ECOLOGY Curricular Documents

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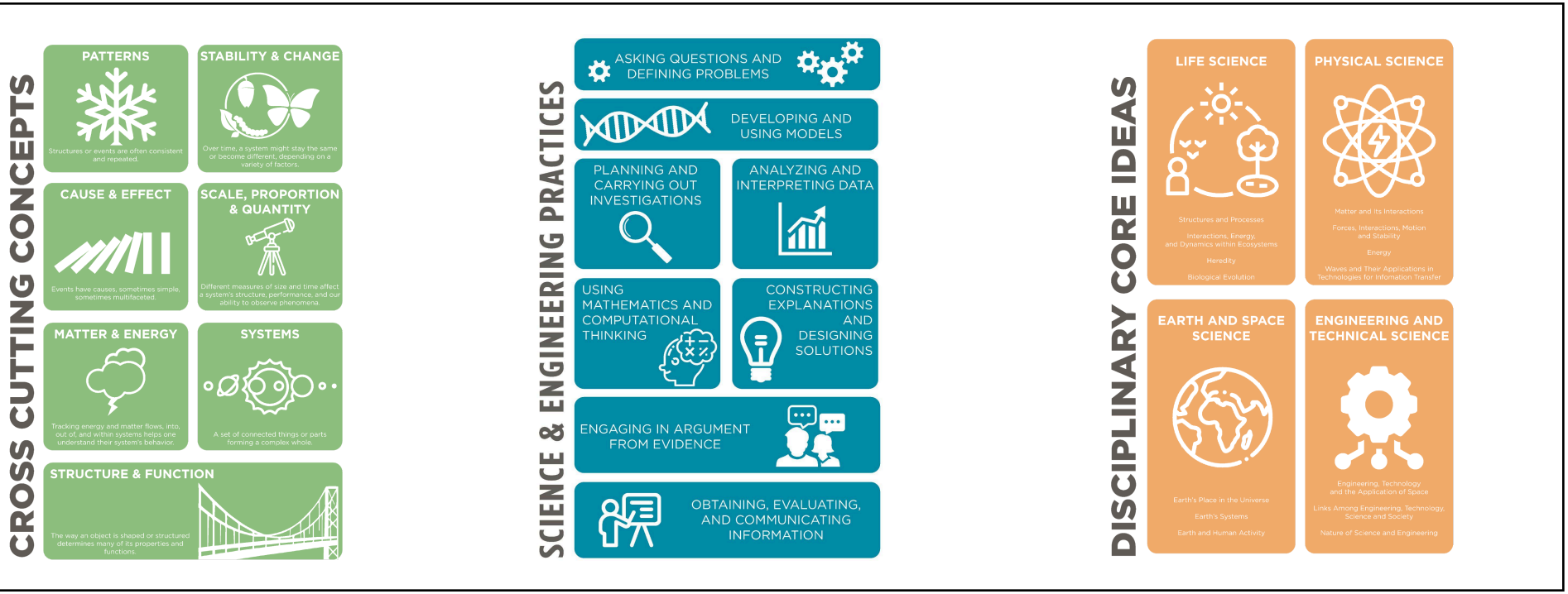
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Ecology	
CURRICULUM/CONTENT AREA	**COURSE LENGTH**
Science	1 year
GRADE LEVEL	**DATE LAST REVIEWED**
11-12	2016 Approved Curricular Docs 2023 Evaluation of Program
PREREQUISITE(s) ***if applicable***	**BOARD APPROVAL DATE**
NA	*December 2024*
PRIMARY RESOURCE ***if applicable***	
NA	

Desired Results	
COURSE DESCRIPTION	
Ecology is a course that explores the intricate relationships between organisms and their surroundings. Through a blend of scientific inquiry, critical analysis, and hands-on exploration, students will study the fundamental principles of ecology and gain a deeper understanding of the interconnected web of life on Earth.	
ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Patterns: Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. **Cause and Effect:** Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.	➔ How (and why} do organisms interact with their environment and what are the effects of these interactions? ◆ How do organisms interact with the living and nonliving environments to obtain matter and energy? ◆ How do matter and energy move through an ecosystem? ◆ What happens to ecosystems when the

