

Living Systems

Content Area: **Science**
Course(s):
Time Period: **Trimester 3**
Length: **5-6 weeks**
Status: **Published**

Course Pacing Guide

This pacing guide should include the vision and mission of the course. It will be the same for all units in your course.

The simpler, the better. Pacing guide flaws come when they are too constricting, so big ideas is best (Cobb, McClain, de Silva Lamberg, & Dean, 2003; Wiggins, Wiggins, & McTighe, 2005)

Model - remove/replace information in this table with information from your course --

Unit	MP/Trimester	Weeks
Investigation 1 - Systems	3	2
Investigation 2 - Nutrient Systems	3	2
Investigation 3 - Transport Systems	3	2
Investigation 4 - Sensory Systems	3	2

Unit Overview

The Living Systems Module has four investigations that focus on systems as the unit of study. The idea of a system is one of the grand integrating (crosscutting) concepts that pervades all of science.

Enduring Understandings

A system is a collection of interacting objects, ideas, and/or procedures that together define a physical entity or process.

Earth can be described as the interaction of four earth systems: the rocky part (the geosphere), the atmosphere, the water (the hydrosphere), and the complexity of living organisms (the biosphere).

Food webs are made up of producers (organisms that make their own food), consumers (organisms that eat other organisms to obtain food), and decomposers (organisms that consume and recycle dead organisms and organic waste).

A kelp forest has similarities to a rainforest (vertical layering). Phytoplankton are the major producers in most aquatic systems (both marine and freshwater). Food webs and competition for resources exist in marine systems.

Yeast is a single-celled fungus. Dormant yeast cells can become active when provided with water, warmth, and sugar as a food source. Carbon dioxide is a waste by-product of yeast metabolism.

Chlorophyll is the green pigment that absorbs sunlight in the cells of producer organisms.

A nutrient is a substance, such as sugar or starch, that is used by a cell to produce the energy needed to perform the functions of life.

Plants make their own food by photosynthesis. Green plant cells make sugar (food) from carbon dioxide and water in the presence of sunlight, and release oxygen.

Animals obtain nutrients by eating other organisms.

Digestion is the process used by animals to break down complex food items into simple nutrients. In vascular plants, xylem tubes carry water and minerals from the plant's roots to all the cells in a one-way flow; phloem tubes carry sugar from the leaves to all the cells that need it. Vascular bundles are arranged in predictable patterns of veins in the leaves of vascular plants.

In the human circulatory system, blood transports resources to the cells and waste from the cells.

In humans, the respiratory system transports oxygen to the blood and carbon dioxide from the blood.

All cells have basic needs: water, food, gas exchange, and waste disposal. Multicellular organisms have systems for transporting nutrients and wastes. A stimulus is something that triggers (starts) a response. A stimulus is often information received through the senses.

A response is a reaction of a living thing to a stimulus.

Animal adaptations include pattern and color that attract attention to warn predators off or to attract a mate.

Animals communicate to warn others of danger, scare predators away, or locate others of their kind, including family members.

Instinctive behaviors, such as knowing what to eat, how to find shelter, and how to migrate, help organisms survive.

Marine ecosystems have biotic (living) and abiotic (nonliving parts). The ocean plays an important role in the carbon cycle.

Essential Questions

How does matter and energy move through ecosystems of the biosphere?

How can you identify a system?

Is planet Earth a system?

What organisms are both predators and prey in the kelp forest ecosystem?

What happens when compost worms interact with organic litter?

What is food, where does it come from, and how do organisms use it?

What does yeast need to break its dormancy?

How do plants get the food they need? How do animals get the nutrients they need?

New Jersey Student Learning Standards (No CCS)

PS3.D: Energy in chemical processes and everyday life • The energy released from food was once energy from the Sun that was captured by plants in the chemical processes that forms plant matter (from air and water). (5-PS3-1)

LS1.C: Organization for matter and energy flow in organisms • Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (5-PS3-1)

LS2.A: Interdependent relationships in ecosystems • The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

LS2.B: Cycles of matter and energy transfer in ecosystems • Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases and water from the environments, and release waste, matter (gas, liquid, or solid) back into the environments. (5-LS2-1)

ESS2.A: Earth materials and systems • Earth's major systems are the geosphere, the hydrosphere, the atmosphere, and the biosphere. These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

Interdisciplinary Connections

RF 4: Read with sufficient accuracy and fluency to support comprehension.

RI 1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences.

RI 2: Determine main ideas of a text and explain how they are supported by key details; summarize the text.

RI 3: Explain the relationships or interactions between two or more concepts in a scientific text based on specific information in the text.

RI 4: Determine the meaning of general academic and domain-specific words and phrases in a text

RI 5: Compare and contrast the overall structure of events, ideas, concepts, or information in two or more texts.

