Pacing & Curriculum Guide

Environmental Science (Pre-Biology) 2001340

This pacing and curriculum guide is intended for instruction provided to students prior to enrollment in a Biology course.

Production and Distribution of Writing	
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or tryi new approach, focusing on addressing what is most significant for a specific purpose and audience.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
6. Use technology, including the Internet, to produce, publish, and update individual or shar writing products, taking advantage of technology's capacity to link to other information and t display information flexibly and dynamically.	6. Use technology, including the Internet, to produce, publish, and update individual or shar writing products in response to ongoing feedback, including new arguments or information.
Research to Build and Present Knowledge	
7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
8.7 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess (rn(s)-1u)7.2 (d)7.1 (d)20.9 (if2.9 (a)2.3.6 (s)16.1 (	

Common Core State Standards for Mathematics: Mathematical Practices Grades K712	
MP 1: Make sense of problems and persevere in solving them	Mathematically proficient students will x start by explaining to themselves the meaning of a problem and looking for entry points to its solution. x analyze givens, constraints, relationships, and goals. x make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. x consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. x monitor and evaluate their progress and change course if necessary. x explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. x check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" x understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MP 2: Reason abstractly and quantitatively	Mathematically proficient students will x make sense of quantities and their relationships in problem situations. x bring two complementary abilities to bear on problems involving quantitative relationships: o the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents o the ability to contextualize—to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. x create a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MP 3: Construct viable arguments and critique the reasoning of others	Mathematically proficient students will x understand and use stated assumptions, definitions, and previously established results in constructing arguments. x make conjectures and build a logical progression of statements to explore the truth of their conjectures. x analyze situations by breaking them into cases, and recognize and use counterexamples. x justify their conclusions, communicate them to others, and respond to the arguments of others. x reason inductively about data, making plausible arguments that take into account the context from which the data arose. x compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it

MP 5: Use appropriate tools strategically

Mathematically proficient students will

- consider the available tools when solving a mathematical problem.
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CCPS Environmental Science Curriculum Map Pre-Biology (Course Number: 2003340)

	Focus Standards		Major Concepts / Topics	Current Textbook Resources
Quarter 1 9 Weeks	SC.912.N.1.1 SC.912.N.1.2 SC.912.N.1.3 SC.912.N.1.4 SC.912.N.1.5 SC.912.N.1.6 SC.912.N.2.1 SC.912.N.2.2 SC.912.N.2.4 SC.912.N.3.1	SC.912.N.3.4 SC.912.N.3.5 SC.912.N.4.1 SC.912.N.4.2 *SC.912.L.14.4 *SC.912.L.16.10 **Content standards as applicable for laboratory investigation	Unit 1: Science Process Skills, Laboratory Skills, and Writing in Science	

Guiding Questions	Learning Goals	Academic Vocabulary	Suggested Labs, Activities, and Video Resources

Unit 2: Introduction to Environmental Biology	Recommended Pacing: 4 Weeks
Standards:	

- 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: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). 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). Examine books and other sources of information to see what is already known, 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). Plan investigations, (Design and evaluate a scientific investigation). 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), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
- SC.912.N.1.2 Describe and explain what characterizes science and its methods.
- 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.
- SC.912.N.1.6 Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
- 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).
- SC.912.N.2.2 Identify which questions can be answered through science and which questions are outside the bou

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Guiding Questions	Learning Goals	Academic Vocabulary	Suggested Labs, Activities, and Video Resources
How does environmental science help us understand the natural world?	Explain the focus of environmental science. Describe the recent trends in human population and resource consumption.	environment environmental science environmentalism natural resource renewablenatural resource nonrenewable natural resource sustainable fossil fuel ecological footprint	Ecological Footprint Calculations Activity Tragedy of the Commons Lab Double Bubble Map of Environmental Science vs. Environmentalism Ecological Footprint: Do We Fit On Our Planet? https://www.youtube.com/watch?v=g_aguo7V0Q4

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What properties of matter are most important to environmental systems?	Differentiate among an atom, an element, a molecule, and a compound. Discuss how various macromolecules are essential to life. Identify some unusual properties of water.	matter atom element nucleus molecule compound hydrocarbon	solution macromolecule protein nucleic acid carbohydrate lipid pH	Macromolecule Sort Activity

Unit 3: Ecology	Recommended Pacing: 13 Weeks
Standards:	

SC.912.N.4.2 Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.L.14.1 Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.3 Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.7 Relate the structure of each of the major plant organs and tissues to physiological processes.
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.
SC.912.L.15.5 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.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 distributio
SC.912.L.17.2 Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4