Scale, Proportion, and Quantity: In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change. **Systems and Models:** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. **Energy and Matter:** Tracking energy and matter flows, into, and out of, and within systems helps one understand their system's behavior. **Structure and Function:** The way an object is shaped or structured determines many of its properties and functions. **Stability and Change:** For both designed and natural systems, conditions that affect stability and factors that control the rates of change are critical elements to consider and understand.	environment changes? ◆ How do organisms interact in groups so as to benefit individuals? ➔ How can there be so many similarities among organisms yet so many different kinds of plants, animals and microorganisms? ◆ What is biodiversity, how do humans affect it, and how does it affect humans? ➔ How do the Earth's surface processes and human activities affect each other? ◆ How do humans change the planet? ◆ How do people model and predict the effects of human activities on Earth's climate?
3 Dimensional Standards	



Cross Cutting Concepts BY GRADE BAND AND UNIT	Unit 1	Unit 2
Standard SCI.CC2 - Cause and Effect Students understand empirical evidence is required to differentiate between cause and correlation and to make claims about specific causes and effects. They suggest cause and effect relationships to explain and predict behaviors in complex natural and designed systems. They also propose causal relationships by examining what is known about smaller scale mechanisms within the system. They recognize changes in systems may have various causes that may not have equal effects.	x	x
Standard SCI.CC3 - Scale, Proportion, and Quantity Students understand the significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. They recognize patterns observable at one scale may not be observable or exist at other scales, and some systems can only be studied indirectly as they are too small, too large, too fast, or too slow to observe directly. They use orders of magnitude to understand how a model at one scale relates to a model at another scale. They use algebraic thinking to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).	x	
Standard SCI.CC5 - Energy and Matter	x	

Students understand that the total amount of energy and matter in closed systems is conserved. They describe changes of energy and matter in a system in terms of energy and matter flows into, out of, and within that system. They also learn that energy cannot be created or destroyed. It only moves between one place and another place, between objects and/or fields, or between systems. Energy drives the cycling of matter within and between systems. In nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved.		
Standard SCI.CC7 - Stability and Change Students understand much of science deals with constructing explanations of how things change and how they remain stable. They quantify and model changes in systems over very short or very long periods of time. They see some changes are irreversible, and negative feedback can stabilize a system, while positive feedback can destabilize it. They recognize systems can be designed for greater or lesser stability.	x	x

Science and Engineering Practices by GRADE BAND and UNIT	Unit 1	Unit 2
Standard SCI.SEP4 - Analyze and Interpret Data Students engage in more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. This includes the following: • Analyze data using tools, technologies, and models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. • Apply concepts of statistics and probability to scientific and engineering questions and problems, using digital tools when feasible. • Concepts should include determining the fit of functions, slope, and intercepts to data, along with correlation coefficients when the data is linear. • Consider and address more sophisticated limitations of data analysis (e.g., sample selection) when analyzing and interpreting data. • Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations. • Evaluate the impact of new data on a working explanation or model of a proposed process or system. • Analyze data to optimize design features or characteristics of system components relative to criteria for success.		x
Standard SCI.SEP5 - Mathematics and Computational Thinking Students use algebraic thinking and analysis, a range of linear and nonlinear functions (including trigonometric functions, exponentials, and logarithms), and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. This includes the following: • Decide if qualitative or quantitative data are best to determine whether a proposed object or tool meets criteria for success. • Create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system. • Use mathematical, computational, and algorithmic representations of phenomena or design solutions to describe and support claims and explanations.	x	x

