

Middle School 7th grade Life Science



Instructional Plan



Seminole County Public Schools
Dept of Teaching and Learning

2012-2013

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Instructional Plan for Middle School 7th grade Life Science

This Instructional Plan has been designed to support a common scope and sequence of classroom instruction while allowing teachers to exercise their creativity when generating lessons.

Explanation of contents

NGSSS Standards: these are the Next Generation Sunshine State Standards as mandated by the Florida DOE to be covered during the course

Common Core Standards: these are the national standards that have been adopted by Florida for Math and Language Arts. Every science course has a few Common Core standards from both content areas embedded. These standards will not be assessed during the science course, but should be infused throughout as part of best practices.

Essential Questions: these questions were selected/created to address the core concepts of each unit; a student who is able to answer the essential questions with confidence and accuracy, will have mastered the benchmarks in the unit

Symbols:

 This symbol links a Life Science benchmark with a supporting Physical Science or Earth Science benchmark. These supporting benchmarks are to be included but not assessed for mastery as they were either mastered in 6th grade or will be covered more thoroughly in 8th grade.



This symbol indicates a benchmark which has a Common Lab associated with it. Common Labs were gathered/developed by the curriculum writing group and should be a part of every 7th grade science student's experience.

Concepts: shorthand reference to the content covered in the indicated benchmarks to help teachers understand the focus of the unit in a glance

DOE Vocabulary: these words are to be included in FCAT 2.0 items and will not be assessed directly but are assumed to be part of the students' working vocabulary.

Textbook references: relate to Pearson Interactive Science: Life Science, Adopted 2010

Lab Component Definition from FLDOE:

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p.3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Instructional Practices suggested by FLDOE:

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

1. Ensuring wide reading from complex text that varies in length.
2. Making close reading and rereading of texts central to lessons.
3. Emphasizing text specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
4. Emphasizing students supporting answers based upon evidence from the text.
5. Providing extensive research and writing opportunities (claims and evidence).

Common Core Math and Language Arts Standards for 7th Grade Life Science

(should be included throughout the year, infused in lessons, but not assessed separately)

LACC.68.RST.1.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

LACC.68.RST.2.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

LACC.68.RST.3.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

LACC.68.RST.4.10: By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

LACC.68.WHST.1.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

LACC.68.WHST.3.9: Draw evidence from informational texts to support analysis reflection, and research.

MACC.6.SP.2.4: Display numerical data in plots on a number line, including dot plots, histograms, and box plots

MACC.6.SP.2.5: Summarize numerical data sets in relation to their context, such as by:

- a. Reporting the number of observations.
- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
- c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

7th Grade Life Science Advanced

(should be included if course is coded as Advanced, they should extend existing required content)

Additional Benchmark	Related Std Level Benchmark
<u>SC.912.L.14.2</u> : Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).	SC.6.L.14.4 (Unit 3)
<u>SC.912.L.14.3</u> : Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.	SC.6.L.14.4 (Unit 3)
<u>SC.912.L.15.6</u> : Discuss distinguishing characteristics of the domains and kingdoms of living organisms.	SC.6.L.15.1 (Unit 2)
<u>SC.912.L.15.13</u> : Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.	SC.7.L.15.2 (Unit 7)
<u>SC.912.L.16.2</u> : Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.	SC.7.L.16.2 (Unit 5)
<u>SC.912.L.16.14</u> : Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.	SC.7.L.16.3 (Unit 4)
<u>SC.912.L.16.16</u> : Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.	SC.7.L.16.3 (Unit 5)
<u>SC.912.L.17.6</u> : Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.	SC.7.L.17.2 (Unit 8)
<u>SC.912.L.17.9</u> : Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.	SC.7.L.17.1 (Unit 8)
<u>SC.912.L.18.7</u> : Identify the reactants, products, and basic functions of photosynthesis.	SC.8.L.18.1 (Unit 9)
<u>SC.912.L.18.8</u> : Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.	SC.8.L.18.2 (Unit 9)
<u>SC.912.L.18.9</u> : Explain the interrelated nature of photosynthesis and cellular respiration.	SC.8.L.18.1 and 18.2 (Unit 9)

