ul>	<ul style="list-style-type: none"> <li>match the functions of related physical, biological, chemical, or earth/space structures from oral descriptions (such as homeostasis/dormancy or atomic/nuclear structures)</li> <li>build different hypotheses based on oral descriptions of <b>science</b> issues</li> </ul>	<ul style="list-style-type: none"> <li>compare/contrast the functions of related physical, biological, chemical, or earth/space structures from oral descriptions (such as fossils/genetics or boiling/melting points)</li> <li>match different oral explanations of the results with evidence of the findings</li> </ul>	<ul style="list-style-type: none"> <li>match analogies (of the functions) of related biological, chemical, or physical structures from oral descriptions from grade level <b>science</b> text</li> <li>conduct <b>scientific</b> inquiry using multimedia resources that include oral input</li> </ul>
<b>Speaking</b>	<ul style="list-style-type: none"> <li>identify components of systems, chains, or cycles from diagrams or graphic organizers (such as taxonomic systems, food chains, or life cycles)</li> <li>create and present collages or depictions of <b>scientific</b> issues</li> </ul>	<ul style="list-style-type: none"> <li>give examples of or describe components of systems, chains, or cycles from diagrams or graphic organizers (such as functions of veins and arteries of the circulatory system)</li> <li>brainstorm ideas based on illustrations <b>scientific</b> issues that affect everyday life (e.g., "What are some examples of pollution?")</li> </ul>	<ul style="list-style-type: none"> <li>describe how systems, chains, or cycles operate from diagrams or graphic organizers (such as solar system or water cycle)</li> <li>describe ways in which <b>scientific</b> issues can be resolved (e.g., "How can we reduce pollution?")</li> </ul>	<ul style="list-style-type: none"> <li>discuss how systems, chains or cycles are interdependent (such as ecosystems or respiratory systems)</li> <li>discuss pros and cons of <b>scientific</b> issues using graphic organizers</li> </ul>	<ul style="list-style-type: none"> <li>explain and give examples of the principle of interdependence of systems or the iterative nature of chains and cycles (such as endocrine system)</li> <li>engage in debates on <b>scientific</b> issues (such as genetic engineering, nuclear energy)</li> </ul>

<p><b>Reading</b></p>	<ul style="list-style-type: none"> <li>identify data from <b>scientific</b> studies from tables, charts, or graphs</li> <li>match pictures of <b>scientific</b> equipment with their uses (such as telescope-see stars)</li> </ul>	<ul style="list-style-type: none"> <li>match sources of data depicted in tables, charts, or graphs from <b>scientific</b> studies with research questions</li> <li>match pictures of <b>scientific</b> equipment with descriptions of kinds of scientists (e.g., “Biologists use this tool to see cells.”)</li> </ul>	<ul style="list-style-type: none"> <li>extract information on the use of data presented in text and tables</li> <li>identify <b>scientific</b> equipment needed for <b>scientific</b> investigations (e.g., “You are examining the migratory patterns of birds. Which scientific tools will help you?”)</li> </ul>	<ul style="list-style-type: none"> <li>interpret data presented in text and tables in <b>scientific</b> studies</li> <li>Identify <b>scientific</b> equipment associated with descriptions of <b>scientific</b> investigations</li> </ul>	<ul style="list-style-type: none"> <li>evaluate <b>scientific</b> data and discuss the implications of the studies presented in grade level text</li> <li>evaluate relative use of <b>scientific</b> equipment based on readings from <b>scientific</b> investigations (e.g., “Which works best to predict weather patterns and why?”)</li> </ul>
<p><b>Writing</b></p>	<ul style="list-style-type: none"> <li>draw pictures and label steps in <b>scientific</b> experiments (such as distillation)</li> <li>use drawings, words, and phrases to answer WH-questions on lab reports based on experiments</li> </ul>	<ul style="list-style-type: none"> <li>state procedures for <b>scientific</b> experiments in biology, chemistry, physics, or earth/space <b>science</b></li> <li>use phrases, sentences, and diagrams to answer questions on lab reports based on experiments</li> </ul>	<ul style="list-style-type: none"> <li>provide information learned from <b>scientific</b> experiments in a lab report, including pre-experiment predictions</li> <li>complete lab reports following step-by-step procedures based on experiments</li> </ul>	<ul style="list-style-type: none"> <li>interpret findings gleaned from data from <b>scientific</b> experiments</li> <li>produce lab reports from outlines or learning logs based on <b>science</b> experiments</li> </ul>	<ul style="list-style-type: none"> <li>justify conclusions reached from examining <b>scientific</b> data</li> <li>produce narrative lab reports based on grade level <b>science</b> experiments</li> </ul>

