

BIOLOGY COURSE CURRICULUM

Time	Content/Activities	Standards	Skills-SWBAT (Learning Outcome)	Materials/ Resources	Assessment
September	<p>Biological communities in ecosystems are based on stable interrelationships and interdependence of organisms</p> <ul style="list-style-type: none"> Analyzing the interactions between organisms that result from the ability to produce populations of infinite size in an environment where resources are finite Providing evidence of how organisms both cooperate and compete in ecosystems Using evidence to explain why interrelationships and interdependencies of organisms may generate stable ecosystems <p>. Using hands on activity and lab about food chain and food pyramid.</p>	<p><u>NJ Standards:</u> 5.3.12.C.1 5.3.12.C.2 5.3.12.B.1 5.3.12.B.2 5.3.12.B.3</p>	<p>Explain the difference between abiotic and biotic factors.</p> <p>Describe the level of biological organization.</p> <p>Differentiate between an organism's habitat and niche.</p> <p>Describe the flow of energy through an ecosystem.</p> <p>Describe food chains, food webs and pyramid models.</p> <p>Describe how nutrients move through the biotic and abiotic parts of an ecosystem.</p> <p>Compare the biochemical cycles of nutrients.</p> <p>Recognize how unfavorable abiotic and biotic factors affect a species.</p> <p>Describe how ranges of tolerance affect the distribution of organisms.</p> <p>Sequence the stages of primary and secondary succession.</p>	<p>1. Text Book 2. Hand-outs 3. Computer 4. Web Link 5. Science magazine 6. Assessment book</p>	<p>1. In class assignments 2. Homework 3. Project on Biome 4. End of chapter assessment test from assessment book. 5. Section quiz from assessment book.</p>
October	<p>Stability in an ecosystem can be disrupted by natural or human interactions</p> <ul style="list-style-type: none"> Identifying situations where humans intentionally and unintentionally modify ecosystems as a result of population growth, technology, and consumption Providing evidence of how human destruction of habitats threatens current local and global ecosystem stability Predicting how direct harvesting, pollution, atmospheric changes, and other factors will affect population dynamics in a given ecosystem based on 	<p><u>NJ Standards:</u> 5.3.12.C.1 5.3.12.C.2</p>	<p>Relate latitude and the three major climate zones.</p> <p>Describe the major abiotic factors that determine the location of a terrestrial biome.</p> <p>Distinguish among terrestrial biomes based on climate and biotic factors.</p> <p>Identify the major abiotic factors that determine the aquatic ecosystems.</p> <p>Identify freshwater ecosystem, transitional aquatic ecosystem and marine ecosystem.</p> <p>Describe characteristics of populations.</p> <p>Understand the concepts of carrying capacity and limiting factors.</p> <p>Describe three types of</p>	<p>1. Text Book 2. Hand-outs 3. Computer 4. Web Link 5. Science magazine 6. Assessment book</p>	<p>1. In class assignments 2. Homework 3. Project on biodiversity and conservation. 4. End of chapter assessment test from assessment book. 5. Section quiz from assessment book.</p>

BIOLOGY COURSE CURRICULUM

	<p>data and accepted mathematical models</p> <ul style="list-style-type: none"> • Predicting how natural disasters such as hurricanes, floods, volcanoes will affect population dynamics in a given ecosystem based on data and accepted mathematical models 		<p>biodiversity and explain the importance of biodiversity. Describe threats to biodiversity. Describe how the decline of a single species can affect an entire ecosystem.</p> <p>Describe two classes of natural resources. Identify methods used to conserve biodiversity. Explain two techniques used to restore biodiversity.</p>		
November	<p>Cells are made of complex molecules that consist mostly of a few elements. Each class of molecules has its own building blocks and specific functions.</p> <p>Cellular processes are carried out by many different types of molecules, mostly by the group of proteins</p> <p>Build a model of enzyme synthesis to understand the concept better.</p>	<p><u>NJ Standards:</u> 5.3.12.A.1 5.3.12.A.2 5.3.12.A.3 5.3.12.A.4 5.3.12.A.5 5.3.12.A.6</p>	<ul style="list-style-type: none"> • Modeling (using physical or digital tools) the four major categories of organic molecules (carbohydrates, fats, proteins, and nucleic acids) using unique characteristics and primary functions • Determining how and why each major category of organic molecule is essential to life • Identifying the six elements most common to biological organisms: carbon, hydrogen, oxygen, nitrogen, phosphorous and sulfur. • Analyzing and explaining how cells carry out a variety of chemical transformations that allow conversion of energy from one form to another, the breakdown of molecules into smaller units, and the building of larger molecules from smaller ones • Recognizing that most chemical transformations are made possible by protein catalysts called enzymes • Identifying enzymes as proteins, and determining how they catalyze biochemical reactions • Conducting experiments to demonstrate that the activities of enzymes are affected by the temperature, ionic conditions, and the pH of the surroundings. 	<ol style="list-style-type: none"> 1. Text Book 2. Hand-outs 3. Computer 4. Web Link 5. Science magazine 6. Assessment book 	<ol style="list-style-type: none"> 1. In class assignments 2. Homework 3. Project on cell membrane structure 4. End of chapter assessment test from assessment book. 5. Section quiz from assessment book.
December	<p>Cellular function is</p>				