• Apply techniques of algebra and functions to represent and solve scientific and engineering problems. • Use simple limit cases to test mathematical expressions, computer programs, algorithms, or simulations of a process or system to see if a model "makes sense" by comparing the outcomes with what is known about the real world. • Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, and others).		
Standard SCI.SEP6 - **A.Construct Explanations** Students create explanations that are supported by multiple and independent student generated sources of evidence consistent with scientific ideas, principles, and theories. This includes the following: • Make quantitative and qualitative claims regarding the relationship between dependent and independent variables. • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources, including students' own investigations, models, theories, simulations, and peer review. • Explanations should reflect the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. • Apply scientific ideas, principles, and evidence to provide an explanation of phenomena taking into account possible, unanticipated effects. • Apply scientific reasoning, theory, and models to link evidence to the claim and to assess the extent to which the reasoning and data support the explanation. B. **Design Solutions** Students create designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. This includes the following: • Design, evaluate, and refine a solution to a complex realworld problem, based on scientific knowledge, student-generated sources of evidence, and prioritized criteria. Consider tradeoffs. • Apply scientific ideas, principles, and evidence to solve design problems, taking into account possible unanticipated effects.		x
Standard SCI.SEP7 - Engage in Arguments Students use appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world. Arguments may also come from current scientific or historical episodes in science. This includes the following: • Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues. • Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. • Respectfully provide and receive critiques on scientific arguments by probing reasoning and evidence, by challenging ideas and conclusions, by responding thoughtfully to diverse perspectives, and by determining what additional information is required to resolve contradictions. • Construct, use, and present oral and written arguments or counter-arguments based on data and evidence. • Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.	x	

• Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments. Consider relevant factors (e.g. economic, societal, environmental, and ethical considerations).		

Disciplinary Core Ideas by GRADE BAND and UNIT		
LIFE SCIENCE		
Standard SCI.LS2		
A. **INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS:** Ecosystems have carrying capacities resulting from biotic and abiotic factors. The fundamental tension between resource availability and organism populations affects the abundance of species in any given ecosystem. The combination of the factors that affect an organism's success can be measured as a multidimensional niche.	x	
B. **CYCLES OF MATTER AND ENERGY TRANSFER IN ECOSYSTEMS:** Photosynthesis and cellular respiration provide most of the energy for life processes. Only a fraction of matter consumed at the lower level of a food web is transferred up, resulting in fewer organisms at higher levels. At each link in an ecosystem, elements are combined in different ways, and matter and energy are conserved. Photosynthesis and cellular respiration are key components of the global carbon cycle.	x	
C. **ECOSYSTEMS DYNAMICS, FUNCTIONING, AND RESILIENCE:** If a biological or physical disturbance to an ecosystem occurs, including one induced by human activity, the ecosystem may return to its more or less original state or become a very different ecosystem, depending on the complex set of interactions within the ecosystem.	x	x
D. **SOCIAL INTERACTIONS AND GROUP BEHAVIOR:** Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives.	x	
Standard SCI.LS4		
A. **ADAPTATION:** Evolution results primarily from genetic variation of individuals in a species, competition for resources, and proliferation of organisms better able to survive and reproduce. Adaptation means that the distribution of traits in a population, as well as species expansion, emergence, or extinction, can change when conditions change.		x
B. **BIODIVERSITY AND HUMANS:** Biodiversity is increased by formation of new species and reduced by extinction. Humans depend on biodiversity but also have adverse impacts on it. Sustaining biodiversity is essential to supporting life on Earth.		x
EARTH AND SPACE SCIENCE		
Standard SCI.ESS2		

A. **WEATHER AND CLIMATE:** The role of radiation from the sun and its interactions with the atmosphere, ocean, and land are the foundation for the global climate system. Global climate models are used to predict future changes, including changes influenced by human behavior and natural factors.		x
Standard SCI.ESS3		
A. **NATURAL RESOURCES:** Resource availability has guided the development of human society and use of natural resources has associated costs, risks, and benefits.		x
B. **NATURAL HAZARDS:** Natural hazards and other geological events have shaped the course of human history at local, regional, and global scales.		x
C. **HUMAN IMPACTS ON EARTH SYSTEMS:** Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies		x
D. **GLOBAL CLIMATE CHANGE:** Global climate models used to predict changes continue to be improved, although discoveries about the global climate system are ongoing and continually needed.		x
ENGINEERING AND TECHNICAL SCIENCE		
Standard SCI.ETS1		
A. **DEVELOPING POSSIBLE SOLUTIONS:** When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical. They are also useful in making a persuasive presentation to a client about how a given design will meet his or her needs.		x

UNIT 1: Principles of Ecology

In this unit, students will study the scientific methods, relationships among organisms, energy and nutrient flow, evolution and adaptation of species, biomes, aquatic life zones & succession, and carrying capacity within population dynamics.