7th grade Life Science

Unit #1: Nature of Science		1 st Nine Weeks	Time Frame: 2 wks
Essential Questions			
How do scientists investigate the natural world?			
How does scientific knowledge develop?			
NGSSS Benchmarks (with Complexity Level)	Concepts	DOE Vocabulary	
SC.7.N.1.3: Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.	Experiment vs Investigation	Analyze Conclusion Control group Controlled variable Data Empirical evidence Experiment Hypothesis Inference Investigation Model Observation Outcome variable Systematic observations Testable Test variable Theory Trials Valid *Additional vocabulary in the chapter	
SC.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.	Independent vs Dependent Variable		
SC.7.N.1.5: Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.	Methods of Science		
SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.	Empirical Evidence		
SC.7.N.1.7: Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.	Debating Science		
SC.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.	History of Science		
SC.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.	Theories		
SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	Models		

Textbook references	Chapter 1 and 2
Ancillary Materials	Bias Anyone? (pp 4-6 Scenario Based), Messy Data (pp 10-12, Scenario Based), Keeping Flowers Fresh (pp 25-33, Lab)
Optional Extensions	Significant digits, percent error

Science Experimentation	Each Nine Weeks	Time Frame: 1 week
Essential Questions How do scientists investigate the natural world? How does scientific knowledge develop?		
NGSSS Benchmarks (with Complexity Level)	Concepts	DOE Vocabulary
SC.7.N.1.1: Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.	Experimental Design	Analyze Conclusion Control group Controlled variable Data
SC.8.P.8.2: Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.	Weight vs Mass	Empirical evidence Experiment Hypothesis Inference
SC.8.P.8.3: Explore and describe the densities of various materials through measurement of their masses and volumes.	Density	Investigation Model
SC.7.N.1.3: Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation	Experiment vs Investigation	Observation Outcome variable Systematic observations Testable
SC.7.N.1.2: Differentiate replication (by others) from repetition (multiple trials).	Replication vs Repetition	Test variable Theory
SC.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.	Independent vs Dependent	Trials Valid
SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	Models	

Textbook references	Chapter 1 and 2
Ancillary Materials	N/A
Key Changes	N/A

Unit #2: Classification		1st Nine Weeks	Time Frame: 1 week
Essential Questions How are living things alike yet different?			
NGSSS Benchmarks (with Complexity Level)		Concepts	DOE Vocabulary
SC.6.L.15.1: Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.		Domains	Binomial nomenclature Classify Eukaryote Kingdom Invertebrate Nucleus
SC.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.			History of Science Organism Prokaryote Species Vertebrate *Additional vocabulary in the chapter

Textbook references	Chapter 8 (Sect 1-3)
Ancillary Materials	Is it Living or non-Living (pg 182, Labs), Classifying Seeds (pg 195, Labs), Living Mysteries (pg 197, Labs)
Optional Extensions	Sect 4 (should be saved for Evolution Unit)

Unit #3: Cells and Organelles		1st Nine Weeks	Time Frame: 2 weeks
Essential Questions What are cells made of?			
NGSSS Benchmarks (with Complexity Level)		Concepts	DOE Vocabulary
SC.6.L.14.1: Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.		Atoms to Molecules	Eukaryote Molecules Nucleus Organism
SC.6.L.14.2: Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life.		Cell Theory (introduce Mitosis)	
 SC.6.L.14.4: Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles. Eggs-periment		Organelles	
SC.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.		Theories	
SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.		Empirical Evidence	

Textbook references	Chapter 3 (Sect 1, 2, 4)
Ancillary Materials	What are the Yeast Cells Doing (pg 73, Labs)
Optional Extensions	Endoplasmic reticulum, ribosomes, golgi apparatus, lysosomes

Unit #4: Cell Processes		end of 1st – beginning of 2nd Nine Weeks	Time Frame: 3 weeks
Essential Questions			
<ol style="list-style-type: none"> 1. What processes do cells undergo to carry out life? 2. How do mitosis and meiosis effect the passing of hereditary traits from parent to offspring? 			
NGSSS Benchmarks (with Complexity Level)		Concepts	DOE Vocabulary
SC.8.L.18.1: Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen		Photosynthesis (review in Unit #9)	Binary fission Budding Model Nucleus
SC.8.L.18.2: Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.		Respiration (review in Unit #9)	
SC.7.P.11.2: Investigate and describe the transformation of energy from one form to another.		Energy Transfer	
SC.8.P.8.5: Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter		Elements to Compounds	
SC.7.L.16.3: Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.		Mitosis (only, not compare yet)	
SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.		Models	*Additional vocabulary in the chapter