<b>Course Objectives</b>	<b>Performance Indicators</b>	<b>Classroom Assessments</b>
<p><b>1. Apply the underlying themes of science to develop defensible visions of the future. (A.12.1.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. identifies possible future problems.</li> <li>2. develops a defensible vision of the future based on a problem.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Using computers and/or newspapers, list beginning problems that may worsen.</li> <li>2.a. Model a possible scientific discovery (e.g., living on the moon, video phone) to solve a problem.</li> <li>2.b. Draw a picture or create a model to show the student's city at a given future point.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Science Connections</p>		
<p><b>2. Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future. (A.12.2.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. identifies conflicting assumptions about science themes.</li> <li>2. shows how conflicting assumptions lead to different opinions and decisions</li> <li>3. shows how these opinions and decisions have diverse effects.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Using interviews, newspapers, and/or computers, list science themes found in resources and conflicting assumptions concerning them.</li> <li>2.a. Present research on a set of conflicting assumptions about a chosen science theme.</li> <li>2.b. Debate conflicting assumptions with a native language group.</li> <li>3.a. Interview and compare in a visual (e.g., a Venn diagram) people who hold conflicting assumptions on a science theme.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Science Connections</p>		



<b>Course Objectives</b>	<b>Performance Indicators</b>	<b>Classroom Assessments</b>
<b>3. Construct arguments that show how conflicting models and explanations of events can start with similar evidence. (A.12.4.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. identifies different types of evidence.</li> <li>2. investigates conflicting models to find examples that start from the same evidence.</li> <li>3. designs a model based on evidence.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Assemble a list of the types of evidence.</li> <li>2.a. Given conflicting models and explanations, research and record the evidence to support each model.</li> <li>3.a. Based on the evidence given, create a model or explanation of the evidence.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Science Connections		
<b>4. Identify and replace inaccurate personal models and explanations of science-related phenomena using evidence learned or discovered. (A.12.6.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. identifies personal models and explanations.</li> <li>2. compares personal models to accurate models.</li> <li>3. uses evidence to replace an inaccurate model.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Given a teacher-generated science question, illustrate the models and related explanations.</li> <li>2.a. Given a model, create a visual (e.g., a Venn diagram) to compare it to the personal model.</li> <li>3.a. Given a teacher-generated science question, illustrate an accurate model related to it.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Science Connections		

Course Objectives	Performance Indicators	Classroom Assessments
<b>5. Show how cultures and individuals have contributed to the development of major ideas in the earth and space, life and environmental, and physical sciences. (B.12.1.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. identifies and describe people or cultures that have contributed to the development of major ideas in the sciences.</li> <li>2. acquires information about people or cultures that contributed to science.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Identify contributors to the sciences from the student's native country.</li> <li>2.a. Describe a person or culture through a picture, word map, portfolio, demonstration, or skit.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Nature of Science		
<b>6. Identify the cultural conditions that are usually present during great periods of discovery, scientific development, and invention. (B.12.2.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. identifies discoveries, developments and inventions during a period.</li> <li>2. describes conditions present during great periods of discovery, scientific development, and invention.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. In groups, create a collage, web, or other visual to show advancements during the Industrial Revolution.</li> <li>2.a. Identify the cultural conditions present during the Industrial Revolution.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Nature of Science		
<b>7. Relate the major themes of science to human progress in understanding science and the world. (B.12.3.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. explains changes in scientific thinking throughout history.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Compare and contrast the thinking of various scientists (e.g., Aristotle, Copernicus, Galileo, Newton, and Einstein). Show how these scientists challenged the commonly held world view of their time.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Nature of Science		

