



LEE ACADEMY

Lee, Maine USA

Official Curriculum

Lab Biology

Revised Summer 2011

Primary text(s) and other major resources

- ✓ *Biology*—Johnson and Raven, Holt, Rinehart and Winston
- ✓ ISBN teacher edition: 0030664748
- ✓ ISBN student edition: 003066473X

Course Description

The biology curriculum emphasizes student investigations and deepens student understanding of the biological sciences. Biology is an interactive laboratory science course developed in accordance with the Maine Learning Results, which describe the learning goals for all Maine students. The course focuses on the study of organisms (living things) and explores the topics of modern biology. The nine units covered in the course include the principles of cell biology, the principles of genetics, the principles of evolution, the principles of ecology, introduction to diversity, introduction to plants, introduction to invertebrates, introduction to vertebrates, and exploring human biology. Some of the topics studied include cell structure and function, cell replication, photosynthesis, cell respiration, Mendel's principles, replication, transcription, protein synthesis, the environment and ecosystems, the theory of evolution, the study of taxonomy, and the study of organisms in relation to their environment. Students study these topics through interactive laboratory investigations, group collaboration, research projects, and dissections. Laboratory work and projects provide a means of assessing student progress in learning over the year.

Notes: This course is structured to leave 7 student days open and available, as lessons may take longer than described.

Unit 1 Overview: Introduction to Biology

Chapter 1: Scientific Processes	1.5 classes	Pages 6-25
Chapter 2: Chemistry of Life	2 classes	Pages 27-47
Chapter 16: Ecosystems	2.5 classes	Pages 339-359
Chapter 17: Biological Communities	2 classes	Pages 361-383
Chapter 14: Classification of Organisms	1.5 classes	Pages 299-315
Chapter 19: Introduction to the Kingdoms of Life	0.5 class	Pages 411-431

MLRs, Unit Name and Length http://www.maine.gov/education/lres/content.html	Objectives	Essential Questions	Labs/Assessments
Unit 1 (U1), ~10 classes U1, Chapter 1 Scientific Processes 1.5 classes A2 Students evaluate the effectiveness of a model by comparing its predictions to actual observations from	Students will: <ul style="list-style-type: none"> ✓ identify unsafe practices in the lab ✓ list the steps of the scientific method ✓ formulate hypotheses ✓ design an experiment ✓ run an experiment 	<ul style="list-style-type: none"> ✓ How is the scientific method used by scientists to solve problem? ✓ How do scientists effectively communicate results of their experiments? ✓ How do scientists determine if an object is living? ✓ How do we write a lab procedure, follow it, and record data? 	Formative: <ul style="list-style-type: none"> ✓ class discussion on the definition and role of science in today's society ✓ given a picture of a lab, identify the unsafe practices ✓ practice writing effective hypotheses ✓ given certain situations, practice writing the scientific method and interpreting results (How to Make a Peanut Butter and Jelly Sandwich Lab) ✓ given a list of objects, use

<p>the physical setting, the living environment, and the technological world</p> <p>B1a Identify questions, concepts and testable hypotheses that guide scientific investigations</p> <p>B1b Design and safely conduct methodical scientific investigations, including experiments with controls</p> <p>B1c Use statistics to summarize, describe, analyze, and interpret results.</p> <p>B1d Formulate and revise scientific investigations and models using logic and evidence.</p> <p>B1g Communicate and defend scientific ideas</p>	<ul style="list-style-type: none"> ✓ make observations ✓ create methods to organize observations ✓ effectively analyze results of an experiment ✓ effectively communicate results of an experiment in a lab report ✓ list and define the 8 characteristics of life 	<ul style="list-style-type: none"> ✓ How do scientists write a lab report (using the established Lee Academy Lab Report Format) 	<p>characteristics to classify as living, dead or nonliving.</p> <p>Summative:</p> <ul style="list-style-type: none"> ✓ given a problem, design and run an experiment (Have students write/carry out a lab procedure for a common activity) ✓ communicate results in a well-written lab report ✓ debate the concepts living or non-living <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Peanut Butter and Jelly Sandwich Lab</i> ➤ <i>Acid Rain Lab—pH of Common Substances, Tie the Shoe Lab</i>
<p>U1, Chapter 2 Chemistry of Life</p> <p>2 Classes</p> <p>B1a Identify questions, concepts, and testable hypotheses that guide scientific investigations</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ differentiate between atoms and elements ✓ distinguish between covalent bonds, hydrogen bonds, and ionic bonds ✓ describe the structure of the 	<ul style="list-style-type: none"> ✓ How do covalent bonds, ionic bonds, and hydrogen bonds differ? ✓ How are acids and bases different? ✓ Why is water important to living organisms? ✓ What are the different properties 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Worksheet on structure of water ✓ Worksheet reviewing major concepts ✓ Vocabulary assignment ✓ Compounds in cells review ✓ Natural indicators lab—acids and bases ✓ Cohesion Lab ✓ Adhesion Lab ✓ Acids/Bases pH Lab

<p>C4d Provide examples of criteria that distinguish scientific explanations from pseudoscientific ones</p> <p>D3b Describe how the number and arrangement of atoms in a molecule determine a molecule's properties, including the types of bonds it makes with other molecules and its mass, and apply this to predictions about chemical reactions</p> <p>D3c Explain the essential roles of carbon and water in life processes</p> <p>D3f Apply an understanding of the factors that affect the rate of chemical reactions to predictions about the rate of chemical reactions</p>	<p>water molecule</p> <ul style="list-style-type: none"> ✓ explain why aqueous solutions are essential to carrying out life processes ✓ define acids and bases ✓ explain how acids and bases are formed ✓ describe the components of DNA and RNA ✓ explain the importance of ATP in cells ✓ describe the role of enzymes in chemical reactions 	<p>of water?</p> <ul style="list-style-type: none"> ✓ Why is ATP important in cells? ✓ How is energy important to living organisms? 	<ul style="list-style-type: none"> ✓ Lab observing enzyme detergents <p>Summative:</p> <ul style="list-style-type: none"> ✓ lab report on different Cohesion and Adhesion ✓ quiz on major concepts <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ "How Many Drops of Water on a Penny" Activity
<p>U1, Chapter 16 Ecosystems</p> <p>2 Classes</p> <p>A1b Explain and provide examples that illustrate how it may not always be possible to predict the impact of changing some part of a man-made or</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Distinguish an ecosystem from a community ✓ Describe the diversity of a representative ecosystem ✓ Sequence the process of succession 	<ul style="list-style-type: none"> ✓ How does succession impact the environment? ✓ Why are food chains rarely longer than three or four links? ✓ How is the flow of energy between an ecosystem and a plant or animal important to the environment? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Diagram a food web and a food chain ✓ Research and create a poster about real succession that has occurred on the earth ✓ Research the Greenhouse Effect online ✓ Lab: Changes of state of water <p>Summative:</p> <ul style="list-style-type: none"> ✓ Modeling Ecosystem Change Over Time (various ways to do