Textbook references	Chapter 3 (Sect 3 and 5), 13 (Sect 1 and 2)
Ancillary Materials	
Optional Extensions	Specific phases of mitosis

Unit #5: Human Body		2nd-3rd Nine Weeks	Time Frame: 7-8 weeks
(Reproductive System will be start of 3rd Nine Weeks)			
Essential Questions			
How does your body work?			
How do systems of the body move and manage materials?			
What systems regulate and control body processes?			
NGSSS Benchmarks (with Complexity Level)		Concepts	DOE Vocabulary
 SC.6.L.14.5: Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.		Body Systems	Homeostasis Model Ovary Regeneration Reproduction
 SC.6.E.7.8: Describe ways human beings protect themselves from hazardous weather and sun exposure.		Skin Protection	
SC.7.P.10.1: Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet , and that white light is made up of a spectrum of many different colors.		Sun's Energy (UV rays only)	
SC.6.L.14.6: Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites		Infectious Diseases	
SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.		Models	

Textbook references	Chapters 4, 5, 6
Ancillary Materials	
Key Changes	For 2012-2013, this unit has been moved to the 2 nd nine weeks and should be taught before Heredity, the Reproductive system and Human Sexuality will be taught during the first 2 weeks of the 3 rd nine weeks
Optional Extensions	Integumentary system, Endocrine system

Unit #6: Heredity		3rd Nine Weeks	Time Frame: 3-4 weeks
Essential Questions Why don't offspring always look like their parents? How can genetic information be used?			
NGSSS Benchmarks (with Complexity Level)	Concepts	DOE Vocabulary	
SC.7.L.16.3: Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.	Meiosis	Allele Characteristic Dominant F1 generation Fertilization Heterozygous Homozygous Inherited trait Model Nucleus P generation Recessive Reproduction Technology *Additional vocabulary in the chapter	
SC.7.L.16.1: Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.	DNA		
 SC.7.L.16.2: Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.	Punnett Square		
SC.7.L.16.4: Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.	Biotechnology		
SC.7.N.1.7: Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.	Debating Science		
SC.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.	History of Science		
SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	Models		

Textbook references	Chapter 10, Chapter 11 (Sect 3)
Ancillary Materials	
Key Changes	For 2012-2013, this unit has been moved to the 3 rd Nine weeks after Human Body
Optional Extensions	Specific phases of meiosis, rest of Chapter 11

Unit #8: Environment		3rd-4th Nine Weeks	Time Frame: 3-4 weeks
(Food Webs should be taught before Spring Break)			
Essential Questions How do living things affect one another?			
NGSSS Benchmarks (with Complexity Level)		Concepts	DOE Vocabulary
SC.7.L.17.1: Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.		Producers, Consumers, etc	Adaptation Autotroph Behavior Carnivore Community Consumer Ecosystem Empirical evidence Food Chain Herbivore Heterotroph Niche Omnivore Population Predator Prey Producer
SC.7.L.17.2: Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism		Symbiotic Relationships	
 SC.7.L.17.3: Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.		Limiting Factors	
 SC.7.E.6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.		Human Impact	
SC.6.E.7.9: Describe how the composition and structure of the atmosphere protects life and insulates the planet		Atmospheric Protection	
SC.6.E.7.7: Investigate how natural disasters have affected human life in Florida		Natural Disasters	
SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.		Empirical Evidence	*Additional vocabulary in the chapter

Textbook references	Chapter 12
Ancillary Materials	
Key Changes	For 2012-2013, this unit will begin during the 3 rd Nine weeks
Optional Extensions	Energy pyramids

Unit #9: Cycles in Living Systems		4th Nine Weeks	Time Frame: 2-3 weeks
Essential Questions How do energy and matter move through ecosystems?			
NGSSS Benchmarks (with Complexity Level)		Concepts	DOE Vocabulary
SC.8.L.18.1: Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen		Photosynthesis (review)	Absorb Chemical Change Ecosystem Empirical evidence Producer
SC.8.L.18.2: Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.			
SC.8.L.18.3: Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.		Carbon Cycle	
SC.8.L.18.4: Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.		Law of Conservation of Energy	
 SC.7.P.11.3: Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.	Law of Conservation of Energy		
SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.		Empirical Evidence	*Additional vocabulary in the chapter

Textbook references	Chapter 13
Ancillary Materials	
Key Changes	N/A
Optional Extensions	Photosynthesis/Respiration equation using chemical formula (words only are necessary), Nitrogen cycle