Course Objectives	Performance Indicators	Classroom Assessments
<p><b>8. Show how basic research and applied research contribute to new discoveries, inventions, and applications. (B.12.4.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. illustrates the importance of research to a discovery, invention or application.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Using a teacher-created form, web, graphic organizer or visual, present information to show how an important discoverer or inventor used research.</li> <li>1.b. Use prior research to invent a new idea or product.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Nature of Science</p>		
<p><b>9. Explain how science is based on assumptions about the natural world and themes that describe the natural world. (B.12.5.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. gives examples of assumptions or laws about the natural world.</li> <li>2. explains how an assumption or law affects science.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Complete experiments based on assumptions or laws and record the represented assumptions or laws.</li> <li>2.a. Choose a law or assumption and demonstrate through pictures, words or experiments how it affects science.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Nature of Science</p>		

<b>Course Objectives</b>	<b>Performance Indicators</b>	<b>Classroom Assessments</b>
<b>10. Ask and write questions suggested by current social issues, popular science literature, and observations of phenomena. (C.12.1.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. asks questions based on current issues, literature, and observations.</li> <li>2. writes questions related to an area of science</li> <li>3. identifies prior knowledge related to the questions.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Compare science-related questions after discussing, reading, or watching a video concerning current issues, literature and observations.</li> <li>1.b. In a group, generate questions ups based on a demonstration or experiment.</li> <li>2.a. Brainstorm and subsequently classify questions from many science areas.</li> <li>2.b. Utilize information from the student's prior knowledge and research to make a logical inference or hypothesis about a question's answer.</li> <li>3.a. Relate research and prior knowledge to a selected group of science area questions.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Science Inquiry		
<b>11. Design and conduct responsible and safe investigations to help answer questions. (C.12.3.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. designs and conducts safe investigations to answer questions.</li> <li>2. establishes parameters for evaluating data.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. With partners, formulate and conduct a process directly related to a question.</li> <li>2.a. Design a rubric or grading scale to evaluate data.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Science Inquiry		

Course Objectives	Performance Indicators	Classroom Assessments
<p><b>12. During investigations, choose the best data collection procedures and materials available and use them competently. (C.12.4a.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. chooses the best data collection procedures.</li> <li>2. uses a data collection procedure competently.</li> <li>3. evaluates data collected in an investigation.</li> <li>3. suggests ways to improve data-collection.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Given an investigation to complete and a variety of data collection options, select the best option.</li> <li>2.a. Collect and record data during an investigation.</li> <li>3.a. After conducting an experiment, meet with other students to describe, compare, and critique the data collection process.</li> <li>4.a. In groups, list ways to improve data collection.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Science Inquiry</p>		
<p><b>13. Observe, describe, and measure physical and chemical properties of elements and other substances. (D.8.1.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. classifies objects according to similar physical properties.</li> <li>2. classifies objects according to similar chemical properties.</li> <li>3. identifies and groups objects according to similar chemical and physical properties.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Use a graphic organizer to group objects by mass, weight, volume, physical state, density, color, texture, hardness, magnetic attraction, and conductivity.</li> <li>2.a. Use a graphic organizer to group objects by chemical properties.</li> <li>3.a. Use a graphic organizer to group objects by chemical and physical properties.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Physical Science</p>		

Course Objectives	Performance Indicators	Classroom Assessments
<b>14. Use the major ideas of atomic theory and molecular theory to describe physical and chemical interactions. (D.8.2.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. distinguishes between elements, compounds, or mixtures.</li> <li>2. demonstrates that atoms are composed of smaller particles called protons, neutrons, and electrons.</li> <li>3. knows that atoms in solids are close together and don't move about easily. Atoms in liquids are close to each other but move about easily. Atoms in gases are quite far apart and move about freely.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Classify substances as elements, compounds, or mixtures.</li> <li>2.a. Use drawings to compare the atoms of various elements in terms of the particle composition and arrangement.</li> <li>3.a. Observe molecular movement in three beakers of water and determine if each beaker is hot, warm, or cold.</li> <li>3.b. Submit a design for a driveway that won't crack because of expansion or contraction.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Physical Science		
<b>15. Summarize how chemical interactions and behaviors lead to new substances. (D.8.3.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. understands that the properties of compounds differ from the properties of elements.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Compare properties of individual elements to the properties of compounds containing the elements.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Physical Science		
<b>16. Conduct investigations and use the science themes to develop explanations of physical and chemical interactions and energy exchanges. (D.8.4.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. while conducting investigations, uses the science themes (change, constancy, evidence, and measurement) to develop explanations.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Design airplanes and explain which modifications produced the best flight results.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Physical Science		