<p>natural system.</p> <p>B2a Identify new problems or a current design in need of improvement.</p> <p>C3b Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety, and the quality of the environment.</p> <p>E2a Explain why ecosystems can be reasonably stable over hundreds or thousands of years, even though populations may fluctuate.</p> <p>E2b. Describe dynamic equilibrium in ecosystems and factors that can, in the long run, lead to change in the normal pattern of cyclic fluctuations and apply that knowledge to actual situation</p>	<ul style="list-style-type: none"> ✓ Distinguish between producers and consumers ✓ Compare food chains and food webs ✓ Summarize the role of plants in the water cycle ✓ Analyze the flow of energy through the carbon cycle ✓ Identify the role of bacteria in the nitrogen cycle 		<p>this online)</p> <ul style="list-style-type: none"> ✓ Biome in a Bottle Project (look online) <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Ecosystems and foodwebs online,</i> ➤ <i>KESAB Patawllona and Torrens Waterwatch,</i> ➤ <i>Food Chain Tag Game</i>
<p>U1, Chapter 17 Biological Communities</p> <p>2 Classes</p> <p>E2b. Describe dynamic equilibrium in ecosystems and factors that can, in the long run, lead to change in the normal pattern of cyclic</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe coevolution ✓ Identify the distinguishing features of symbiotic relationships ✓ Describe the role of competition in shaping the 	<ul style="list-style-type: none"> ✓ How does coevolution affect interactions between species? ✓ How does competition affect an ecosystem? ✓ How do the features of plants and animals found in different biomes compare? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Examining the effects of competition in species ✓ Examining changes in a niche (looking at data) ✓ Research estuaries online and the impacts humans have on them <p>Summative:</p> <ul style="list-style-type: none"> ✓ Predicting Change in a Niche Data Lab

<p>fluctuations and apply that knowledge to actual situations</p> <p>E2c. Explain the concept of carrying capacity and list factors that determine the amount of life that any environment can support.</p> <p>A1a Analyze a system using the principles of boundaries, subsystems, inputs, outputs, feedback, or the system's relation to other systems and design solutions to a system problem.</p> <p>A3 Students identify and analyze examples of constancy and change that result from varying types and rates of change in physical, biological, and technological systems with and without counterbalances.</p>	<p>nature of communities</p> <ul style="list-style-type: none"> ✓ Summarize the importance of biodiversity ✓ Recognize the role of climate in determining the nature of a biological community ✓ Summarize the key feature of the Earth's major biomes 	<ul style="list-style-type: none"> ✓ How does elevation and latitude affect the distribution of biomes? 	<ul style="list-style-type: none"> ✓ Project creating climate conditions and biomes for a new island
<p>U1, Chapter 14</p> <p>1.5 Classes</p> <p>E5a. Describe the premise of biological evolution, citing evidence from the fossil record and evidence based on the</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Summarize the scientific system for naming a species ✓ List the seven levels of biological classification ✓ List the characteristics used 	<ul style="list-style-type: none"> ✓ How did Linnaeus develop the modern system of naming organisms? ✓ How do biologists use cladograms to determine evolutionary history? ✓ How are analogous structures 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Cladogram Activity ✓ Cladistic taxonomy and evolutionary systematics Activity <p>Summative:</p> <ul style="list-style-type: none"> ✓ Making a Dichotomous Key (look online can be done with tree leaves) <p><i>Supplemental options:</i></p>

<p>observation of similarities within the diversity of existing organisms.</p> <p>E5c. Explain why some organisms may have characteristics that have no apparent survival or reproduction advantage</p>	<p>to classify organisms</p> <ul style="list-style-type: none"> ✓ Summarize the biological species concept 	<p>related to convergent evolution</p>	<ul style="list-style-type: none"> ➤ <i>Use a field guide to identify trees and other plants and make labels for the organisms.</i>
<p>U1, Chapter 19 Introduction to the Kingdoms of Life</p> <p>0.5 Classes</p> <p>E1a Explain how the variation in structure and behavior of a population of organisms may influence the likelihood that some members of the species will have adaptations that allow them to survive in a changing environment.</p> <p>E1b Describe the role of DNA sequences in determining the degree of kinship among organisms and the identification of species.</p> <p>E1d Analyze the effects of changes in biodiversity and predict possible consequences</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Differentiate between bacteria and archaeobacteria ✓ Describe the characteristics of protists and fungi ✓ List the levels of cellular organization that occur in plants and animals ✓ Name the characteristics of plants and animals 	<ul style="list-style-type: none"> ✓ How are organisms classified into the different kingdoms using characteristics? ✓ How are protists and fungi similar? ✓ How are plants and animals different? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Phylogenetic tree of kingdoms worksheet ✓ Grouping Organisms Activity ✓ Quick lab Modeling True Multicellularity <p>Summative:</p> <ul style="list-style-type: none"> ✓ Kingdom Diversity Research <p><i>Supplemental options;</i></p> <ul style="list-style-type: none"> ➤ <i>Grouping by Complexity: Design a family tree using pictures and describe,</i> ➤ <i>Distinguishing Organisms Microscope Lab Activity (differences between unicellular, colonial, aggregate, and multicellular algae)</i>

E5b. Describe the origins of life and how the concept of natural selection provides a mechanism for evolution that can be advantageous or disadvantageous to the next generation.



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Unit 2: Exploring Plants

Chapter 5: Photosynthesis	2 days	Pages 93-103
Chapter 23: Introduction to P	2 days	Pages 501-527
Chapter 24: Plant Reproduction0.5	2 days	Pages 529-549
Chapter 25: Plant Structure and Fun	2 days	Pages 551-569
Chapter 26: Plant Growth and Development	2 days	Pages 571-589

