Scope and Sequence

Course / Grade Title: Biology					
Course / Grade Content: What will students be expected to know and do? Provide the core knowledge and skills (standards) that will be taught and assessed. Organize the essential content standards by unit. • How do organisms live and grow? • How and why do organism interact with their environment, and what are the effects of these interacts? • How are characteristics of one generation passed to the next? • How can individuals of the same species and even siblings have different characteristics? • What evidence shows that different species are related? https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/391/9th-12th%20coursemapping.pdf			**Student Activities** What will students do to demonstrate their learning? What cross-content integration is there with literacy? (Include CCSS for History, Science, and the Technical Subjects where applicable)	**Assessment(s)** What common assessments (formative and/or summative) will be used to measure student progress and achievement? (These may remain the same or require minimal changes for subsequent units)	**Differentiation** How will the curriculum, instruction, and assessments be accommodated to meet the needs of each student? (These may remain the same or require minimal changes for subsequent units)
Unit Name / Number of Days or Weeks / Time Period	**Big Ideas / Topics / Key Concepts**	**Essential Standards (Include the SMP for Math)**			
Unit 1 Characteristics of Life & Nature of Science	1. How do organisms live and grow? 2. How and why do organism interact with their environment, and what are the effects of these interacts? • Characteristic of Living Things	HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-3: Plan and conduct an investigation to	• Daily Question of the Day • Safety Poster • Safety Identification WS • Safety Quiz • Scientific Method & Experimental Design Notes	Question of the Day (warmup to start class) Class Activities Quiz/Test Informal Class Discussions	• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class

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	• Unifying Themes of Biology • Scientific Method & Experimental Design	provide evidence that feedback mechanisms maintain homeostasis.	• Scientific Method & Mythbusters Identification • Word Part Activity • Was Leonardo Da Vinci Correct? (Measurement activity using the scientific method) • Characteristics of Life Notes • Characteristics of Life Identification Gallery Walk • Quiz • Informal Class Discussions		Multiple test versions
Unit 2 **Chemistry of Life**	1. How do organisms live and grow? 2. How and why do organism interact with their environment, and what are the effects of these interacts? • Atoms, Ions, Molecules • Water's Unique Properties • Carbon-based Molecules • Chemical Reactions • Enzymes	HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-6:Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or	• Daily Question of the Day • Atoms Notes • Properties of Water Notes • Properties of Water Lab Activities • "Shattering the Water Myth" Article & Questions • Atoms & Water Quiz • Carbon-Based Molecules Notes • Dehydration Synthesis/Hydrolysis Activity	Question of the Day (warmup to start class) Class Activities Research Project Quiz/Test Informal Class Discussions	• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class • Multiple test versions

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		other large carbon-based molecules. HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy HS-PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	• Macromolecules Review Game • Macromolecules Comparison Jigsaw Chart • Macromolecules in your food Activity & Research • Enzymes & Chemical Reactions Notes • Protein Disease Project • Macromolecules Test • Informal Class Discussions		
Course / Grade Content:			**Student Activities**	**Assessment(s)**	**Differentiation**

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Unit 3 **Cells**	1. How do organisms live and grow? 2. How and why do organism interact with their environment, and what are the effects of these interacts? • Cell Theory • Cell Organelles • Cell Membrane • Cell Transport.	HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	• Daily Question of the Day • Cell Structure & Function Scaffolded Notes • Organelle Posters & Class Gallery Walk • Cell Membrane Cut & Paste Activity • Egg Lab • Informal Discussions	Question of the Day (warmup to start class) Class Activities Creative Project Quiz/Test Informal Class Discussions	• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class • Multiple test versions
Unit 4 **Cell Energy**	1. How do organisms live and grow? 2. How and why do organism interact with their environment, and what are the effects of these interacts? • Chemical Energy & ATP • Photosynthesis • Cellular Respiration	HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-5: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	• Daily Question of the Day • Photosynthesi/Cellular Respiration Overview • PS/CR Scavenger Hunt • Photosynthesis Lab Simulation Activity • Foldable Wheel • Creative Project • Informal Class Discussions		• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class • Multiple test versions