<b>Course Objectives</b>	<b>Performance Indicators</b>	<b>Classroom Assessments</b>
<b>17. Describe the motion of objects by describing the forces acting on them. (D.8.5.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. understands the concept of inertia (Newton's first law).</li> <li>2. explains how the forces of friction and gravity affect the motion of objects.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Explain the relationship between wearing a seatbelt and inertia.</li> <li>2.a. Using a pendulum, design an experiment to measure gravity's effect.</li> <li>2.b. Use a ball on a ramp to investigate and measure motion in terms of speed, distance, and time.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Physical Science		
<b>18. Explain motion in relation to real-life situations. (D.8.6.)</b>	<b>Performance will be satisfactory when the student:</b> <ol style="list-style-type: none"> <li>1. uses the concepts of speed, velocity, acceleration, friction, and momentum to explain the motion of objects.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Use a concept definition map to explain speed, velocity, acceleration, friction, and momentum.</li> <li>1.b. Find or draw pictures illustrating the concepts of speed, velocity, accelerations, friction, and momentum.</li> <li>1.c. Design an investigation to show the relationship between speed, velocity, acceleration, and momentum.</li> </ol>
<b>Above objective aligned with AASD Science standards:</b> Physical Science		

Course Objectives	Performance Indicators	Classroom Assessments
<b>19. Define energy and conservation of energy. (D.8.7.)</b>	<b>Performance will be satisfactory when the student:</b> 1. conducts an experiment to verify substances within a closed system interact with one another the total mass of the remains the same no matter how atoms are arranged (Law of Conservation of Matter).	1.a. Conduct an experiment resulting in a chemical change and compare the mass of the substance before and after the reaction (e.g., burn a marshmallow in a closed container). 1.b. Compare, record, and explain what happens to an ice cube once it melts, refreezes, and melts again. Measure the mass before and after. Use drawings.
<b>Above objective aligned with AASD Science standards:</b> Physical Science		
<b>20. Describe and investigate the properties of electromagnetic radiation, gravity, and sound as they interact with material objects. (D.8.8.)</b>	<b>Performance will be satisfactory when the student:</b> 1. describes and investigates light. 2. describes and investigates the electromagnetic spectrum (such as gamma, x-ray, ultraviolet, and infrared). 3. describes and investigates that vibrations move at different speeds in different materials. 4. demonstrates that electric current can produce magnetic forces, and magnets can cause electric currents.	1.a. Use a prism to separate light into component wavelengths. 1.b. Compare and contrast light refraction through various substances. 2.a. Compare the effects of various types of electromagnetic radiation. 3.a. Design an investigation to show the effects of different materials on the speed of radio or sound waves. 4.a. Construct an electromagnet.
<b>Above objective aligned with AASD Science standards:</b> Physical Science		



<b>Course Objectives</b>	<b>Performance Indicators</b>	<b>Classroom Assessments</b>
<b>21. Use models to explain the behaviors of various forms energy transmission. (D.8.9.)</b>	<b>Performance will be satisfactory when the student:</b> 1. explains the behaviors of energy resources (solar, fossil fuels, hydroelectric, geothermal, wind, nuclear, and tidal), using models of energy transmission.	1.a. Compare the advantages and disadvantages of various energy types.
<b>Above objective aligned with AASD Science standards:</b> Physical Science		
<b>22. Explain how models of the atomic structure of matter have changed over time. (D.8.10.)</b>	<b>Performance will be satisfactory when the student:</b> 1. explains how models of the atomic structure of matter have changed over time, including historical models and modern atomic theory.	1.a. Construct a model of the atomic structure of matter based on modern atomic theory and a second model based on earlier atomic theory.
<b>Above objective aligned with AASD Science standards:</b> Physical Science		
<b>23. Using the science themes, explain and predict changes in major features of (a) land, (b) water, and (c) atmospheric systems. (E.8.1.)</b>	<b>Performance will be satisfactory when the student:</b> 1. explains and predicts changes in major features of land, water, and atmospheric systems.	1.a. Interpret U.S. Geological drawings to describe the formation of mountains. 1.b. Use actual examples from photos or maps to describe the erosion of a mountain.
<b>Above objective aligned with AASD Science standards:</b> Earth and Space Science		