<p>Unit 2 (U2), Exploring Plants ~10 classes</p> <p>Chapter 5 Photosynthesis</p> <p>2 Classes</p> <p>E2d Describe the critical role of photosynthesis and how energy and the chemical elements that make up molecules are transformed in ecosystems and obey basic conservation laws.</p> <p>E3e Describe the role of regulation and the processes that maintain an internal environment amidst</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Analyze the flow of energy through living systems ✓ Describe the role of ATP in metabolism ✓ Explain the steps of photosynthesis 	<ul style="list-style-type: none"> ✓ How does the processes of photosynthesis contribute to energy transfer and the continuity of life? ✓ How does the environment affect the rate of photosynthesis? ✓ How is cellular respiration related to photosynthesis? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Labeling photosynthesis diagrams ✓ Photosynthesis vocabulary matching game ✓ Photosynthesis online ✓ Chromatography Lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Photosynthesis Lab Report ✓ Photosynthesis Review (Quiz or Test) <p>Supplemental options:</p> <ul style="list-style-type: none"> ➤ Observing Oxygen Production from Plants using Photosynthesis Lab
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<p>changes in the external environment.</p> <p>E3f Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary materials to perform their functions.</p>			
<p>U2, Chapter 23 Introduction to Plants</p> <p>2 Classes</p> <p>E1a. Explain how the variation in structure and behavior of a population of organisms may influence the likelihood that some members of the species will have adaptations that allow them to survive in a changing environment.</p> <p>E3e Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> ✓ Distinguish nonvascular plants from vascular plants ✓ Describe the structure of a vascular plant sporophyte ✓ Describe the key features of the four major groups of plants ✓ Describe the various uses of plants 	<ul style="list-style-type: none"> ✓ How do seeds and flowers help the success of plants? ✓ How did plants adapt to living on land? ✓ What are the 12 living phyla of plants? ✓ How are plants used to treat human ailments? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Observing behavior of Stomata (examining stomata under a microscope) ✓ Activity Analyzing the Effect of Climate on Plants (can turn into a lab in class) ✓ Quick Lab distinguishing between fruits and vegetables <p>Summative:</p> <ul style="list-style-type: none"> ✓ Research Project on Uses of Plants ✓ Surveying Plant Diversity Lab (Identification)
<p>U2, Chapter 24 Plant Reproduction</p> <p>2 Classes</p> <p>E3g. Describe how cells differentiate to form</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> ✓ Summarize the life cycle of a moss and fern ✓ Distinguish the male and female gametophytes of 	<ul style="list-style-type: none"> ✓ How do the parts of a flower relate to their function? ✓ How is vegetative reproduction advantageous? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Activity or Lab Examining different types of seeds ✓ Research Online the Importance of Bees in the World ✓ Lab: Observing the Parts of a Flower

<p>specialized <i>systems</i> for carrying out life functions.</p>	<p>seed plants</p> <ul style="list-style-type: none"> ✓ Describe the function of each part of a seed ✓ Summarize the life cycle of a conifer ✓ Summarize the life cycle of an angiosperm ✓ Identify several ways to propagate plants ✓ Differentiate between sexual and asexual reproduction in plants 		<p>Summative:</p> <ul style="list-style-type: none"> ✓ Quiz: Compare and contrast the different methods of plant reproduction and the advantages of each type
<p>U2, Chapter 25 Plant Structure and Function</p> <p>2 Classes</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> ✓ Identify the three kinds of tissues in a vascular plant's body and state the function of each ✓ Relate transpiration to the movement of water up a plant ✓ Describe how guard cells regulate the rate of transpiration ✓ Describe the process of translocation in a plant 	<ul style="list-style-type: none"> ✓ How do the different structure of roots, stems, and leaves help a plant carry out its functions? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Activity comparing and contrasting C3 and C4 Leaves ✓ FIELD TRIP: Sugar Maples— Making Syrup ✓ Refer to Chromatography Lab if didn't do it before ✓ Transpiration Lab (look online) <p>Summative:</p> <ul style="list-style-type: none"> ✓ Plant Observation Lab

<p>Chapter 26 Plant Growth and Development</p> <p>2 Classes (start plant growth lab at beginning of units)</p> <p>E1a. Explain how the variation in structure and behavior of a population of organisms may influence the likelihood that some members of the species will have adaptations that allow them to survive in a changing environment.</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> ✓ Compare seed germination in beans and corn ✓ Contrast annuals, biennials, and perennials ✓ Explain how primary and secondary growth are produced ✓ Identify the nutrients needed to grow a plant 	<ul style="list-style-type: none"> ✓ How is development in plants different from animals? ✓ How do hormones affect plant growth? ✓ How does the environment affect plant growth? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Activity examining cross sections of trees ✓ Lab Examining Bean and Corn Seeds Germinate ✓ Lab Examining the Effects of Ethylene on a Plant ✓ Lab Examining the role of auxin in plants growing toward light <p>Summative:</p> <ul style="list-style-type: none"> ✓ Lab Germinating Seeds (Have each student choose a type of seed: annual, perennial, biennial, flower, or vegetable to grow in the classroom) Students must chart growth daily and record observations. ✓ Lab Report on Plant Growth and Development
<p>Unit 3: Principles of Cell Biology</p>			

Chapter 3: Cell Structure	3 classes	Pages 49-71	
Chapter 4: Cell Environment	1.5 classes	Pages 73-91	
Chapter 5: Cellular Respiration	1 class	Pages 104-113	
Chapter 6: Chromosomes and Cell Reproduction	2.5 classes	Pages 117-139	
Unit 3 (U3), Chapter 3 Cell Structure 3 Classes E3a Describe the similarities and differences in the basic functions of cell membranes and of the specialized parts within cells that allow them to transport materials, capture and release energy, build proteins, dispose of waste, communicate, and move.	Students will: <ul style="list-style-type: none"> ✓ Identify and define parts of the microscope ✓ List and define cell parts ✓ Describe the function of cell parts ✓ Explain how the structure is essential to the function of cell parts ✓ Discuss the experiments that led to the modern scientific understanding of cells 	<ul style="list-style-type: none"> ✓ How does the structure influence the function of cell parts? ✓ How has the scientific concept of cells developed? ✓ How do plant cells differ from animal cells? 	Formative: <ul style="list-style-type: none"> ✓ Microscope worksheets ✓ Worksheets on the structure of plant and animal cells ✓ Cell structure vocabulary ✓ Cell analogy worksheet ✓ Lab comparing plant and animal cells ✓ Surface Area to Volume Lab Summative: <ul style="list-style-type: none"> ✓ Use microscopes correctly in microscope lab ✓ Analogy of cells to larger entities ✓ Venn Diagram comparing plant and animal cells ✓ Cell Organelle Project <i>Supplemental options:</i> <ul style="list-style-type: none"> ➤ <i>Cells Alive internet activity,</i> ➤ <i>Creating cells from everyday items,</i> ➤ <i>Comparing size of cells of bacteria in yogurt to human and plant cells,</i> ➤ <i>Examining cell structure using prepared slide of a cheek cell.</i>
U3, Chapter 4	Students will: <ul style="list-style-type: none"> ✓ List and explain the methods 	<ul style="list-style-type: none"> ✓ How does the transport of materials into and out of the cell effect cell life? 	Formative: <ul style="list-style-type: none"> ✓ Passive transport worksheet ✓ LabS on Osmosis/Diffusion