BIOLOGY COURSE CURRICULUM

<p>January</p>	<p>maintained through the regulation of cellular processes in response to internal and external environmental conditions</p> <p>Lab will be the part of activity to show diffusion and osmosis.</p> <p>Cells divide through the process of mitosis, resulting in daughter cells that have the same genetic composition as the original cell.</p> <p>Lab will be the part of activity to show cell division stages.</p> <p>Cell differentiation is regulated through the expression of different genes during the development of complex multicellular organisms.</p> <p>There is a relationship</p>		<ul style="list-style-type: none"> • Modeling how processes are regulated both internally and externally by environments in which cells exist • Explaining how the fundamental life processes of organisms depend on a variety of chemical reactions that occur in specialized areas of the organism's cells • Modeling how cells are enclosed within semi-permeable membranes that regulate their interaction with their surroundings, including the transport of materials into and out of the cell. • Explaining how the many cells in an individual can be very different from one another, even though they are all descended from a single cell and thus have essentially identical genetic instructions • Tracing the general process where the progeny from a single cell form an embryo in which the cells multiply and differentiate to form the many specialized cells, tissues and organs that comprise the final organism • Present evidence that supports the concept that complex multicellular organisms are formed as a highly organized arrangement of differentiated cells • Providing examples of how different parts of the genetic instructions are influenced by the cell's environment. • Identifying genes as a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism. • Relating the specialization of cells in multicellular 		
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BIOLOGY COURSE CURRICULUM

	<p>between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism</p>		<p>organisms to the different patterns of gene expression rather than to differences of the genes themselves</p> <ul style="list-style-type: none">• Applying these understandings to analyze, support and/or critique current and emerging biotechnologies• Describing the relationships within multi-cellular organisms, where cells perform specialized functions as parts of sub-systems (e.g., tissues, organs, and organ systems), which work together to maintain optimum conditions for the benefit of the whole organism• Recognizing that certain chemicals, pathogens, and high-energy radiation can seriously impair normal cell functions and the health of the organism• Identifying emerging biotechnology that shows promise in preventing and treating disease.		
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BIOLOGY COURSE CURRICULUM

<p>January and February</p>	<p>Plants have the capability to take energy from light to form sugar molecules containing carbon, hydrogen, and oxygen.</p> <p>Design an experiment for photosynthesis. Determine the dependent, independent variable and control group for the experiment.</p> <p>In both plant and animal cells, sugar is a source of energy and can be used to make other carbon-containing (organic) molecules.</p> <p>All organisms must break the high-energy chemical bonds in food molecules during cellular respiration to obtain the energy needed for life processes.</p>	<p><u>NJ Standards:</u> 5.3.12.B.4 5.3.12.B.5 5.3.12.B.6</p>	<p>Recognizing the process of photosynthesis as providing a vital connection between the sun and the energy needs of living systems</p> <ul style="list-style-type: none"> • Describing how plants capture energy by absorbing light and use it to form strong chemical bonds between the atoms of carbon-containing molecules • Designing independent investigations to determine the effects of changing environmental factors on photosynthesis <p>Analyzing and describing how the process of photosynthesis provides a vital connection between the sun and the energy needs of living systems</p> <ul style="list-style-type: none"> • Explaining how plants and many microorganisms use solar energy to combine molecules of carbon dioxide and water into complex, energy rich organic compounds and release oxygen to the environment. <p>Examining how the breakdown of some food molecules enables the cell to store energy in specific molecules that are used to carry out the many functions of the cell.</p> <p>Tracing the process in which nutrients are transported to cells to serve as building blocks for the synthesis of structures and as reactants for cellular respiration</p> <ul style="list-style-type: none"> • Recognizing that food molecules are taken into cells and react to provide the chemical constituents needed to synthesize other molecules, and knowing that the breakdown and synthesis are made possible by enzymes . 	<ol style="list-style-type: none"> 1. Text Book 2. Hand-outs 3. Computer 4. Web Link 5. Science magazine 6. Assessment book 	<ol style="list-style-type: none"> 1. In class assignments 2. Homework 3. Project 4 End of chapter assessment test from assessment book. 5. Section quiz from assessment book. <p>Mid-term exam</p>
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BIOLOGY COURSE CURRICULUM

