Biology Curriculum Bundle #3

Title	Suggested Dates
Ecosystems and Biomes 	10/4/10 – 10/22/10 14 days

Big Idea/Enduring Understanding	Guiding Questions
The chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways.	▪ How does matter cycle through ecosystems? ▪ What is the role of climate in ecosystems? ▪ What is the relationship between biotic and abiotic factors in ecosystems? ▪ What makes a biome?

The resources included here provide teaching examples and/or meaningful learning experiences to address the District Curriculum. In order to address the TEKS to the proper depth and complexity, teachers are encouraged to use resources to the degree that they are congruent with the TEKS and research-based best practices. Teaching using only the suggested resources does not guarantee student mastery of all standards. Teachers must use professional judgment to select among these and/or other resources to teach the district curriculum.

Knowledge & Skills with Student Expectations	District Specificity/Examples	Suggested Resources (See note above)
Bio.10 Science concepts. The student knows that biological systems are composed of multiple levels. The student is expected to: **10C** analyze the levels of organization in biological systems and relate the levels to each other and to the whole system.	Cells→tissue→organ→organ system→organism Atom→molecule→ (above) → population→community→ecosystem→ etc. Review this concept.	
Bio.11 Science concepts. The student knows that biological systems work to achieve and maintain balance. The student is expected to: **11B** investigate and analyze how organisms, populations, and communities respond to external factors;	Recognize variations in population sizes, including extinction, and describe mechanisms and conditions that produce these variations. CCRS *a. Describe mechanisms that produce variations in population sizes.* Ex: catastrophic events effect other organisms in the ecosystem. *b. Recognize, describe, and explain typical patterns of change in population size (e.g., the logistic growth curve).* Ex: carrying capacity of ecosystem established by limiting resources. *c. Describe particular examples of extinction and describe conditions that produced these extinctions (e.g., Permian, Cretaceous dinosaur, wooly mammoth, passenger pigeon).* Ex: how those extinctions affected the development of other animals	

	d. Know that populations of organisms have changed, and continue to change over time, showing patterns of descent with modification from common ancestors to produce the organismal diversity observed today. *e. Describe general features of the history of life on Earth, including generally accepted dates and sequence of the geologic time scale and characteristics of major groups of organisms present during these time periods.* *f. Describe mechanisms that produce change in populations from generation to generation (e.g., artificial selection, natural selection, genetic drift, mutation, recombination).* *g. Describe and explain processes and major events in natural selection, genetic drift, mutation, etc., and distinguish these processes from each other. CCRS* Understand typical forms of organismal behavior. CCRS *a. Describe and give examples of organismal behavior (e.g., fixed action patterns, releasers, fight-or-flight responses, territorial displays, circadian rhythms).* Niche *CCRS*	
11C summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems; and	When identifying living organisms in a food web…identify that microorganisms play a vital role.	
Bio.12 Science concepts. The student knows that interdependence and interactions occur within an environmental system. The student is expected to:		
12A interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms;	Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years. NSES	
12B compare variations and adaptations of organisms in different ecosystems;	Identify Earth's major biomes, giving their locations, typical climate conditions, and characteristic organisms. CCRS *a. Name and describe Earth's major biomes, including tundra, boreal forests, temperate deciduous forests, grasslands, deserts, tropical rain forests, estuaries and other wetlands, and marine biomes, including their typical locations, the typical organisms found in each, and important physical factors (e.g., temperature, rainfall rates) that produce these distribution patterns. CCRS*	

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12C analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids;	Know patterns of energy flow and material cycling in Earth's ecosystems. CCRS *a. Describe patterns of energy flow and nutrient cycling through ecosystems.* *b. Describe and explain a trophic pyramid, including descriptions of typical organisms to be found at each trophic level in an ecosystem.* *c. Describe patterns of energy flow and nutrient cycling through ecosystems including the role of microorganisms. CCRS*	
12D recognize that long-term survival of species is dependent on changing resource bases that are limited;	Carrying capacity	
12E describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles; and	Consequences in the ecosystem if disruption occurs.	
12F describe how environmental change can impact ecosystem stability.		
TEKS 1A-B, 2E – H, 3A, B, F should spiral back throughout all bundles during laboratory investigations		
1 Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. **1A** demonstrate safe practices during laboratory and field investigations;	*	
1 Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. **1B** demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	*	
2 The student uses scientific methods and equipment during laboratory and field investigations **2E** plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	*	

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2 The student uses scientific methods and equipment during laboratory and field investigations **2F** collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;	*	
2 The student uses scientific methods and equipment during laboratory and field investigations **2G** analyze, evaluate, make inferences, and predict trends from data;	*	
2 The student uses scientific methods and equipment during laboratory and field investigations **2H** communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	*	
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3A** in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;	*	
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3B** communicate and apply scientific information extracted from various sources such as current events,	Suggestions: • Green washing • BP oil-spill	

news reports, published journal articles, and marketing materials;		
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3C** draw inferences based on data related to promotional materials for products and services;	• Socratic Seminars • Philosophical Chairs	
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3D** evaluate the impact of scientific research on society and the environment;	Think GLOBALLY: • Legislation: UN Policies/Treaties; Soil and Water conservation; How these affect the world • Wildlife management; Reintroduction of formerly endangered species • Permit process for civil engineering projects; Landscape architecture • Scientific studies and the effect on the economy(threshold of pollution that our ecosystems can withstand); sustainability • Biological magnification – how much harm do new pesticides have even though their impact should be less than former pesticides • Fossil fuels – alternative fuels; bioremediation • Food conversion ratio – how do we solve world hunger in an ecologically sustainable way?	
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3E** evaluate models according to their limitations in representing biological objects or events;	Cycles of matter do not exist in isolation (not closed systems)	
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3F** research and describe the history of biology and contributions of scientists.	Such as James Audubon, Dian Fossey, Jane Goodall, Rachel Carson	