Course Objectives	Performance Indicators	Classroom Assessments
<p><b>24. Describe underlying structures of the earth that cause changes in the earth’s surface. (E.8.2.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. understands that the solid earth is layered with a thin, brittle crust, hot, convecting mantle, and dense, metallic core.</li> <li>2. describes the underlying structures of the earth that cause changes in the earth’s surface.</li> <li>3. explains mechanisms of plate tectonics (mantle structure, subduction, divergency).</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Make a model of a cross section of the earth.</li> <li>1.b. Interpret seismic data related to earth movements.</li> <li>2.a. Demonstrate movements in the earth’s crust using crackers and peanut butter to represent the earth’s crust and mantle material.</li> <li>3.a. Give examples of earth fracture produced as a result of plate tectonics.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Earth and Space Science</p>		
<p><b>25. Describe the general structure of the solar system, galaxies. (E.8.7)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. describes the general structure of the solar system, galaxies, and the universe.</li> <li>2. matches structures of universe to appropriate scales (solar system → galaxies → clusters → universe).</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Construct a model of the solar system.</li> <li>1.b. Construct a model of a galaxy.</li> <li>1.c. Construct graph of stars in terms of size and temperature. Evaluate.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Earth and Space Science</p>		

Course Objectives	Performance Indicators	Classroom Assessments
<p><b>26. Using past and current models of the structure of the solar system, explain the daily, monthly, yearly, and long-term cycles of the earth. (E.8.8.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. explains the daily, monthly, yearly, and long-term cycles of the earth citing evidence gained from personal observation as well as evidence used by scientists.</li> <li>2. interprets data about motions of the sun, earth, and moon.</li> <li>3. describes the motions of the earth in relation to the sun and moon.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Maintain a journal of the cycles of the earth for one month. Include personal observations and scientific explanations.</li> <li>2.a. Measure the angles of the sun on an hourly, daily, and yearly basis.</li> <li>3.a. Construct a model of earth science.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Earth and Space Science</p>		
<p><b>27. Identify personal interests in science and technology; account for implications that these interests might have for future education, and options to be considered. (G.12.1.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. identifies personal interest in science and technology.</li> <li>2. determines implications that personal interest may have in the future.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Given a list of science areas, rank each by personal preference.</li> <li>1.b. Draw a picture of the student's interests in science and technology.</li> <li>2.a. Match areas in science and technology to options in education or careers.</li> <li>2.b. Write a "help wanted" advertisement corresponding to the student's interests.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Science Applications</p>		

Course Objectives	Performance Indicators	Classroom Assessments
<p><b>28. Design, build, evaluate, and revise models and explanations related to the earth and space, life and environmental, and physical sciences. (G.12.2.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. designs, builds, evaluates, and revises a model.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Draw a plan for a rocket that will fly (e.g., twenty feet).</li> <li>1.b. Using this plan, build a model rocket that will fly twenty feet.</li> <li>1.c. Test the rocket, measuring and recording the results.</li> <li>1.d. Make revisions according to the test.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Science Applications</p>		
<p><b>29. Advocate a solution or combination of solutions to a problem in science or technology. (H.12.4.)</b></p>	<p><b>Performance will be satisfactory when the student:</b></p> <ol style="list-style-type: none"> <li>1. advocates a solution to a problem in science or technology.</li> </ol>	<ol style="list-style-type: none"> <li>1.a. Given a problem, present a solution to other students.</li> <li>1.b. Choose the best solution to a problem, given various solutions.</li> </ol>
<p><b>Above objective aligned with AASD Science standards:</b> Science in Social and Personal Perspectives</p>		