

Unit 02: The Living World (Weeks 7-12)

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

SCI.HS-LS1	From Molecules to Organisms: Structures and Processes
SCI.HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
SCI.HS-LS1-7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
SCI.HS-LS2	Ecosystems: Interactions, Energy, and Dynamics
SCI.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.
SCI.HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
SCI.HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
SCI.HS-LS2-5	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
SCI.HS-LS2-6	Evaluate the 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.
SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
SCI.HS-ESS2	Earth's Systems
SCI.HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
SCI.HS-ESS3	Earth and Human Activity
SCI.HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.2.12	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.12.B	Technology and Society: Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.
TECH.8.2.12.B.2	Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation and maintenance of a chosen product.
TECH.8.2.12.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).

Interdisciplinary Connections: NJSLs for ELA, Social Studies, Science and/or Math Section

Key Ideas and Details

LA.K-12.NJLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
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LA.K-12.NJSLSA.R2	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
LA.RI.11-12.1	Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain.
LA.K-12.NJSLSA.W	Writing Text Types and Purposes
LA.RI.11-12.2	Determine two or more central ideas of a text, and analyze their development and how they interact to provide a complex analysis; provide an objective summary of the text.
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.K-12.NJSLSA.W2	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
LA.K-12.NJSLSA.W9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.W.11-12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.K-12.NJSLSA.SL	Speaking and Listening Comprehension and Collaboration
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.W.11-12.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.11-12.2.A	Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LA.W.11-12.2.B	Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
LA.W.11-12.2.C	Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
LA.W.11-12.2.F	Provide a concluding paragraph or section that supports the argument presented (e.g., articulating implications or the significance of the topic).
LA.W.11-12.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.SL.11-12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
LA.SL.11-12.1.C	Propel conversations by posing and responding to questions that probe reasoning and

evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

LA.SL.11-12.1.D

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit...

The purpose of this unit is to analyze the interconnectedness on the planet and understand the interaction between living organisms and nonliving factors

Meaning

Essential Questions

Essential Questions

- How do biotic organisms interact with each other as well as abiotic factors?
- How do ecosystems function?
- How is energy transferred throughout an ecosystem?
- How are materials like water, carbon and nitrogen cycled through the planet?
- What creates a biome and how are biomes unique from one another?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

Students will understand that:

- In an ecosystem, the biotic (living) and abiotic (non living) components interact to form an interconnected system
- The flow of every, cycling of materials and ecological succession combine to affect how ecosystems work
- Energy from the chemical reactions in the sun bring energy in the form of heat to the Earth; producers use this energy to create food, consumers transfer the energy and decomposers return the energy back to the ecosystem
- Water, nitrogen and carbon are all part of cycle in which the materials are reused and remain on Earth
- Biomes include a variety of ecosystems, cover vast areas of land and are described by their vegetation, climate and precipitation

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know...

- An ecosystem is all of the organisms living in an area together with their physical environment
- All ecosystems are connected; materials may move from one to another
- Components of an ecosystem involve energy, minerals nutrients, carbon dioxide, water, oxygen and living organisms
- Biotic factors are the living parts of the ecosystem and abiotic factors are the nonliving components

- The biosphere is composed of ecosystems, which are composed of biomes, which are composed of communities, which are composed of populations, which are made from individual organisms
- The place an organism lives is its habitat
- The 6 kingdoms of life are archaeobacteria, eubacteria, plantae, fungi, animalia and protista
- Animals are either invertebrates (no backbone) or vertebrates (backbone)
- Most of the energy on Earth comes from the Sun
- Autotrophs make their own food called glucose during photosynthesis
- Organisms consume the food and turn it into energy called ATP during cellular respiration
- The chemical formula for both photosynthesis and cellular respiration
- Autotrophs are also called producers
- Heterotrophs consume food for energy and are also called consumers
- Some types of bacteria called extremophiles are able to get their energy from other sources other than the sun
- Decomposers break down organic matter and recycle nutrients back to the environment
- Energy cannot be created or destroyed, but it can change and transfer forms through the environment.
- Only 10% of the original energy will get transferred from one organism to the next during consumption, the rest will get lost to metabolic functions.
- A food chain is a sequence in which energy is transferred from one organism to the next during consumption
- A food web shows many feeding relationships that are possible in an ecosystem and is much more complex than a food chain
- An energy pyramid shows the transfer of energy within trophic feeding levels; producers will always be on the bottom
- Carbon, Nitrogen and Water are all recycled in the environment; each has its own cycle with very specific steps
- Carbon Cycle
- Nitrogen Cycle
- Water Cycle
- Human impact on the cycles
- Biomes: Tundra, Taiga, Temperate, Rain, Desert, Savanna, Grasslands, Chaparral, Wetlands, Ocean Waters and Coral Reefs

Skills

Skills

Student will be skilled at ...

- Define an ecosystem
- Distinguish between the biotic and abiotic factors in an ecosystem
- Describe how a population differs from a species
- Compare/Contrast the terms biosphere, ecosystem, community, population and organism
- Explain how habitats are important for organisms
- Explain the process of photosynthesis and cellular respiration
- Identify the role that photosynthesis and cellular respiration play in the cycling of materials
- Describe how energy is transferred from the sun to producers and then to consumers

- Describe how consumers depend on producers
- Evaluate the importance of decomposers and the role they have in recycling the nutrients through the ecosystem
- Identify the five different types of consumers and how they obtain energy
- Analyze how energy transfer in a food web is more complex than energy transfer in a food chain
- Explain why an energy pyramid is a representation of trophic levels
- Discuss why only 10% of the energy from the original energy source is transferred between energy levels
- Describe the water cycle
- Describe the carbon cycle
- Describe the nitrogen cycle
- Identify how humans are affecting the carbon cycle
- Explain the freshwater crisis
- Identify the role that nitrogen-fixing bacteria play in the nitrogen cycle
- Explain how the excess use of fertilizer can affect the nitrogen cycle
- Identify the difference between primary succession and secondary succession
- Differentiate between the different biomes on the planet
- Describe why vegetation is used to name a biome
- Explain how temperature and precipitation determine which plants grow in an area
- Explain how latitude and altitude affect which plants grow in an area

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

- Powerpoint presentations
- Textbook Environmental Science (Holt)
- Scienceworld Magazines
- Articles related to topics
- Youtube videos
- Materials for labs and projects
- What Eats What card game
- Planet Earth II DVD's
- Fred Stine "Dredging Newton Creek" Presentation

Formative Assessment Strategies

Formative Assessment Strategies

- Quick Thoughts
- Exit Slips
- Kahoot
- Bingo
- White Board Participation
- Homework
- Teacher Check
- Thumbs up/thumbs down
- Create a Test/Take a Test
- Whole class questioning and answering
- Graphic Organizers
- Foldables
- Ecology Quiz
- Biome Quiz

Learning Activities/Unit of Study

Learning Activities/Unit of Study

- Ecology Lecture and student notes
- Venn diagram: biotic vs abiotic
- Hands on paper cut out ecology concept map
- Photosynthesis and Cellular Respiration foldable
- Life without decomposers RACE essay
- "What Eats What" ecology card game
- Types of consumers foldable
- Draw water cycle, carbon cycle and nitrogen cycle
- Biome Lecture and student notes
- Fred Stine "Dredging Newton Creek" Presentation
- Planet Earth II movie - students identify various biomes

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps

prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.