

Department: Science
Course Title: Honors Biology
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Unit Title	Unit Length (week)	Unit (Month -)	Essential Questions	Topics to be Covered Texts Used	Skills to be Assessed/what students need to be able to do	Standard Alignment	Formative Assessment	Summative Assessment
Introduction to Biology <i>Miller and Levine Biology - Chapter 1</i>	2	A/S	How do scientists investigate questions and solve problems? How is scientific information communicated? What is the relationship and distinction between science and technology? What is Biology and how do we study it? How do we safely and ethically perform experiments? What does it mean to be alive, and how do we classify organisms?	variables graphical analysis lab safety characteristics of life types of technology	Discuss how the study of science leads to a better understanding of natural events. Identify and apply problem solving skills to real world situations. Compare and contrast science and technology. Apply dependent, independent and controlled variables to an experiment. Analyze data using graphical analysis. Identifies and uses evidence to support a conclusion or validity of experimental results. Describe the different types of technology. Differentiate between qualitative and quantitative data. Explain why the value of technology may differ for different people and at different times. Write clear experimental procedures that can be replicated by others. Describe the importance of responsible technological development. Differentiate between observation, inference, prediction and fact.	HS-ETS1-1: Analyze a real world problem to specify a problem and criteria for a solution. HS-ETS1-2: Design a solution to a problem. HS-ETS1-3: Evaluate a solution to a problem.	quizzes homework article reading classwork	Unit test
The Chemistry of Life: biomolecules, water, and pH <i>Miller and Levine Biology - Chapter 2</i>	3	S	How do the major elements found in living things combine to form biomolecules? What are the structures and functions of the four major types of biomolecules? How and why does the potential energy of biomolecules affect life? How are lipids both necessary and harmful to humans? How do the properties of water influence life? What are enzymes and why are they important? What factors influence the rate of a reaction?	carbohydrates, lipids, proteins, nucleic acids properties of water enzymes	Explain the role of enzymes. Identify structures, functions, and properties of major macromolecules. Explain how the unique properties of water impact our world.	HS-LS1-6: Construct an argument and/or a design to support an explanation or hypothesis using empirical evidence and scientific reasoning.	quizzes Homework article readings classwork McMush lab water strider lab jelly lab	Unit test
Cells and cell processes <i>Miller and Levine Biology - Chapter 3</i>	5	O/N	What are the similarities and differences in structure between prokaryotic and eukaryotic cells? How do cell organelles function together to maintain homeostasis? What are the mechanisms by which substances move across cell membranes? How does a cell membrane function? How does cell reproduction differ in prokaryotic versus eukaryotic cells?	prokaryotic and eukaryotic cells cell organelles cell membrane cell reproduction active and passive transport	Explain cell organelles work independently and together allowing for proper cell function. Explain the characteristics that distinguish plant from animal cells and why they differ. Identify the structure, function and anatomy of various cell organelles. Determine levels of permeability within organelle membranes. Differentiate between prokaryotic and eukaryotic cells. Manipulate variables and analyze results to determine the effect of variables on cell function.	HS-LS1-2: Develop a model to illustrate the hierarchical organization of interacting parts of systems that recognize the changes and respond to maintain homeostasis. HS-LS1-3: Plan and conduct an investigation to develop a model to illustrate the hierarchical organization of interacting parts of systems that recognize the changes and respond to maintain homeostasis. HS-ETS1-1: Analyze a real world problem to specify a problem and criteria for a solution. HS-ETS1-2: Design a solution to a problem. HS-ETS1-3: Evaluate a solution to a problem.	quizzes Homework article readings classwork cell model cell membrane diffusion lab osmosis lab pond scum lab cell slide lab	Unit test