<p>Cell Environment</p> <p>1.5 classes</p> <p>A3 Students identify and analyze examples of constancy and change that result from varying types and rates of change in physical, biological, and technological systems with and without counterbalances.</p> <p>E3 Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p>	<p>of passive and active transport</p> <ul style="list-style-type: none"> ✓ Discuss situations in which these methods occur ✓ Relate concentration gradients, diffusion, and equilibrium ✓ Describe the importance of the sodium-potassium pump 	<ul style="list-style-type: none"> ✓ How does passive transport relate to active transport? 	<ul style="list-style-type: none"> ✓ Active transport worksheet ✓ Worksheet comparing and contrasting various types of transport <p>Summative:</p> <ul style="list-style-type: none"> ✓ Osmosis lab report ✓ Concept map comparing the various types of passive and active transport <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Sore Throat Remedy,</i> ➤ <i>Diffusion Demonstration with red and blue food coloring,</i> ➤ <i>Potato Slice Demonstration,</i> ➤ <i>Passive transport online,</i> ➤ <i>Active transport online,</i> ➤ <i>Cell energy factory project—flow of energy in an ecosystem</i>
<p>Unit 3</p> <p>Chapter 5 Cellular Respiration</p> <p>1 class</p> <p>E3e Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Analyze the flow of energy through living systems ✓ Describe the role of ATP in metabolism ✓ Explain the steps of cellular respiration 	<ul style="list-style-type: none"> ✓ How do the processes of cellular respiration contribute to energy transfer and the continuity of life? ✓ How is cellular respiration related to photosynthesis? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Analyzing steps of reactions ✓ Respiration concept map ✓ Cellular respiration diagrams ✓ Fermentation Research ✓ Fermentation Lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Fermentation Lab Report ✓ Cellular Respiration Review (Quiz or Test) <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Cell respiration online,</i>

<p>E3f Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary materials to perform their function</p>			<p>➤ <i>Heat is on Lab</i></p>
<p>U3 Chapter 6 Chromosomes and Cell Reproduction</p> <p>2.5 classes</p> <p>E3c Describe the interactions that lead to cell growth and division (mitosis) and allow new cells to carry the same information as the original cell (meiosis).</p> <p>E3d Describe ways in which cells can malfunction and put an organism at risk.</p> <p>E3g Describe how cells differentiate to form specialize systems for carrying out life functions.</p> <p>E4d Describe the possible causes and effects of gene mutations.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe the structure of chromosomes ✓ List and discuss the steps of mitosis ✓ Discuss what happens when the cell cycle becomes uncontrolled ✓ List types of mutations and discuss the effects of these mutations on growing organisms 	<ul style="list-style-type: none"> ✓ How does the process of mitosis contribute to the growth of organisms at a cellular level? ✓ How do changes in the chromosome number or structure lead to mutations and cancer? ✓ How is cytokinesis different in plant and animal cells? ✓ How is the cell cycle controlled in eukaryotic cells 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Microscope ✓ Cell Division Worksheets ✓ Cell Cycle Diagrams ✓ Online Cancer Activity ✓ Modeling Chromosomal Mutations Quick Lab ✓ Math Lab Calculating the Number of Cells Resulting from Mitosis ✓ Modeling Mitosis Exploration lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Chromosomes and Cell Reproduction Test ✓ Cancer Research Project <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Cell Cycle Videos</i> ➤ <i>Cancer Activities: videos, discussion, research</i>

Unit 4: Principles of Evolution and Ecology

Chapter 12: History of Life on Earth	1 class	Pages 251-273
Chapter 13: Theory of Evolution	2 classes	Pages 275-297
Chapter 15: Populations	2 classes	Pages 319-337
Chapter 18: The Environment	1 class	Pages 385-405

<p>Unit 4</p> <p>Chapter 12 History of Life on Earth</p> <p>1 Class</p> <p>E5a Describe the premise of biological evolution, citing evidence from the fossil record and evidence based on the observation of similarities within the diversity of existing organisms.</p> <p>E5b Describe the origins of life and how the concept of natural selection provides a mechanism for evolution that can be advantageous or disadvantageous to the next generation.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe how cellular organization began ✓ Explain the importance of heredity to the development of life ✓ Describe how radioisotopes can be used in determining Earth's age ✓ Describe the evolution of prokaryotes and eukaryotes ✓ Explain how mass extinctions affected the evolution of life on Earth ✓ Identify the first multicellular organisms and animals to live on land 	<ul style="list-style-type: none"> ✓ How does heredity affect the development of life? ✓ How did the development of the ozone lead to the adaptation of life on the land? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Chapter 12 worksheet ✓ Lab Modeling Radioactive Decay ✓ Group Activity creating models of endosymbionts and bacteria ✓ Read Excerpt from Darwin's <i>Origin of Species</i> <p>Summative:</p> <ul style="list-style-type: none"> ✓ Create a timeline of life on Earth <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Egg Demonstration</i>
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<p>Unit 4</p> <p>Chapter 13 Theory of Evolution</p> <p>2 Classes</p> <p>E5c Explain why some organisms may have characteristics that have no apparent survival or reproduction advantage.</p> <p>E5d Relate structural and behavioral adaptations of an organism to its survival in the environment.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Discuss the fossil discoveries and the experiments that lead to the current scientific understanding of how life on earth began ✓ Discuss Darwin's observations ✓ Explain the theory of natural selection and how it relates to changes in organisms ✓ Discuss how evolutionary changes may be advantageous or harmful to organisms 	<ul style="list-style-type: none"> ✓ How does natural selection provide a mechanism for evolution that can be advantageous or harmful to the next generation? ✓ How do structural and behavioral adaptations effect the survival of an organism? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Natural selection in goldfish ✓ Candy Dish selection ✓ Online activity researching Darwin's ideas followed by class discussion ✓ http://www.biologyinmotion.com/e-vol/index.html (online simulation) <p>Summative:</p> <ul style="list-style-type: none"> ✓ Concept map on evolution <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Video on Evolution</i>
<p>U4, Chapter 15 Populations</p> <p>2 Classes</p> <p>A2 Students evaluate the effectiveness of a model by comparing its predictions to actual observations from the physical setting, the living environment, and the technological world.</p> <p>E2a Explain why ecosystems can be reasonably stable over hundreds or thousands of</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Define population ✓ Discuss the models of population growth ✓ Discuss these models as they relate to actual populations ✓ Explain various mechanisms that allow organisms to evolve ✓ Explain the Hardy-Weinberg principle 	<ul style="list-style-type: none"> ✓ How does the change in population alleles frequencies affect population growth? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Lab Observing how natural selection affects a population ✓ Genetic Drift: The Founder Effect Group Activity ✓ Math Lab Building a normal distribution curve ✓ Exponential/Logistic Growth Models: http://www.otherwise.com/population/exponent.html <p>Summative:</p> <ul style="list-style-type: none"> ✓ Chapter 15 Quiz ✓ Population Project <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Sampling Activity—Blades of Grass</i>

