



Sparta Area School District

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Course Outcome Summary

Course Information: (SPHEA) Life Science

Description: The Science curriculum rotates every year between Physical Science, Earth/Space Science, Life Science, and Health. This year, the curriculum will be covered in the area Life Science. Students will complete hands on labs or activities after every unit. At the end of the course students will complete a comprehensive final.

Instruction Level: Differentiated

Total Credits: 2

Prerequisites: (Grade 4-6 skill level)

Textbooks: Life Science, Kristine Lindsay and Kristina M. Swann, PCI Education

Course Standards:

Common Career and Technical Core:

<https://www.act.org/content/dam/act/unsecured/documents/CCRS-ScienceStandards.pdf>

Units

1. What is an Organism?
2. The Cell
3. Classification
4. Heredity & Reproduction
5. Evolution
6. Bacteria & Viruses
7. Protists & Fungi
8. Plants
9. Animals
10. The Human Body

Unit Outlines

1. What is an Organism?

- Characteristics
- Basic Needs of Organisms

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- How do the structures of organisms enable life's functions?
- How do organisms grow and develop?
- How do organisms obtain and use the matter and energy they need to live and grow?
- How do organisms detect, process and use information about the environment?
- How do the parts of living things help them to survive?

Essential Knowledge:

- Knowledge of various vocabulary terms: organism, adaptation, asexual reproduction, cell, deoxyribonucleic acid (DNA), develop, digest, heredity, homeostasis, metabolism, sexual reproduction, stimulus.
- Students will know about: cells, response to stimuli, energy, reproduction, growth, adaptation, food, water, air, and environment.

2. The Cell

- Parts of a Cell
- Chemicals in a Cell
- Movement of Molecules
- How Cells Make Food
- The Cell Cycle

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment

- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What are cells and how do they carry out life functions?
- How are cells organized into working groups?
- How are organisms grouped and classified?
- How do living organisms get the energy they need and how do they use it?

Essential Knowledge:

- Knowledge of various vocabulary terms: cell membrane, cell wall, chloroplast, cytoplasm, Golgi body, lysosome, tissue, vacuole, organ, organelle, nucleus, mitochondria.
- Students will know about: cell theory, cells, tissues, organs, animal cell, plant cell, water, proteins, carbohydrates, lipids, ATP, movement of small molecules, movement of large particles, photosynthesis, cellular respiration, fermentation, binary fission, eukaryotic cell division, stages of mitosis.

3. Classification

- Taxonomy
- How Organisms are Classified

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 401. Understand a simple experimental design
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What is the system for classifying the diversity of living things?
- Why do biologists have taxonomic systems?
- What makes up the scientific name of a species?
- In what ways are organisms alike and different from one another?
- What is taxonomy and why is it necessary?
- What is a taxonomic key and how are they useful?
- How do we classify organisms into groups?

- What are the distinguishing characteristics of the kingdoms and representative organisms of each?
- What are the evolutionary relationships between organisms and how do we illustrate those relationships in a cladogram?

Essential Knowledge:

- Knowledge of various vocabulary terms: taxonomy, species, phylum.
- Students will know about: taxonomy, kingdom, phylum, class, order, family, genus, and species.

4. Heredity & Reproduction

- Traits
- Dominant & Recessive Traits
- Reproduction

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 401. Understand a simple experimental design
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- How are the characteristics of one generation related to the previous generation?
- Why (How) do individuals of the same species vary in how they look, function, and behave?
- How are traits in organisms passed from one generation to another?
- How are traits inherited?
- What is heredity?
- Who is Gregor Mendel?
- What did Gregor Mendel discover about heredity?

Essential Knowledge:

- Knowledge of various vocabulary terms: cross-pollinate, trait, allele, dominant trait, gene, genotype, recessive trait, probability, phenotype, budding, chromatid, egg cell, meiosis.
- Students will know about: Mendel's findings, dominant traits, recessive traits, genotype, phenotype, Punnett squares, traits of humans, asexual and sexual reproduction.

5. Evolution

- Genes & Mutations
- Darwin's Theory of Natural Selection
- Fossils

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 401. Understand a simple experimental design
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What evidence shows that different species are related?
- How does genetic variation among organisms affect survival and reproduction?
- How has the history of life been recorded through the fossil records?
- How are fossils of the past similar to organisms of today?
- Why do some organisms become fossils and others do not?
- What common patterns of development are similar in embryos of different species?
- What enable some species to carry on genetically while others become extinct?
- How do different environments affect evolution of the same species?

Essential Knowledge:

- Knowledge of various vocabulary terms: evolution, extinct, fossil, mutation, nucleotide, adapt, natural selection, fossil record, geologic time, mold, sediment.
- Students will know about: mutation, adaptation, dating fossils, the fossil record.

6. Bacteria & Viruses

- Bacteria
- Viruses

Standard(s):

- SIN 301. Understand the methods used in a simple experiment
- IOD 302. Understand basic scientific terminology
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information

- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What are viruses?
- What do they look like?
- How does it reproduce?
- How do viruses get into your body?
- How many viruses are known to man?
- Where are viruses found and what living conditions do they prefer?
- What is the difference between a virus and bacteria?
- What are the basic types of viruses and are there such things as good viruses?
- How many kinds are there?
- Are viruses living things?
- Can viruses be deadly and can your body become immune to viruses?
- Do viruses change?
- What do viruses do?
- What are some symptoms of viruses?
- What are Bacteria?
- What does Bacteria look like?
- What are the two kingdoms of Bacteria?
- What is Bacteria's role in the world?
- Is there good and bad Bacteria?
- Where are Bacteria found and what living conditions does it prefer?
- How do Bacteria reproduce?