Photosynthesis and cellular respiration <i>Miller and Levine Biology - Chapter 4</i>	6	N/D/J	What is the overall purpose of photosynthesis? What are the reactants and products of photosynthesis and cellular respiration? What organelle in the plant performs photosynthesis? What role do pigments (like chlorophyll) play in capturing sunlight and their function? How do specialized structures like leaves and stomata help leaf structure? Why is photosynthesis considered the foundation of most life on Earth? How does photosynthesis regulate the oxygen and carbon dioxide levels in the atmosphere? How do environmental stresses (e.g., drought, high salinity, cold) affect photosynthesis? What is cellular respiration, where does it occur, and how does it relate to photosynthesis? How is energy production during cellular respiration related to photosynthesis? How are cellular respiration and photosynthesis related? What are the reactants and products of cellular respiration and photosynthesis? What are aerobic and anaerobic respiration and why are each important? How is fermentation important?	photosynthesis cellular respiration structure of chloroplast and mitochondrion pigments and their function leaf structure glc light and dark cycles aerobic and anaerobic respiration fermentation	Explain the transformation of energy from a nonliving to a living source. Compare and contrast the reactants and products of photosynthesis and cellular respiration. Explain the interactions between the reactants and products of photosynthesis and cellular respiration. Explain how ATP is used and manufactured in cells. Compare and contrast the basic energy yields from photosynthesis, respiration and fermentation. Identify the basic functions of aerobic and anaerobic cellular respiration. Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell. Explain how the structure of ATP is important in storing and releasing energy. Describe the relationship between photosynthesis and respiration. Identify the reactants and products of the light dependent reactions. Identify the reactants and products of the light independent reactions. Explain the pigments and photosystems involved in photosynthesis. Compare and contrast chloroplasts and mitochondria.	HS-LS1-5: Use mathematical representations to support a claim or argument about the structure and function of the cell or organism. HS-LS1-7: Use mathematical representations to support a claim or argument about the structure and function of the cell or organism. HS-ETS1-1: Analyze a real world problem to specify a problem and criteria for a solution. HS-ETS1-2: Design a solution to a problem. HS-ETS1-3: Evaluate a solution to a problem.	quizzes Homework article readings classwork chloroplastic structure photosynthesis cellular respiration fermentation lab muscle fatigue lab	Unit test
Cell Growth and Division: mitosis and meiosis <i>Miller and Levine Biology - Chapter 5</i>	3	J	Why do cells divide? How do organisms use mitosis versus meiosis for growth, repair, and asexual reproduction? What are the consequences of cell cycle errors? How do cells prevent errors? How do chromosome numbers change? Why does mitosis result in two identical daughter cells? What are the similarities and differences between mitosis and meiosis? Where does genetic variation come from? How do processes like crossing over and independent assortment contribute to genetic variation? Why is diversity essential?	mitosis and meiosis genetic variation types of cell cycle errors sexual and asexual reproduction human chromosome #s crossing over independent assortment	explain the stages of cellular reproduction, including full interphase analyze errors in the cell cycle explain how genetic variation is essential for life to be successful Explain why 4 cells are produced during meiosis and why they only contain ½ the genetic material of the parent cell. Differentiate between sexual and asexual reproduction and the importance of each.	HS-LS1-4: Use mathematical representations to support a claim or argument about the structure and function of the cell or organism. HS-ETS1-1: Analyze a real world problem to specify a problem and criteria for a solution. HS-ETS1-2: Design a solution to a problem. HS-ETS1-3: Evaluate a solution to a problem.	quizzes Homework article readings classwork	Unit test
Genetics and heredity <i>Miller and Levine Biology - Chapter 6</i>	8	F/M	What is the structure and function of DNA? How does DNA replication occur? How are traits passed from one generation to another?	DNA and RNA protein synthesis gene expression	Explain the structure of DNA and how it is replicated. Trace mutations and predict mutation trends in future generations through a pedigree analysis. Explain the process in which RNA and proteins are made.	HS-LS1-1: Construct an argument and/or a design to support an explanation or hypothesis using empirical evidence and scientific reasoning. HS-LS3-1: Ask a question that can be answered by an investigation, design a plan of investigation, and identify variables. HS-LS3-2: Make a claim about the relationship between the evidence and the question.	quizzes Homework article readings	Unit test