<p>years, even though populations may fluctuate.</p> <p>E2b Describe dynamic equilibrium in ecosystems and factors that can, in the long run, lead to change in the normal pattern of cyclic fluctuations and apply that knowledge to actual situations.</p> <p>E2c Explain the concept of carrying capacity and list factors that determine the amount of life that any environment can support.</p>			<ul style="list-style-type: none"> ➤ <i>The lesson of the Kaibab Worksheet</i> ➤ <i>Variation and selection in the Egyptian Origami Bird-Prey Simulation</i> ➤ <i>Interpreting Ecological Data Worksheet</i> ➤ <i>Water, Water, Everywhere Activity</i>
<p>U4, Chapter 18 The Environment</p> <p>1 Class</p> <p>A1b Explain and provide examples that illustrate how it may not always be possible to predict the impact of changing some part of a man-made or natural system.</p> <p>C3a Explain how science and technology influence the carrying capacity and sustainability of the planet.</p> <p>C3b Explain how ethical, societal, political, economic,</p>	<p>Students wil:</p> <ul style="list-style-type: none"> ✓ Evaluate the long-term consequences of atmospheric ozone depletion ✓ Discuss the issues that are affecting global atmospheric conditions ✓ Describe the effects of chemical pollutants on the environment ✓ Discuss ways of changing human patterns to improve conditions 	<ul style="list-style-type: none"> ✓ How does global environmental change affect organisms? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Chapter 18 Worksheet ✓ Ground Water In Your Back Yard Activity ✓ Making a Commitment: what we can do as a school to help the environment <p>Summative:</p> <ul style="list-style-type: none"> ✓ Essay on which environmental concern will have the greatest impact on their community in the next decade. ✓ Or ✓ Research Paper on one factor caused by humans that has affected the environment. <p>Supplemental options:</p>

and cultural factors influence personal health, safety, and the quality of the environment.

E2b Describe dynamic equilibrium in ecosystems and factors that can, in the long run, lead to change in the normal pattern of cyclic fluctuations and apply that knowledge to actual situations.

- UV Damage
- Topsoil in Mississippi River Basin Online Activity
<http://www.sierraclub.org/ecoregions/missbasin.asp>,
- Create a school display on the Human Impact on the Environment

Unit 5: Principles of Genetics

Chapter 7: Meiosis and Sexual Reproduction	2 classes	Pages 143-159
Chapter 8: Mendel and Heredity	4 classes	Pages 161-187
Chapter 11: Gene Technology	1 class	Pages 227-247
Chapter 9: DNA	1.5 classes	Pages 189-205
Chapter 10: Proteins	0.5 class	Pages 207-225

<p>Unit 5</p> <p>Chapter 7 Meiosis and Sexual Reproduction</p> <p>2 Classes</p> <p>E3c Describe the interactions that lead to cell growth and division (mitosis) and allow new cells to carry the same information as the original cell (meiosis).</p> <p>E3g Describe how cells differentiate to form specialize systems for carrying out life functions.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ List and discuss the steps of meiosis ✓ Discuss the similarities and differences between mitosis and meiosis ✓ Relate crossing-over, independent assortment, and random fertilization to genetic variation ✓ Differentiate between asexual and sexual reproduction 	<ul style="list-style-type: none"> ✓ How does meiosis contribute to the creation of new and different organisms? ✓ How do asexual and sexual reproduction have advantages and disadvantages? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Modeling Crossing-Over Lab (look online) ✓ Observing Reproduction in Yeast Lab ✓ Modeling Meiosis Lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Flip books and written comparisons of mitosis and meiosis <p>Supplemental options:</p> <ul style="list-style-type: none"> ➤ Meiosis Videos
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<p>U5, Chapter 8 Mendel and Heredity</p> <p>4 Classes</p> <p>E4a Explain some of the effects of the sorting and recombination of genes in sexual reproduction.</p> <p>E4b Describe genes as segments of DNA that contain instructions for the cells and include information that leads to the differentiation of cells.</p> <p>E4c Explain how the instructions in DNA that lead to cell differentiation result in varied cell functions in the organism and DNA.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Explain Mendel's experiment and its result ✓ Explain the 3 Laws of Heredity and apply them to genetic problems ✓ Set up and perform Punnett squares ✓ Discover and discuss the probability of outcomes for Punnett squares ✓ Construct and interpret pedigrees ✓ Discuss complex patterns of inheritance ✓ Discuss genetic disorders 	<ul style="list-style-type: none"> ✓ How are Mendel's principles used to determine the probability of genetic outcomes? ✓ How are Mendel's principles used to determine the probability of genetic disorders? ✓ How are Mendel's principles used to explain complex patterns of inheritance? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Chapter 8 worksheet ✓ Complete various worksheets on Punnett Squares ✓ Complete practice sheets on pedigrees ✓ Calculating Mendel's Ratios Math Lab ✓ Identifying Dominant or Recessive Traits Lab ✓ Probability of the Outcome of a Cross Lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Genetic Disorder research project ✓ Design a species project ✓ Set up and solve Punnett squares <p>Supplemental options:</p> <ul style="list-style-type: none"> ➢ Construct a pedigree ➢ Hairy Knuckles Activity
<p>U5, Chapter 11 Gene Technology</p> <p>1 Class</p> <p>C3b Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety, and the quality of the environment.</p> <p>C3c Explain how ethical, societal, political, economic,</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Discuss the process of cloning ✓ Discuss the applications of genetic engineering ✓ Discuss the benefits and consequences of genetic engineering 	<ul style="list-style-type: none"> ✓ How does gene technology enhance or detract from the quality of life? ✓ How has the Human Genome Project influence our understanding of genetics? ✓ Why is genetic engineering important for creating vaccines? ✓ Why is genetic engineering important for agriculture? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Chapter 11 worksheet ✓ Lab on Gel Electrophoresis (look online) ✓ Online activity researching advances in cloning followed by a discussion of the process and results of cloning <p>Summative:</p> <ul style="list-style-type: none"> ✓ Project on Genetically Modified Foods <p>Supplemental options:</p> <ul style="list-style-type: none"> ➢ <i>Articles on cloning or agricultural</i>

<p>religious, and cultural factors influence the development and use of science and technology.</p> <p>C4b Select and describe one of the major episodes in the history of science including how the scientific knowledge changed over time and any important effects on science and society.</p> <p>C4c Give examples that show how societal, cultural, and personal beliefs and ways of viewing the world that can bias scientists.</p>			<p><i>advances</i></p>
<p>U5, Chapter 9 DNA</p> <p>1.5 Classes</p> <p>C1a Describe how hypotheses and past and present knowledge guide and influence scientific investigations.</p> <p>C2a Provide an example that shows how science advances with the introduction of new technologies and how solving technological problems often impacts new scientific knowledge.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Trace the experiments important in the discovery of DNA as the genetic material ✓ Explain the structure of DNA ✓ Discuss the experiments instrumental in the discovery of the structure of DNA ✓ Explain the process of DNA replication and how the structure of the DNA molecules aids this process 	<ul style="list-style-type: none"> ✓ How does the structure of DNA affect its function? ✓ How are errors corrected during DNA replication? ✓ How did the contributions of Chargaff, Franklin, and Wilkins help Watson and Crick determine the double-helical structure of DNA? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ KWL Worksheet ✓ DNA online animations ✓ Lab modeling DNA structure ✓ Math Lab analyzing the rate of DNA replication ✓ Observing Properties of DNA Lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Creating a DNA model ✓ Quiz on DNA <p>Supplemental options:</p> <ul style="list-style-type: none"> ➤ DNA History webquest