RI 7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question.

RI 8: Explain how an author uses reasons and evidence to support particular points in a text. RI 9: Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

RI 10: By the end of the year, read and comprehend informational science texts.

W 5: Develop and strengthen writing.

W 7: Conduct short research projects that use several sources to build knowledge through investigation of

different aspects of a topic.

W 8: Recall relevant information from experiences or gather relevant information; take notes. W 9: Draw evidence from informational texts.

SL 1: Engage in collaborative discussions.

SL 2: Summarize information presented visually.

SL 4: Report on a topic or text or present an opinion, using appropriate facts and relevant information.

SL 6: Adapt speech to a variety of contexts and tasks.

L 5: Demonstrate understanding of word relationships.

L 6: Acquire and use academic and domain-specific words and phrases.

Mathematics

MP.2 Reason abstractly and quantitatively. (5-LS2-1)

MP.4 Model with mathematics. (5-LS2-1)

MP.5 Use appropriate tools strategically. (5-LS1-1)

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (5-LS1-1)

Technology Standards

TECH.8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
TECH.8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/or pictures.
TECH.8.1.5.A.CS1	Understand and use technology systems

21st Century Themes/Careers

Digital media will be used incorporated in project presentations. This module will develop students' abilities to do and understand scientific inquiry. Students will identify questions, design and conduct scientific investigations to answer those questions, employ tools to gather, analyze, and interpret data. They will use data to construct reasonable explanations, develop and communicate investigations and evidence and understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge. This module will develop and extend students' understandings about science and technology. Students will work collaboratively in teams and use tools and scientific techniques to make better observations.

Instructional Strategies & Learning Activities

Support an argument that plants get the materials they need for growth chiefly from air and water.

Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Use a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the Sun.

Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Differentiated Instruction

Examples may include:

- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Sentence & Discussion Stems
- Tiered Learning Targets
- Learning through play
- Relationship-Building & Team-Building
- Self-Directed Learning
- Debate

- Goal-Setting & Learning Contracts
- Game-Based Learning
- Grouping
- Rubrics
- Learning Through Workstations
- Concept Attainment
- Flipped Classroom
- Assessment Design & Backwards Planning

Formative Assessments

Response Sheets

Performance Assessments

Science Notebook Entries



Summative Assessment

i-check investigation assessments

Benchmark Assessments

i-check investigations

performance assessments

Alternate Assessments

Focus Question Answer assessments

Resources & Technology

The following resources are available on the Teacher Module on the FOSS webpage:

word wall cards

streaming videos

teaching slides

list of recommended books

list of recommended websites

Online activities

BOE Approved Texts

FOSS Living Systems Investigation Guide - teacher manual

FOSS Living Systems - Student textbook

Closure

Such as:

- Snowstorm - Students write down what they learned on a piece of scratch paper and wad it up. Given a signal, they throw their paper snowballs in the air. Then each learner picks up a nearby response and reads it aloud.
- Parent Hotline - Give students an interesting question about the lesson without further discussion. Email their guardians the answer so that the topic can be discussed over dinner.
- Gallery Walk - On chart paper, small groups of students write and draw what they learned. After the completed works are attached to the classroom walls, others students affix post-its to the posters to extend on the ideas, add questions.
- Sequence It - create timelines of major events discussed
- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Question Stems - Have students write questions about the lesson on cards, using [question stems framed around Bloom's Taxonomy](#). Have students exchange cards and answer the question they have acquired.
- Kids answer the following prompts: "What takeaways from the lesson will be important to know three years from now? Why?"
- Have students dramatize a real-life application of a skill.
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade

would get it.

- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Ask students to write what they learned, and any lingering questions on an "exit ticket". Before they leave class, have them put their exit tickets in a folder or bin labeled either "Got It," "More Practice, Please," or "I Need Some Help!"
- After writing down the learning outcome, ask students to take a card, circle one of the following options, and return the card to you before they leave: "Stop (I'm totally confused. Go (I'm ready to move on.)" or "Proceed with caution (I could use some clarification on . . .)"

ELL

Such as:

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaries
- Google Translate

Special Education

List is not inclusive but may include examples such as:

- Shorten assignments to focus on mastery of key concepts.
- Shorten spelling tests to focus on mastering the most functional words.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student's needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Use a study carrel. (Provide extras so that the student is not singled out.)

- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.
- Allow the student to complete an independent project as an alternative test.
- Give progress reports instead of grades.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for a better grade.
- Average grades out when assignments are reworked, or grade on corrected work.
- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

At Risk

Examples may include:

- Use of mnemonics
- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Use of a study carrel
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart
- Chart progress and maintain data

Gifted and Talented

Focus on effort and practice

Offer the Most Difficult First

Offer choice

Speak to Student Interests

Allow G/T students to work together

Encourage risk taking