UNIT 1 DESIRED RESULTS

~~ESSENTIAL QUESTION:~~

- ➔ ~~*How (and why) do organisms interact with their environment and what are the effects of these interactions?*~~
  - ◆ ~~*How do organisms interact with the living and nonliving environments to obtain matter and energy?*~~
  - ◆ ~~*How do matter and energy move through an ecosystem?*~~
  - ◆ ~~*What happens to ecosystems when the environment changes?*~~
  - ◆ ~~*How do organisms interact in groups so as to benefit individuals?*~~

Guiding questions:

- ➔ *How can the scientific method be used to design experiments that address real-world ecological and environmental challenges?*
- ➔ *How do biotic and abiotic factors, nutrient and energy flow, and interactions between organisms shape ecosystems and influence biodiversity, balance, and productivity?*
- ➔ *How do environmental pressures, natural selection, and ecological succession drive species adaptation and evolution, and how do these processes help ecosystems recover from disturbances?*

UNIT PRIORITY STANDARDS: *Students will know and be able to…*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
<u>Scale, Proportion, and Quantity</u> ● The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. <u>Energy and Matter</u> ● Energy cannot be created or destroyed; it only moves between one place and another place,	<u>Using Mathematics and Computational Thinking</u> Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model	<u>LS2.A: Interdependent Relationships in Ecosystems</u> ● 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

between objects and/or fields, or between systems. Stability and Change ● Much of science deals with constructing explanations of how things change and how they remain stable. <u>Cause and Effect</u> ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.	data. Simple computational simulations are created and used based on mathematical models of basic assumptions. ● Use mathematical and/or computational representations of phenomena or design solutions to support explanations. **<u>Engaging in Argument from Evidence</u>** Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science. ● Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments.	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. **<u>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</u>** ➔ 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 and habitat availability. **<u>LS2.B: Cycles of Matter and Energy</u>** Transfer in Ecosystems 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 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. **LS2.D: Social Interactions and Group** Behavior Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives.

3 DIMENSIONAL LEARNING TARGETS

HS-LS2-2:	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	
HS-LS2-6.	Evaluate claims, evidence, and reasoning that 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.	
HS-LS2-8.	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	
	HS-LS2-4.	Use mathematical representations to support claims for the

		cycling of matter and flow of energy among organisms in an ecosystem.

UNIT 1 ASSESSMENT EVIDENCE

Performance is evaluated in terms of… Students will show their learning by…

Performance Task Description(s):

- ➔ *How (and why} do organisms interact with their environment and what are the effects of these interactions?*

HS LS 2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS LS 2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS LS 2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS LS 2-6 Evaluate claims, evidence, and reasoning that 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.

HS LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Success Criteria Rubrics

- ➔ Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during & after the unit learning, and feedback. (Rubric links- TBD)

Key Feedback & Assessment Strategies *(What are different ways students can demonstrate their learning?)**:***

- ➔ *Conferring/Strategy Groups: Use current evidence of standards & learning targets, feedback is scaffolded based on student strengths, needs, and goals.*
- ➔ *Assessment of Unit Skills- Examples for Targeted Data Collection*
  - ◆ *Driving Question Board to gather background knowledge and activate prior knowledge*
  - ◆ *Student evidence notebooks: focus notes, CER /CEEAL argument writing, model & model revisions*
  - ◆ *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
  - ◆ *Lab analysis questions and write-ups*
  - ◆ *Assess unit vocabulary terms*
  - ◆ *Evaluate student investigation tasks*
  - ◆ *Assess key unit concepts (Unit summative assessment)*

The above is not an exhaustive list but shows the possible strategies & tasks that provide meaningful student evidence of learning.