<p>C2b Provide examples of how creativity, imagination, and a good knowledge base are required to advance scientific ideas and technological design.</p> <p>C2c Provide examples that illustrate how technological solutions to problems sometimes lead to new problems or new fields of inquiry.</p> <p>E3b Describe the relationship between DNA, protein molecules, and amino acids in carrying out the work of cells and how this is similar among all organisms.</p>			
<p>U5, Chapter 10 Proteins</p> <p>0.5 Class</p> <p>E3b Describe the relationship between DNA, protein molecules, and amino acids in carrying out the work of cells and how this is similar among all organisms.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Explain the structure of RNA ✓ Explain the process of transcription ✓ Explain the process of translation ✓ Explain how these two processes lead to the production of protein 	<ul style="list-style-type: none"> ✓ How does the structure of RNA affect its function? ✓ How does the role of codons affect the sequence of amino acids that result after translation? ✓ How is the genetic code significant to evolution? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Chapter 10 worksheet ✓ Exercise using a codon table ✓ Lab modeling transcription ✓ Online activity exploring Jumping Genes ✓ Lab modeling introns and exons ✓ Lab Modeling protein synthesis <p>Summative:</p> <ul style="list-style-type: none"> ✓ Quiz on using a codon table and other information <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ Animations on transcription and translation

Unit 6: Exploring Diversity			
Chapter 14: Classification of Organisms	0.5 day	Pages 298-315	
Chapter 19: Introduction to the Kingdoms of Life Review Above Refer Back to Unit 1	0.5 day	Pages 411-431	
Chapter 20: Viruses and Bacteria	2 days	Pages 433-457	
Chapter 21: Protists	2 days	Pages 459-479	
Chapter 22: Fungi	3 days	Pages 481-497	
<p>U6, Chapter 20 Viruses and Bacteria</p> <p>2 Classes</p> <p>A1b Explain and provide examples that illustrate how it may not always be possible to predict the impact of changing some part of a man-made or natural system.</p> <p>B1a Identify questions, concepts, and testable hypotheses that guide scientific investigations.</p> <p>B1b Design and safely conduct methodical scientific investigations, including experiments with</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe why a virus is not considered a living organism ✓ Describe the basic structure of a virus ✓ List the steps of viral reproduction ✓ Explain how HIV infects immune system cells ✓ Describe the three different ways bacteria obtain energy. ✓ List the seven differences between bacteria and eukaryotic cells. ✓ Describe the different shapes and structure of bacteria 	<ul style="list-style-type: none"> ✓ How are viruses different from bacteria? ✓ How are bacteria beneficial and harmful to the environment and humans? ✓ What are the advantages and disadvantages of antibiotics? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ KWL Chart ✓ Chapter 20 Worksheet ✓ Diagram Viral Reproduction ✓ Chart Comparing Viruses and Bacteria ✓ Observing Bacteria Over Time Lab ✓ Vocabulary Quiz <p>Summative:</p> <ul style="list-style-type: none"> ✓ Virus Research Project ✓ Observing Bacteria Over Time Lab Report ✓ Bacterial Diseases Research Project <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Design a Virus Activity,</i> ➤ <i>HIV and AIDS Project, Antibiotics,</i> ➤ <i>Gram Negative/Gram Positive Activity,</i> ➤ <i>Disease Detectives Article</i>

<p>controls.</p> <p>C3b Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety, and the quality of the environment.</p>			
<p>U6, Chapter 21 Protists</p> <p>2 Classes</p> <p>C3b Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety, and the quality of the environment.</p> <p>E2d Describe the critical role of photosynthesis and how energy and the chemical elements that make up molecules are transformed in ecosystems and obey basic conservation laws.</p> <p>E5d Relate structural and behavioral adaptations of an organism to its survival in the environment.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe the characteristics of protists ✓ Describe three different kinds of algae ✓ Discuss the differences between amoebas, forams, diatoms, flagellates, and ciliates ✓ Explain the characteristics of protistan molds ✓ Describe the impact of sporozoans on the environment ✓ Describe how protists affect human health 	<ul style="list-style-type: none"> ✓ How are protists important to the environment? ✓ How can protists affect human health? ✓ How is protist structured related to its function? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Chapter 21 Vocabulary ✓ Current Science Online Articles ✓ Algae Lab ✓ Protists in the World Around us Worksheet <p>Summative:</p> <ul style="list-style-type: none"> ✓ Kinds of Protists Lab and Report <p>Supplemental options:</p> <ul style="list-style-type: none"> ➤ Space Algae Activity ➤ , Red Tide Activity, ➤ Potato Threat, ➤ Grown Your Own Slime Mold, ➤ Algae in Your House Research Project, ➤ Vaccines

<p>U6, Chapter 22 Fungi</p> <p>3 Classes</p> <p>B1c use statistics to summarize, describe, analyze, and interpret results.</p> <p>C2a Provide an example that shows how science advances with the introduction of new technologies and how solving technological problems often impacts new scientific knowledge.</p> <p>C3b Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety, and the quality of the environment.</p> <p>E5d Relate structural and behavioral adaptations of an organism to its survival in the environment.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe the characteristics of the kingdom Fungi ✓ Explain how fungi reproduce and obtain nutrients ✓ Describe the life cycles of zygomycetes, ascomycetes, and basidiomycetes ✓ Explain the symbiotic relationship of fungi ✓ Define and Explain about lichens 	<ul style="list-style-type: none"> ✓ How does the way fungi obtain nutrients relate to their role in ecosystems? ✓ How are fungi used commercially? ✓ How are mycorrhizae ecologically important? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Fungi Mushroom Dissection Lab ✓ Spore Prints ✓ Fungi Game ✓ Fungi Quiz ✓ Mushroom Farm Observations <p>Summative:</p> <ul style="list-style-type: none"> ✓ Moldy Bread Lab and Report ✓ Fungi Research Project <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Favorite Fungus Activity,</i> ➤ <i>Observing Yeast and Fermentation Lab</i>
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Unit 7: Exploring Invertebrates