Essential Knowledge:

- Knowledge of various vocabulary terms: cyanobacteria, flagella, pathogenic, capsid, envelope, host cell, lysogenic cycle, lytic cycle, virus.
- Students will know about: cell structure, movement, size, and shape of a cell, reproduction and survival of a cell, two kingdoms, beneficial bacteria, harmful bacteria, are viruses alive, shapes of viruses, lysogenic and lytic cycles.

7. Protists & Fungi

- Protists
- Fungi
- Lichen

Standard(s):

- IOD 302. Understand basic scientific terminology
- SIN 301. Understand the methods used in a simple experiment
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment

- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- What is a protist?
- What are the different types of protists?
- What characteristics do plantlike protists share with plants?
- In what ways are protists helpful and harmful to humans?
- How are algae beneficial to an ecosystem?
- How do protists capture their food?
- How do other animal-like protists move?
- How does an amoeba move like some animals?
- How is fungus like protists beneficial to an environment?

Essential Knowledge:

- Knowledge of various vocabulary terms: algae, cilia, fungus like protist, parasite, phytoplankton, protozoa, spore, hyphae, mycelium.
- Students will know about: algae, protozoa, fungus like protists, unique features and characteristics of fungi, four kinds of fungi, and how lichen forms.

8. Plants

- What is a Plant?
- Nonvascular & Vascular Plants
- Plant Life Cycle
- Parts of a Plant
- Photosynthesis

Standard(s):

- IOD 302. Understand basic scientific terminology
- IOD 201. Select one piece of data from a simple data presentation
- SIN 301. Understand the methods used in a simple experiment
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- How do plants make adaptations to changing conditions caused by the seasons?
- What do living things need to grow and thrive?
- How do living things use their body parts to get the things they need to live and grow?
- How do we measure changes in living things over time?

Essential Knowledge:

- Knowledge of various vocabulary terms: cellulose, cuticle, plant, angiosperm, gymnosperm, nonvascular plant, vascular plant, ovary.
- Students will know about: nonvascular plants, vascular, vascular plants without seeds, vascular plants with seeds, gymnosperms, angiosperms, parts of a plant, parts used for photosynthesis, sugar from light energy, and stomata and guard cells.

9. Animals

- Characteristics of Animals
- Invertebrates
- Vertebrates
- Animal Behavior

Standard(s):

- IOD 302. Understand basic scientific terminology
- SIN 401. Understand a simple experimental design
- IOD 201. Select one piece of data from a simple data presentation (e.g., a simple food web diagram)
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 301. Understand the methods used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- How do we take good care of living things?
- What are the characteristics of animals?
- What do animals need to live and grow?
- How do animals use their body parts to get the things they need to live and grow?
- How do animals go through a cycle in their lifetimes?
- How are humans and other animals dependent upon one another?
- How do animals make adaptations to changing conditions caused by the seasons?

Essential Knowledge:

- Knowledge of various vocabulary terms: carnivore, herbivore, omnivore, bilateral symmetry, exoskeleton, invertebrate, metamorphosis, molting, radial symmetry, vertebrate.
- Students will know about: common characteristics of animals, sponges, coelenterates, roundworms, flatworms, segmented worms, mollusks, arthropods, echinoderms, fish, birds, reptiles, amphibians, mammals, survival behaviors, seasonal behaviors.

10. The Human Body

- From Cells to Systems
- Skeletal & Muscular Systems
- Circulatory & Respiratory Systems
- Digestive & Excretory Systems
- Endocrine & Reproductive Systems
- The Nervous System
- The Integumentary System

Standard(s):

- IOD 302. Understand basic scientific terminology
- SIN 401. Understand a simple experimental design
- SIN 202. Understand the tools and functions of tools used in a simple experiment
- SIN 301. Understand the methods used in a simple experiment
- SIN 502. Predict the results of an additional trial or measurement in an experiment
- SIN 601. Determine the hypothesis for an experiment
- EMI 201. Find basic information in a model (conceptual)
- EMI 302. Determine which models present certain basic information
- EMI 404. Identify similarities and differences between models

Essential Question:

Students will be able to answer the following question(s):

- How do organs and tissues interact with one another and carry out life functions?
- How do organ systems work and respond to changing demands of an organism?

Essential Knowledge:

- Knowledge of various vocabulary terms: organ system, involuntary muscle, joint, ligament, muscle, tendon, artery, atrium, heart, vein, bladder, esophagus, large intestine, small intestine, gland, hormone, impulse, neuron, dermis, epidermis.
- Students will know about: cells make tissues, organs and the system, skeletal system, muscular system, cardiovascular system, lymphatic system, respiratory system, breathing, digestive system, excretory system, endocrine system, reproductive systems, central nervous system, peripheral nervous system, layers of the skin, hair and nails.