STAGE 3: UNIT LEARNING PLAN (under construction- note: this section does not require board approval) *Planned learning experiences and instruction: Learner Readiness, Key vocab, materials & resources unique to the unit*			
Plan & Prep for the Unit Stage:			
Review Learners' Attributes and needs: ● Review 504s & IEP at a Glance ● Review current classroom data (by standard) ● Review any ACT, screening, or diagnostic data ● Other?		Send Family Unit Communication ☐ *ADD example link*	Review any previous student exemplars Proficient ☐ *ADD LINK* Advanced/Excellent ☐ *ADD LINK*
Implementation Stage:			
Key Unit Vocabulary/ Root words:			
Recommended Pacing for Lesson/ Week	**Learning Target (s)**	**Differentiation**	**Teacher Resources:**
LESSON 1, WEEK 1 *Add more rows as needed*		Multiple Means for Students to Access Content: ● . ● . Multiple Modes for Students to Express Understanding ●	● *Example- Africa Storyline Calendar w/key videos, data sets & activities*
LESSON 2, WEEK 2 *Add more rows as needed*		Multiple Means for Students to Access Content: ● . ● . Multiple Modes for Students to Express Understanding	●
End of Unit Reflection:			

- What successes did we have with students learning our desired results (Enduring Understandings, Essential Questions, Priority Standards)? How do we know? (summative results? Progress monitoring data?)
- What opportunities do we have to leverage desired results (Enduring Understandings, Essential Questions, Priority Standards, Anchor Phenomenon) in the future?
- How are we celebrating with students and as a team?

24/25	•
25/26	•
26/27	•
27/28	•

UNIT 2: Natural Resources Management and Environmental Issues

In this unit, students will study the value of health ecosystems, wildlife management, human caused environmental issues, and conservation and sustainability.

UNIT 2 DESIRED RESULTS

~~ESSENTIAL QUESTION:~~

- ➔ ~~How (and why) do organisms interact with their environment and what are the effects of these interactions?~~
  - ◆ ~~How do organisms interact with the living and nonliving environments to obtain matter and energy?~~
  - ◆ ~~How do matter and energy move through an ecosystem?~~
  - ◆ ~~What happens to ecosystems when the environment changes?~~
  - ◆ ~~How do organisms interact in groups so as to benefit individuals?~~
- ➔ ~~How can there be so many similarities among organisms yet so many different kinds of plants, animals and microorganisms?~~
  - ◆ ~~What is biodiversity, how do humans affect it, and how does it affect humans?~~
- ➔ ~~How do the Earth's surface processes and human activities affect each other?~~
  - ◆ ~~How do humans change the planet?~~
  - ◆ ~~How do people model and predict the effects of human activities on Earth's climate?~~

Guiding Questions:

- ➔ How do natural resource management and wildlife conservation efforts address key threats to ecosystems, species extinction, and human interference?
- ➔ How do carrying capacity, population growth, and ecological principles influence species survival and sustainability within ecosystems?
- ➔ Why is it important to prevent species extinction, and what conservation strategies help maintain population stability and protect endangered species?

UNIT PRIORITY STANDARDS: *Students will know and be able to…*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
<u>Stability and Change</u> ➔ Much of science deals with constructing explanations of how things change and how they remain stable. <u>Cause and Effect</u>	<u>Constructing Explanations and Designing Solutions</u> ➔ Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated	<u>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</u> ➔ Moreover, anthropogenic changes (induced by human activity) in the environment — including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change — can disrupt an ecosystem and threaten the survival of some species.

- ➔ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

Systems and System Models

- ➔ When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.

sources of evidence consistent with scientific ideas, principles, and theories. Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade off considerations.

Using Mathematics and Computational Thinking

- ➔ Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Create or revise a simulation of a phenomenon, designed device, process, or system.

Analyzing and Interpreting Data

- ➔ Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. Analyze data using computational models in order to make valid and reliable scientific claims. -

Connections to Nature of Science Scientific Investigations

- ➔ Use a Variety of Methods Science

LS4.C: Adaptation

- ➔ Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline — and sometimes the extinction — of some species.

LS4.D: Biodiversity and Humans

- ➔ Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary) Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary) (Note: This Disciplinary Core Idea is also addressed by HSLS4-6.)