Unit 7: Exploring Invertebrates			
Chapter 27: Introduction to Animals	2 classes		Pages 593-615
Chapter 28: Simple Invertebrates	1 class		Pages 617-639
Chapter 29: Mollusks and Annelids	1 class		Pages 641-661
Chapter 30: Arthropods	1 class		Pages 663-689
Chapter 31: Echinoderms and Invertebrate Chordates	2 classes		Pages 691-707
<p>U7, Chapter 27 Introduction to Animals</p> <p>2 Classes</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Identify the features that animals have in common ✓ Distinguish radial symmetry from bilateral symmetry ✓ Summarize the importance of a body cavity ✓ Summarize the functions of the body systems ✓ Differentiate between open and closed circulatory systems ✓ Distinguish between asexual and sexual reproduction 	<ul style="list-style-type: none"> ✓ How do scientists determine evolutionary relationships among animals? ✓ What are the advantages of sexual and asexual reproduction? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Research How Twins Form ✓ Lab Surveying Invertebrate Diversity <p>Summative:</p> <ul style="list-style-type: none"> ✓ Posters of Different Symmetry of Animals ✓ Research paper on a specific organism's reproductive patterns and how they are essential to its survival <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Lab Collecting Live Invertebrates</i>
<p>U7, Chapter 28 Simple Invertebrates</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe the features of 	<ul style="list-style-type: none"> ✓ How does a sponge's structure help it survive? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Microscope Lab observing slides of invertebrates

<p>1 Class</p> <p>Chapter 29 Mollusks and Annelids</p> <p>1 Class</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>sponges</p> <ul style="list-style-type: none"> ✓ Compare the two types of reproduction of sponges ✓ Describe the features of cnidarians ✓ Compare the two types of reproduction of cnidarians ✓ Compare the three types of flatworms ✓ Describe the body plan of a round worm ✓ Describe the key characteristics and body systems of mollusks ✓ Compare the body plans and feeding patterns of gastropods, bivalves, and cephalopods ✓ Describe the body plan and systems of annelids 	<ul style="list-style-type: none"> ✓ How does the structure of cnidarians help it survive? ✓ How does the structure of flatworms and roundworms and how it helps them survive? ✓ How did the evolutionary relationship between mollusks and annelids develop? 	<ul style="list-style-type: none"> ✓ Model an Open Circulatory System ✓ Earthworm Dissection Lab ✓ Observing Characteristics of Clams Lab ✓ Research the Modern Uses of leeches <p>Summative:</p> <ul style="list-style-type: none"> ✓ Project comparing invertebrates, mollusks, and annelids
<p>U7, Chapter 30 Arthropods</p> <p>1 class</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe the characteristics of arthropods ✓ Describe the growth in arthropods ✓ Identify and Describe the characteristics of arachnids 	<ul style="list-style-type: none"> ✓ How are arthropods and annelids related through evolution? ✓ How are spiders, ticks, and mites related? ✓ How are crustaceans and insects similar and dissimilar? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Research Flea Control in Pets Online ✓ Research the affects of Tics on Humans and Animals ✓ Research Health Risks posed by Arachnids Online ✓ Grasshopper Dissection Lab ✓ Lobster Observation or Dissection <p>Summative:</p>

<p>environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<ul style="list-style-type: none"> ✓ Describe the characteristics of insects ✓ Describe the characteristics of crustaceans 		<ul style="list-style-type: none"> ✓ Poster comparing different arthropods and evolutionary advantageous adaptations
<p>Chapter 31 Echinoderms and Invertebrate Chordates</p> <p>2 Classes</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe the characteristics of echinoderms ✓ Summarize how a sea star's vascular system functions ✓ Describe the characteristics of chordates 	<ul style="list-style-type: none"> ✓ How is the developmental pattern found in protostomes similar to deuterostomes? ✓ How are tunicates and lancelets similar and dissimilar? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Sea Star Dissection Lab ✓ Microscope observation of adult lancelet slides to see notochord and nerve chord <p>Summative:</p> <ul style="list-style-type: none"> ✓ Poster on sea star characteristics and functions

Unit 8: Exploring Vertebrates

Unit 8: Exploring Vertebrates			
Chapter 32: Introduction to Vertebrates	1 class	Pages 711-743	
Chapter 33: Fishes and Amphibians	3 classes	Pages 745-769	
Chapter 34: Reptiles and Birds	1 class	Pages 771-797	
Chapter 35: Mammals	1 class	Pages 799-821	
Chapter 36: Animal Behavior	2 classes	Pages 823-841	
<p>U8, Chapter 32 Introduction to Vertebrates</p> <p>1 Class</p> <p>Chapter 33 Fishes and Amphibians</p> <p>3 Classes</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p> <p>E4a. Explain some of</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Identify key characteristics of vertebrates ✓ Identify the relationship of fishes and amphibians ✓ Contrast ectotherms and endotherms ✓ Summarize why dinosaurs became the dominant land vertebrates ✓ Describe the characteristics of primates ✓ Identify the evidence that indicates human ancestors walked upright before their brain enlarged ✓ Compare the characteristics 	<ul style="list-style-type: none"> ✓ How did early fish adapt to their environment? ✓ How are amphibians adapted for life on land? ✓ Why did mammals replace dinosaurs? ✓ How are humans and apes related? ✓ How are the Neanderthals similar to modern humans? ✓ How are modern fish different from their ancestors? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Exploration Lab Comparing Hominid Skulls (by pictures) ✓ Yellow Perch Dissection Lab ✓ Frog Dissection Lab or observing a live frog <p>Summative:</p> <ul style="list-style-type: none"> ✓ Create a timeline of vertebrate development and adaptations ✓ Compare and contrast fishes and amphibians

<p>the effects of the sorting and recombination of genes in sexual reproduction.</p>	<p>of the development throughout the genus <i>Homo</i></p> <ul style="list-style-type: none"> ✓ Describe the characteristics of modern fish ✓ Summarize how fish get oxygen, reproduce, and balance salt content ✓ Summarize the characteristics of modern amphibians 		
<p>U8, Chapter 34 Reptiles and Birds</p> <p>1 Class</p> <p>Chapter 35 Mammals</p> <p>1 Class</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p> <p>E4a. Explain some of the effects of the sorting</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe the key characteristics of reptiles ✓ Describe a reptiles metabolism and adaptations that allow it to live on land ✓ Compare the parental care of crocodylians with other reptiles ✓ Summarize how a birds structure is related to its function ✓ Describe how a mammal's structure relates to its function ✓ Describe parental care of 	<ul style="list-style-type: none"> ✓ How does the amniotic egg serves to protect young? ✓ How does a bird's structure aid it in survival? ✓ How are mammals adapted to survive in different environments? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Observing the amniotic egg lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Research a specific bird's life patterns and present it to the class ✓ Research and compare different gestation periods of mammals <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Observing slides of skin under a microscope</i>