<p>February and March</p>	<p>Genes are segments of DNA molecules located in the chromosome of each cell. DNA molecules contain information that determines a sequence of amino acids, which result in specific proteins.</p> <p>DNA building lab for better understanding of a DNA structure.</p> <p>Inserting, deleting, or substituting DNA segments can alter the genetic code. An altered gene may be passed on to every cell that develops from it. The resulting features may help, harm, or have little or no effect on the offspring's success in its environment.</p>	<p><u>NJ Standards:</u> 5.3.12.D.1 5.3.12.D.2 5.3.12.D.3</p>	<p>Recognizing that the instructions for specifying the characteristics of the organism are carried in DNA, a large polymer formed from subunits of four kinds (adenine, thymine, guanine, and cytosine)</p> <ul style="list-style-type: none"> • Explaining how the chemical and structural properties of DNA allow for genetic information to be both encoded in genes and replicated • Identifying that hereditary information is contained in genes, located in the chromosomes of each cell, and each gene carries a single unit of information • Providing specific examples of how an inherited trait of an individual can be determined by one or many genes and a single gene can influence more than one trait • Analyzing the current and potential impact of genome projects on human health (e.g. pathogenic bacteria or disease vectors) or species with commercial importance (e.g. livestock and crop plants) • Recognizing that changes in DNA (mutations) occur spontaneously at low rates, and some of these changes make no difference to the organism, whereas others can change cells and organisms . . Explaining that only mutations in germ cells can create the variation that changes an organism's offspring • Tracing the progression of conditions that result from genetic mutation in a variety of different organisms . .Explaining the process where an egg and sperm unite to begin the development of a new individual, and how that new individual receives genetic information from its 	<ol style="list-style-type: none"> 1. Text Book 2. Hand-outs 3. Computer 4. Web Link 5. Science magazine 6. Assessment book 	<ol style="list-style-type: none"> 1. In class assignments 2. Homework 3. Project about amino acid sequence. 4 End of chapter assessment test from assessment book. 5. Section quiz from assessment book.
<p>April and May</p>	<p>Sorting and recombination of genes in</p>				

BIOLOGY COURSE CURRICULUM

<p>sexual reproduction result in a great variety of possible gene combinations in the offspring of any two parents .</p> <p>Mendelian genetics probability lab to show how new heritable characteristics can result from new combinations of existing genes in reproductive cells of the parents.</p> <p>New traits may result from new combinations of existing genes or from mutations of genes in reproductive cells within a population</p> <ul style="list-style-type: none"> • Recognizing how heritable characteristics can strongly influence how likely an individual is to survive and reproduce • Describing how evolution involves changes in the genetic make-up of whole populations over time, not changes in the genes of an individual organism • Analyzing natural selection simulations and use the data generated to describe how environmentally favored traits are perpetuated over generations resulting in species survival, while less favorable traits decrease in frequency or may lead to extinction. <p>Molecular evidence (e.g., DNA, protein structures etc.) substantiates the</p>	<p><u>NJ Standards:</u> 5.3.12.E.1 5.3.12.E.2 5.3.12.E.3 5.3.12.E.4</p>	<p>parents</p> <ul style="list-style-type: none"> • Explaining how sexually produced offspring are never identical to either of their parents • Understanding how new heritable characteristics can result from new combinations of existing genes in reproductive cells • Recognizing how heritable characteristics can strongly influence what capabilities an organism will have, therefore influencing how likely it is to survive and reproduce <p>Describe the principles of natural selection.</p> <p>Describe how fossils provide evidence of evolution. Discuss morphological evidence of evolution. Explain how biochemistry provides evidence of evolution.</p> <p>Discuss pattern observed in evolution. Describe factors that influence speciation. Compare gradualism with punctuated equilibrium.</p> <p>Characteristics of primates. Trace the evolution of primates.</p> <p>Describe hominoid and hominin features. Trace hominoid evolution from proconsul to Homo.</p> <p>Describe species in the genus Homo.</p>	<ol style="list-style-type: none"> 1. Text Book 2. Hand-outs 3. Computer 4. Web Link 5. Science magazine 6. Assessment book 	<ol style="list-style-type: none"> 1. In class assignments 2. Homework 3. Project about amino acid sequence. 4 End of chapter assessment test from assessment book. 5. Section quiz from assessment book.
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BIOLOGY COURSE CURRICULUM

<p>June</p>	<p>anatomical evidence for evolution and provides additional detail about the sequence in which various lines of descent branched.</p> <ul style="list-style-type: none"> • Identifying, explaining and demonstrating how technology can be used to determine evolutionary relationships among species (gel electrophoresis, DNA/amino acid sequences) • Integrating scientific information from a variety of disciplines to provide evidence for the relatedness of species on Earth (geology, comparative anatomy, biochemistry, and taxonomy. The principles of evolution (including natural selection and common descent) provide a scientific explanation for the history of life on Earth as evidenced in the fossil record and in the similarities that exist within the diversity of existing organisms. • Recognizing that a change in a species over time does not follow a set pattern or timeline • Explaining how the millions of different species on Earth today are related by common ancestry using evidence • Using natural selection and its evolutionary consequences to provide a scientific explanation for the fossil record and the molecular similarities observed among the diverse species of organisms. <p>Review for final exam Dissection of frog</p>		<p>Explain the out of Africa hypothesis. Compare Neanderthals and modern humans.</p> <p>Compare Aristotle's and Linnaeus's methods of classifying organisms. How to write a scientific name using binomial nomenclature. Explain the categories used in biological classification. Compare major characteristics of the three domains. Differentiate among the six kingdoms. Classify organisms to the kingdom level.</p>	<p>1. Text Book 2. Hand-outs 3. Computer 4. Web Link</p>	<p>Final exam</p>
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BIOLOGY COURSE CURRICULUM

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