ETS1.B: Developing Possible Solutions

- ➔ When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary) Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. (secondary)

	investigations use diverse methods and do not always use the same set of procedures to obtain data. New technologies advance scientific knowledge. Scientific Knowledge is Based on Empirical Evidence Science knowledge is based on empirical evidence. Science arguments are strengthened by multiple lines of evidence supporting a single explanation.	ESS3.A: Natural Resources ➔ Resource availability has guided the development of human society. ESS3.B: Natural Hazards ➔ Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. ESS3.C: Human Impacts on Earth Systems ➔ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. ESS3.D: Global Climate Change ➔ Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts. ESS2.D: Weather and Climate ➔ Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary)

3 DIMENSIONAL LEARNING TARGETS

HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*
HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
HS-LS2-1.	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

UNIT 2 ASSESSMENT EVIDENCE

Performance is evaluated in terms of… Students will show their learning by…

Performance Task Description(s):

- ➔ *How (and why} do organisms interact with their environment and what are the effects of these interactions?*
  - ◆ HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
- ➔ *How can there be so many similarities among organisms yet so many different kinds of plants, animals and microorganisms?*
  - ◆ HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
- ➔ *How do the Earth's surface processes and human activities affect each other?*
  - ◆ HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*
  - ◆ HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*
  - ◆ HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
  - ◆ HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Success Criteria Rubrics

- ➔ Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during & after the unit learning, and feedback.

Key Feedback & Assessment Strategies *(What are different ways students can demonstrate their learning?)**:***

- ◆ *Conferring/Strategy Groups: Use current evidence of standards & learning targets, feedback is scaffolded based on student strengths, needs, and goals.*

- ◆ *Assessment of Unit Skills- Examples for Targeted Data Collection*
  - *Driving Question Board to gather background knowledge and activate prior knowledge*
  - *Student evidence notebooks: focus notes, CER /CEEAL argument writing, model & model revisions*
  - *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
  - *Lab analysis questions and write-ups*
  - *Assess unit vocabulary terms*
  - *Evaluate student investigation tasks*
  - *Assess key unit concepts (Unit summative assessment)*
- ➔ *Extensions & College/Career Readiness may include:*
  - ◆ All lessons: Remove scaffolds provided with Science and Engineering Practices as a way to give students more independent work with the elements of these practices.

The above is not an exhaustive list but shows the possible strategies & tasks that provide meaningful student evidence of learning.

STAGE 3: UNIT LEARNING PLAN (under construction- note: this section does not require board approval) *Planned learning experiences and instruction: Learner Readiness, Key vocab, materials & resources unique to the unit*			
Plan & Prep for the Unit Stage:			
Review Learners' Attributes and needs: ● Review 504s & IEP at a Glance ● Review current classroom data (by standard) ● Review any ACT, screening, or diagnostic data ● Other?		Send Family Unit Communication ☐ *ADD example link*	Review any previous student exemplars Proficient ☐ *ADD LINK* Advanced/Excellent ☐ *ADD LINK*
Implementation Stage:			
Key Unit Vocabulary/ Root words:			
Recommended Pacing for Lesson/ Week	**Learning Target (s)**	**Differentiation**	**Teacher Resources:**
LESSON 1, WEEK 1 *Add more rows as needed*		Multiple Means for Students to Access Content: ● . ● .	● *Example- Africa Storyline Calendar w/key videos, data sets &*

		Multiple Modes for Students to Express Understanding •	*activities*
LESSON 2, WEEK 2 *Add more rows as needed*		Multiple Means for Students to Access Content: • . • . Multiple Modes for Students to Express Understanding	•

End of Unit Reflection:

- What successes did we have with students learning our desired results (Enduring Understandings, Essential Questions, Priority Standards)? How do we know? (summative results? Progress monitoring data?)
- What opportunities do we have to leverage desired results (Enduring Understandings, Essential Questions, Priority Standards, Anchor Phenomenon) in the future?
- How are we celebrating with students and as a team?

24/25	•
25/26	•
26/27	•
27/28	•