<p>and recombination of genes in sexual reproduction.</p> <p>E5d. Relate structural and behavioral adaptations of an organism to its survival in the environment.</p>	<p>mammals</p> <ul style="list-style-type: none"> ✓ Compare the reproductive patterns of mammals 		
<p>U8, Chapter 36</p> <p>2 Classes</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p> <p>E4a. Explain some of the effects of the sorting and recombination of genes in sexual reproduction.</p> <p>E5d. Relate structural and behavioral adaptations of an organism to its survival in the environment.</p> <p>E5b. Describe the origins of life and how the concept of natural selection provides a mechanism for evolution that can be advantageous or disadvantageous to the next generation.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe how natural selection shapes behavior ✓ Compare innate and learned behaviors ✓ Describe six types of animal behavior ✓ How do animals use signals 	<ul style="list-style-type: none"> ✓ How is behavior influence by both learning and heredity? ✓ How can sexual selection influence evolution? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Pavlov and Skinner Research ✓ Read part of Darwin's <i>Origin of Species</i> ✓ Research on natural selection ✓ Lab studying nonverbal communication of humans <p>Summative:</p> <ul style="list-style-type: none"> ✓ Gold Fish Behavior Lab Report <p><i>Supplemental options:</i></p> <ul style="list-style-type: none"> ➤ <i>Videos on Mate Choice</i>

Unit 9: Exploring Human Biology

Unit 9: Exploring Human Biology			
Chapter 37: Introduction to Body Structure	1 class	Pages 845-869	
Chapter 38: Circulatory and Respiratory Systems	1 class	Pages 871-897	
Chapter 39: Digestive and Excretory Systems	1 class	Pages 899-921	
Chapter 40: Body's Defenses	1 class	Pages 923-941	
Chapter 41: Nervous System	1 class	Pages 943-971	
Chapter 42: Hormones and the Endocrine System	1 class	Pages 973-993	
Chapter 43: Reproduction and Development	1 class	Pages 995-1015	
<p>U9, Chapter 37 Introduction to Body Structure</p> <p>1 Class</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3f. Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Identify four levels of structural organization within the human body ✓ List the body's major organ systems ✓ Distinguish between the axial skeleton and the appendicular skeleton ✓ Identify three main classes of joints ✓ Relate the structure of a skeletal muscle to the 	<ul style="list-style-type: none"> ✓ How do the different body tissues help the human body? ✓ How is endothermy important in maintaining homeostasis? ✓ How do bones develop? ✓ How is energy supplied to muscles for contraction? ✓ How does the skin help the body maintain homeostasis? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Microscope Lab Observing Different Tissue Types ✓ Osteoporosis Research ✓ Research on DNA fingerprinting <p>Summative:</p> <ul style="list-style-type: none"> ✓ Skin, Bone, or Muscle Disorder Project

<p>materials to perform their functions.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>muscle's ability to contract</p> <ul style="list-style-type: none"> ✓ Identify the important features of skin, hair, and nails 		
<p>U9, Chapter 38 Circulatory and Respiratory Systems</p> <p>1 Class</p> <p>Chapter 39 Digestive and Excretory Systems</p> <p>1 Class</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3f. Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary materials to perform their functions.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Relate the function of the lymphatic system to the functions of the cardiovascular system and the immune system ✓ Summarize the path that blood flows through the heart ✓ Summarize the path that air flows when it enters the body through the nose or mouth ✓ How is breathing rate regulated ✓ Identify the different nutrients and energy building materials needed for the body ✓ Describe the digestive process ✓ Identify the role of nephrons, the kidney, the urinary 	<ul style="list-style-type: none"> ✓ How is a person's blood type determined? ✓ How are vascular diseases detrimental to the human body? ✓ How is breathing rate related to activity? ✓ Why is the USDA food guide pyramid important? ✓ How are nutrients absorbed from the digestive system into the bloodstream? ✓ How are major wastes eliminated from the human body? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Research Heart Attacks ✓ Research Lung Diseases ✓ Research Diabetes ✓ Research Eating Disorders ✓ Research Kidney Dialysis ✓ Lab Demonstrating Lactose Digestion <p>Summative:</p> <ul style="list-style-type: none"> ✓ Lab Measuring Heart Rate and Breathing Rate

	system		
<p>U9, Chapter 40 The Body's Defenses</p> <p>1 Class</p> <p>Chapter 41 Nervous System</p> <p>1 Class</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3f. Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary materials to perform their functions.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Describe how the skin and membranes defend the body ✓ Identify an inflammatory response ✓ List the kinds of immune system cells and their functions ✓ List five ways diseases can be transmitted ✓ Describe several autoimmune diseases ✓ Identify the causes of an allergic reaction ✓ Analyze the structure and function of neurons ✓ Describe the parts of the brain and their functions ✓ How are the senses received in the brain ✓ Identify types of psychoactive drugs and how they affect the body 	<ul style="list-style-type: none"> ✓ How are white blood cells important in the human body? ✓ How do vaccines produce immunity to pathogens? ✓ How does HIV disable the immune system and how is it transmitted? ✓ How is the brain important to the human body? ✓ How do the different senses help the human body to function? ✓ How do drugs affect the human body? 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Lab Simulating Disease Transmission ✓ Vision and Hearing Labs ✓ Calculating Reaction Times Lab <p>Summative:</p> <ul style="list-style-type: none"> ✓ Research on HIV or drug addiction/impacts
<p>U9, Chapter 42 Hormones and the Endocrine System</p>	<p>Students will:</p> <ul style="list-style-type: none"> ✓ Identify the four major 	<ul style="list-style-type: none"> ✓ How do hormones help the human body to maintain 	<p>Formative:</p> <ul style="list-style-type: none"> ✓ Research the Dangers of Steroids in Athletes

<p>1 Class</p> <p>Chapter 43 Reproduction and Development</p> <p>1 Class</p> <p>E3e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.</p> <p>E3f. Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary materials to perform their functions.</p> <p>E3g. Describe how cells differentiate to form specialized <i>systems</i> for carrying out life functions.</p>	<p>functions of hormones</p> <ul style="list-style-type: none"> ✓ Explain the functions of endorphins and prostaglandins ✓ Identify how steroid and thyroid hormones work ✓ Summarize the roles of the hypothalamus, pituitary, thyroid, parathyroid, adrenal, pancreas ✓ Describe the roles of hormones in reproduction ✓ Describe the structure and function of the male reproductive system ✓ Describe the structure and function of the female reproductive system ✓ Describe the stages of pregnancy ✓ Explain the causes and symptoms of various STDs and how they are treated 	<p>homeostasis?</p> <ul style="list-style-type: none"> ✓ How do hormones help with development and reproduction? ✓ How is the structure of the male reproductive system related to its function? ✓ Why does the female reproductive system has an ovarian and menstrual cycle? ✓ How is development affected by drug use? ✓ How Sexually Transmitted Diseases impact the human body? 	<p>Summative:</p> <ul style="list-style-type: none"> ✓ Research Project on Reproduction or STDs
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