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		HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in the new compounds are formed resulting in a net transfer of energy. HSLS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. HS-PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.			
Unit 5	2. How are characteristics of	HS-LS1-4: Use a model to illustrate the role of	• Daily Question of the Day	Question of the Day (warmup to start class)	• Accommodations made as per IEPs

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Cell Cycle	one generation passed to the next? 2. How can individuals of the same species and even siblings have different characteristics? • Cell Cycle • Mitosis • Regulation of Cell Cycle • Meiosis	cellular division (mitosis) and differentiation in producing and maintaining complexing organisms. HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	• Cell Cycle Scaffolded Notes • "How long is each phase of the cell cycle?" Activity • Informal Discussions	Class Activities Quiz/Test Informal Class Discussions	• Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class • Multiple test versions
Unit 6 **DNA to Proteins**	1. How are characteristics of one generation passed to the next? 2. How can individuals of the same species and even siblings have different characteristics? • DNA • Replication • Transcription • Translation • Mutations	HS-LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions	• Daily Question of the Day • DNA & Protein Synthesis Scaffolded Notes • Strawberry DNA Isolation Activity • Protein Synthesis Activity • Informal Discussions	Question of the Day (warmup to start class) Class Activities Quiz/Test Informal Class Discussions	• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class • Multiple test versions

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		within multicellular organisms. HS-LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.			
Unit 7 **Genetics**	2. How are characteristics of one generation passed to the next? 2. How can individuals of the same species and even siblings	HS-LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring	• Daily Question of the Day • Genetics Scaffolded Notes • Punnett Square Practice Activity • Genetics Project	Question of the Day (warmup to start class) Class Activities Project Quiz/Test	• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class

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	have different characteristics? • Chromosomes • Traits, Genes, Alleles • Punnett Squares & Probability • Genetic Variation • Phenotypes & Genotypes • Patterns of Inheritance • Pedigree	HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. HS-LS3-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population		Informal Class Discussions	• Multiple test versions
Unit 8 Evolution	1. How and why do organism interact with their environment, and what are the effects of these interacts? 2. What evidence shows that different species are related? • Evolution-Theory & Evidence	HS-LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS2-8: Evaluate the evidence for the role of group behavior on individual and species'	• Daily Question of the Day • Group Project • Informal Discussions	Question of the Day (warmup to start class) Class Activities Quiz/Test Informal Class Discussions	• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions • Frequent check-ins during class • Multiple test versions

	• Theory of Natural Selection • Gene Flow, Genetic Drift, Sexual Selection • Speciation • Patterns in Evolution • Hardy-Weinberg Equilibrium	chances to survive and reproduce. HS-LS4-1: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. HS-LS4-2: Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase the number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. HS-LS4-3: Apply concepts of statistics and probability to support explanations			

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		that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. HS-LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations. HS-LS4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.			
Unit 9 Ecology	1. How and why do organism interact with their environment, and what are the effects of these interacts?	HS-LS2-1: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales	• Daily Question of the Day • Group Project • Informal Discussions	Question of the Day (warmup to start class) Class Activities Project Quiz/Test	• Accommodations made as per IEPs • Teacher/Student discussions for clarification of content/directions

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	2. What evidence shows that different species are related? • Biotic & Abiotic Factors in an Ecosystem • Energy in Ecosystems • Food Chains & Food Webs • Cycling of Matter • Interactions in the Ecosystem • The Biosphere: Biomes, Climate, Ecosystems • Human Impact on Ecosystems	HS-LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS2-3: Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. HS-LS2-4: Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem HS-LS2-6: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in		Informal Class Discussions	• Frequent check-ins during class • Multiple test versions

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		stable conditions, but hanging conditions may result in a new ecosystem HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity HS-ESS2-6: Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. HSESS2-7: Construct an argument based on evidence about the simultaneous co-evolution of Earth's systems and life on Earth. HSLS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.			

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