			How are RNA and proteins made?	mutations	Explain the process of gene regulation	HS-LS3-3: Appl classwork	
			How are genes regulated and expressed?	pedigrees	Identify mutations and explain how they can occur.	HS-ETS1-1: An extract your DN	
			What are mutations and how do they occur?	Punnett squares	Discuss the implications of biotechnology on genetics.	HS-ETS1-2: De pedigree project	
			How are genetic materials and reproductive processes manipulated?	genetic disorders in various		HS-ETS1-3: Ev Wisconsin Fast Plants	
			What are the ethical, social, and legal issues associated with genetic engineering?	Mendelian genetics		karyotyping lab	
Ecology and Biodiversity	7	A/M	How do matter and energy cycle through an ecosystem and how is matter recycled?	matter, energy and nutrients	Construct a hierarchy of life from cells to ecosystems	HS-LS1-2: Dev quizzes	Unit test
Miller and Levine Biology - Chapter 3, 4			Where does the energy for life come from, and why is the level of energy important?	abiotic and biotic factors	Cite examples of abiotic and biotic factors of ecosystems	HS-LS2-1: Use Homework	
			How do living things (biotic) and non-living elements (abiotic) interact?	population growth models	Compare and contrast the characteristics of biomes	HS-LS2-2: Use article readings	
			What factors limit or promote the growth of a population? (e.g., food chains, food webs, energy flow)	Explain how the carbon, nitrogen, phosphate, and water cycles contribute to the growth of a population	HS-LS2-3: Con: classwork		
			How do species interact within a community? (e.g., competition, predation, mutualism)	parts of an ecosystem	Analyze an ecosystem's energy flow through food chains, food webs, and energy flow	HS-LS2-4: Use sea turtle case	
			What determines the level of biodiversity in a specific area and how is it maintained?	human impacts on ecology	Identify and predict the factors that control population, including predation, competition, and mutualism	HS-LS2-5: Dev: wolves case study	
			How are human activities impacting global biodiversity and a sustainable future?		Summarize the symbiotic ways in which individuals within a community interact with their environment	HS-LS2-6: Eval ecological case	
			What is the relationship between ecosystem health and human health?	J curves, S curves, carrying capacity	Identify the properties of each of the five levels of ecology: organism, population, community, ecosystem, and biosphere	HS-LS2-7: Des: biome project	
			How can we use ecological principles to live more sustainably?		Analyze the effects of human population growth and technology on the environment	HS-LS2-8: Eval	
					Assess current world issues applying scientific themes (e.g., global changes in climate, biodiversity, and land use)	HS-ETS1-1: An	
					Investigate Connecticut's biodiversity using appropriate tools and technology	HS-ETS1-2: De	
Evolution	5	M/J	What are the mechanisms of evolutionary change?	homologous vs analogous structures	Define biodiversity and explain why it is so important.	HS-LS4-1: Corr quizzes	Unit test
Miller and Levine Biology - Chapter 17, 18			What is the evidence for evolution and how has it changed over time?	fossil record	Explain what is meant by the term evolution.	HS-LS4-2: Con: Homework	
			How do organisms adapt?	Darwin and Lamarck	Classify living organisms into their relevant taxonomic systems.	HS-LS4-3: Appl article readings	
			How is evolution relevant in modern society and what are the implications for the future?	natural selection	Identify the observations of living things that puzzled early scientists.	HS-LS4-4: Con: classwork	
				types of evolution	Justify the process of natural selection.	HS-LS4-5: Eval Who wants to live	
				genetic variation	Identify "key events" in the evolution of life on Earth.	HS-LS4-6: Cre: classwork	
	39			speciation mechanisms	Use biochemical evidence (amino acid sequences or DNA sequences) to show how evolution is linked to how closely two species are related.	HS-ETS1-1: An	
				human impact on evolution	Explain how evolution is linked to how closely two species are related.	HS-ETS1-2: De	
				taxonomy	Give examples of variations and explain their importance to natural selection.	HS-ETS1-3: Ev	
					Compare and contrast the theories of Darwin and Lamarck and explain why Darwin's theory is more widely accepted.		