What are the important characteristics of populations?	Explain the usefulness of tracking population size. Define population density. Define the three ways populations can be distributed. Explain what age structure diagrams tell you about a population.	population size population density population distribution age structure age-structure diagram sex ratio	Modeling Lab, Using Mark-and-Recapture Bozeman Science: Population Ecology https://www.youtube.com/watch?v=PQCQ3CQE3g&t=5s Crash Course Ecology: The Texas Mosquito Mystery https://www.youtube.com/watch?v=RBOsqmBQBQk&t=6s
What factors determine whether, and how, a population's size changes?	Describe the factors that influence a population's growth rate. Explain exponential growth and logistic growth. Explain how limiting factors and biotic potential affect population growth.	survivorship curve immigration emigration migration exponential growth limiting factor carrying capacity logistic growth density-dependent factor density-independent factor biotic potential	In Your Neighborhood Activity, Migrating Populations Scientific Method Lab, Yeast Population Growth Fishing for Goldfish Carrying Capacity Lab http://webcache.googleusercontent.com/search?q=cache:LfYZWuIWC5EJ:fillpot.pbworks.com/f/Fishing%2Bfor%2BGoldfish.doc+&cd=2&hl=en&ct=clnk&gl=us
Why do we study human populations?	Describe how technological advances have contributed to human population growth. Explain recent trends in population growth. Identify characteristics of human population that are studied by demographers	Industrial Revolution infant mortality life expectancy growth rate demography	Human Population Growth Computer Lab Activity 7 Billion People Discussion-Where do you Stand? https://www.worldof7billion.org/teacher-resources/high-school-activities/ NPR: 7 Billion...How Did We Get So Big So Fast? https://www.youtube.com/watch?v=VcSX4ytEfcE If 100 People Lived on Earth https://www.youtube.com/watch?v=gfbPrcuRUBw3 (e)1.6 (t)-1.3 ( )-13 (S

What conditions and organisms characterize the world's biomes?	Explain how organisms are adapted to the conditions of their biomes.	canopy emergent layer understory epiphyte	deciduous estivation coniferous hibernation permafrost	Biome Flip Chart Real Data – Which Biome? (Textbook pg. 179)
What conditions and organisms characterize the world's aquatic ecosystems?	Describe the criteria ecologists use to classify aquatic ecosystems. List the major categories of freshwater ecosystems. Explain the ecological importance of estuaries. List the three major zones of the ocean.	salinity photic zone aphotic zone benthic zone littoral zone limnetic zone wetland		

Unit 4: Human Impacts and Sustainability	Recommended Pacing: 9 Weeks
Standards:	

SC.912.N.3.5 Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.2 Weigh the merits of alternative strategies for solving a specific societ10.3 (71uv)-5.4 /CS0 cs 0 scn /TT1 1 Tf 1273/1.6 (v)-5.4inbrniri4-8.7 -2.3 (10e)0.7 (t)m (i)-p(v)-5.4 (e o)-23

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How can physical events in the environment affect your health?

Discuss how earthquakes affect structures o Earth's surface.

Discuss how volcanoes affect human lives and property.

Describe tornadoes, hurricanes, and thunderstorms.

Discuss the dangers of avalanches.

earthquake
landslide
tsunami
volcano
tornado
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What are the characteristics of a sustainable city?	Describe 4 different components of city planning. Explain the importance of mass transit options to a city and its residents. Explain the importance of open space to a livable city. Differentiate green buildings from conventional buildings. Discuss the progress toward sustainability some cities have made and its importance to the world.	city planning geographic information system (GIS) zoning urban growth boundary (UGB) smart growth ecological restoration greenway	Design A City Project Go Outside – Open Space (Textbook pg. 310)

What factors determine Earth's climate?	Describe factors that affect how the sun warms Earth. Discuss the role of wind patterns in determining climate. Explain how the oceans affect climate. Describe how climate is affected by topography, volcanoes, regional vegetation, and periodic changes in Earth's orbit.	greenhouse effect greenhouse gas thermohaline circulation El Nino topography	Quick Lab – Does Latitude Affect the Sun's Rays? [illegible]

How can we use biomass energy and geothermal energy?	Explain the benefits and current status of renewable energy resources. Define biomass energy and explain how it is used. Describe how geothermal energy is harnessed and used.	biomass energy biofuel biopower geothermal energy ground source heat pump	In Your Neighborhood Activity-Regional Renewable Energy Paper and Pencil Activity-Compare Biofuels Introduction to Geothermal Energy https://www.youtube.com/watch?v=VhBq0E53WD0
How can water be used to address energy needs?	Explain how river water can be used to generate electricity. Identify benefits and costs of hydropower. Describe how energy from the ocean can generate electricity.	Hydropower tidal energy ocean thermal energy conversion	Hydropower 101 https://www.youtube.com/watch?v=q8HmRLCgDAI Tidal Power 101

What is the best way to manage our solid waste?	Discuss the importance of reducing waste. Describe how composting and recycling help reduce the amount of waste.	Source reduction Biodegradable Composting Recycling material recovery facility