Environmental Science (#2001340)

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Course Standards

CPALMS Link	Description
SC.912.N.1.1:	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. **Pose questions about the natural world,** (Articulate the purpose of the investigation and identify the relevant scientific concepts). 2. **Conduct systematic observations,** (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). 3. **Examine books and other sources of information to see what is already known,** 4. **Review what is known in light of empirical evidence,** (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). 5. **Plan investigations,** (Design and evaluate a scientific investigation). 6. **Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs),** (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. **Pose answers, explanations, or descriptions of events,** 8. **Generate explanations that explicate or describe natural phenomena (inferences),** 9. **Use appropriate evidence and reasoning to justify these explanations to others,** 10. **Communicate results of scientific investigations, and** 11. **Evaluate the merits of the explanations produced by others.**
SC.912.N.1.2:	Describe and explain what characterizes science and its methods. **Clarifications:** Science is characterized by empirical observations, testable questions, formation of hypotheses, and experimentation that results in stable and replicable results, logical reasoning, and coherent theoretical constructs. Florida Standards Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.

SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented. **Clarifications:** Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions. Florida Standards Connections: MAFS.K12.MP.2: Reason abstractly and quantitatively; MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation. **Clarifications:** Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories. Strict standards of science include controlled variables, sufficient sample size, replication of results, empirical and measurable evidence, and the concept of falsification. Florida Standards Connections: LAFS.910.RST.1.1 / LAFS.1112.RST.1.1.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. **Clarifications:** Recognize that contributions to science can be made and have been made by people from all over the world.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. **Clarifications:** Collect data/evidence and use tables/graphs to draw conclusions and make inferences based on patterns or trends in the data. Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). **Clarifications:** Science is the systematic and organized inquiry that is derived from observations and experimentation that can be verified or tested by further investigation to explain natural phenomena (e.g. Science is testable, pseudo-science is not; science seeks falsifications, pseudo-science seeks confirmations.)
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

	Clarifications: Identify scientific questions that can be disproved by experimentation/testing. Recognize that pseudoscience is a claim, belief, or practice which is presented as scientific, but does not adhere to strict standards of science (e.g. controlled variables, sample size, replicability, empirical and measurable evidence, and the concept of falsification). Florida Standards Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **Clarifications:** Recognize that ideas with the most durable explanatory power become established theories, but scientific explanations are continually subjected to change in the face of new evidence. Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them; MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. **Clarifications:** Explain that a scientific theory is a well-tested hypothesis supported by a preponderance of empirical evidence. Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them; and, MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.
SC.912.N.3.5:	Describe the function of models in science and identify the wide range of models used in science. **Clarifications:** Describe how models are used by scientists to explain observations of nature. Florida Standards Connections: MAFS.K12.MP.4: Model with mathematics.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. **Clarifications:** Recognize that no single universal step-by-step scientific method captures the complexity of doing science. A number of shared values and perspectives characterize a scientific approach. MAFS.K12.MP.1: Make sense of problems and persevere in solving them, and MAFS.K12.MP.2: Reason abstractly and quantitatively.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.

	Clarifications: Investigate and discuss how humans affect and are affected by geological systems and processes by describing the possible long-term consequences (costs and benefits) that increased human consumption (e.g. mining and extraction techniques; off-shore drilling; petrochemical refining) has placed on the environment (e.g. pollution, health, habitat destruction) and the impact on future energy production.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change. **Clarifications:** Explain the possible natural (e.g. increased global temperature, wildfires, volcanic dust) and anthropogenic mechanisms (e.g. air pollution, acid rain, greenhouse gases, burning of fossil fuels) and the effects of these mechanisms on global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively. **Clarifications:** Describe and discuss the conditions that bring about floods, droughts, wildfires, thunderstorms, hurricanes, rip currents, and tsunamis and how these conditions can influence human behavior (e.g. energy alternatives, conservation, migration, storm preparedness).
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water. **Clarifications:** Explain how the oceans act as sources/sinks of heat energy, store carbon dioxide mostly as dissolved HCO3- and CaCO3 as precipitate or biogenic carbonate deposits, which have an impact on climate change.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success. **Clarifications:** Annually assessed on Biology EOC. Also assesses SC.912.L.15.14, SC.912.L.15.15, and SC.912.N.1.3.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.

	Clarifications: Florida Standards Connections: MAFS.K12.MP.7: Look for and make use of structure.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity. **Clarifications:** Annually assessed on Biology EOC. Also assesses SC.912.L.17.2; SC.912.L.17.4; SC.912.L.17.8; SC.912.N.1.4.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. **Clarifications:** Annually assessed on Biology EOC. Also assesses SC.912.E.7.1.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land. **Clarifications:** Integrate HE.912.C.1.3. Evaluate how environment and personal health are interrelated.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution. **Clarifications:** Integrate HE.912.C.1.3. Evaluate how environment and personal health are interrelated; and, HE.912.C.1.5. Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

	Clarifications: Annually assessed on Biology EOC. Also assesses SC.912.L.17.11, SC.912.L.17.13, SC.912.N.1.3.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others. **Clarifications:** Differentiate between kinetic and potential energy. Recognize that energy cannot be created or destroyed, only transformed. Identify examples of transformation of energy: Heat to light in incandescent electric light bulbs; Light to heat in laser drills; Electrical to sound in radios; Sound to electrical in microphones; Electrical to chemical in battery rechargers; Chemical to electrical in dry cells; Mechanical to electrical in generators [power plants]; Nuclear to heat in nuclear reactors; Gravitational potential energy of a falling object is converted to kinetic energy then to heat and sound energy when the object hits the ground.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. **Clarifications:** Use calorimetry to illustrate conservation of energy. Differentiate between the different types of systems and solve problems involving conservation of energy in simple systems (Physics).Explain how conservation of energy is important in chemical reactions with bond formation and bond breaking (Chemistry).