Phoenixville Area School District Understanding by Design (UbD) Science Unit Plan

Grade Level &/or HS Subject: BIOLOGY **Unit Name: ECOSYSTEMS**

Stage 1 Desired Results

Overarching NGSS & PA Standards:

HS-LS2-1

HS-LS2-4

HS-LS2-6

Which branch(es) of science apply:

BIOLOGY

Transfer

Students will be able to independently use their learning to…

- Analyze and interpret data using computational thinking.
- Develop and/or use models.
- Obtain, evaluate, and communicate information (supported by evidence)

Meaning-Making

Students will understand that…

- factors affect carrying capacity of ecosystems at different scales.
- there is cycling of matter and flow of energy among organisms in an ecosystem.
- the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.

ESSENTIAL QUESTIONS

Students will keep considering...

- How do organisms interact with the living and nonliving environments to obtain materials?
- How do matter and energy move through an ecosystem?
- What happens to ecosystems when the environment changes?

Knowledge and Skills Acquisition

UNDERSTANDINGS

Students will know…

- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.
- Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is

Students will be skilled at…

- Use mathematical and/or computational representations of phenomena or design solutions to support explanations
- Use mathematical representations of phenomena or design solutions to support claims.
- Evaluate the claims, evidence, and reasoning behind

	discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. • A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources andhabitat availability. • the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere).* • biotic and abiotic components of aquatic and terrestrial ecosystems.* • how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).* • biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).* • how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle).* • the effects of limiting factors on population dynamics and potential species extinction*	currently accepted explanations or solutions to determine the merits of arguments.
	KEY VOCABULARY Abiotic, Aquatic, Biome, Biosphere, Biotic, Carrying capacity, Community, Competition Consumer, Ecosystem, Food web, Geochemical cycles, Individual, Limiting factors, Population, Predation, Producer, Succession, Symbiosis, Terrestrial, Trophic levels	

Stage 2 – Evidence		
Evaluative Criteria	***Assessment Evidence***	
What criteria will be used in each assessment to evaluate attainment of the desired results?	PERFORMANCE TASK(S): • Ecosystem Modeling (Food Web and Interactions) • Biogeochemical Cycle Modeling • Predator/Prey Population Inquiry Lab	Differentiation Considerations: • Grouping of students • Split Screen Activities • Scaffolding of Information
What criteria will be used in each assessment to evaluate attainment of the desired results?	OTHER EVIDENCE: • Quizzes and Unit Exams • Choice of the following: o Population Ecology Virtual Lab Activity – OPTIONAL o Sketch Notes – OPTIONAL	Differentiation Considerations: • Grouping of students • Split Screen Activities • Scaffolding of Information