

**Course Resources:**

**Biology Foundations - Course Syllabus**



Biology Foundations - Course Syllabus

**Description:**

A compelling, thorough course, Biology Foundations engages students in the study of life and living organisms and examines biology and biochemistry in the real world. This course encompasses traditional concepts in biology and encourages exploration of new discoveries in this field of science. The components include biochemistry, cell biology, heredity and reproduction, the evolution of life, classification and the first four kingdoms, plant and animal kingdoms, human body systems, and ecology.

**Textbook:** Biology Foundations - Excel Education Systems, Inc.

**Course objectives:**

Throughout the course, you will meet the following goals:

- Understand the relationships among living organisms.
- Describe the functions and processes that control cellular activities.
- Trace the discoveries and scientific thought that increase the application of new technology in the field of DNA and genetics.
- Examine the taxonomy that organizes all organisms
- Recognize the structures and functions of systems of the human body.
- Relate the interdependence of ecosystems and environmental issues.

**Contents:**

**Semester A Unit**

- 1: Cell Biology: An Overview (Ch. 1-7)
- 2: Genetics and Biology (Ch. 8-12)
- 3: Theory and Study of Evolution (Ch. 13-15)
- 4: Ecology in Practice (Ch. 16-19)
- 5: Diversity in the Biological World (Ch. 20-23)

**Semester B Unit**

- 6: Characteristics of Plants (Ch. 24-27)
- 7: Invertebrates and Their Traits (Ch. 28-32)
- 8: The World of Vertebrates (Ch.33-37)
- 9: Human Biology: An Overview (Ch. 38-44)

**Grading Scale**

- A = 90-100%
- B = 80-89%
- C = 70-79%
- D = 60-69%
- F = under 59%

**Grade Weighting**

- Quizzes..... 70%
- Final Exam..... 30%
- 100%

Unit	Benchmarks	Essential Questions	Learning Objectives	Instructional Strategies	Resources	Assessments
Unit 1: Cell Biology: An Overview, Months 1-12						
Module 1: An Introduction to Biology Foundations <i>(updated 3/17/20)</i>		Why should I study biology?	Students will: Understand that all living things are connected Understand the study of biology allows for a deeper appreciation for the connections between us and the biological world	direct instruction graphic aids	1.1 An Introduction to Biology Foundations	

**Curriculum Map - Science - Biology Foundations**

<p>Module 2: Your Relationship to Biology <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.1.1(A) Explain how cell processes are influenced by internal and external factors, such as pH and temperature, and how cells and organisms respond to changes in their environment to maintain homeostasis.</p>	<p>How do we know if something is alive? Why is biology important to our daily life?</p>	<p>Students will: Identify properties of life which distinguish living organisms from nonliving things Identify 7 unifying themes of biology Identify contemporary issues and their biological connections Identify and explain stages of scientific investigations Explain process for constructing a scientific theory</p>	<p>direct instruction graphic aids note taking</p>	<p>2.1 Themes of Biology 2.2 The Environment and Society 2.3 Scientific Processes</p>	<p>CYU's</p>
<p>Module 3: Life's Chemical Makeup <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.1.1(A) Explain how cell processes are influenced by internal and external factors, such as pH and temperature, and how cells and organisms respond to changes in their environment to maintain homeostasis. SS.9.4.1.2.1(A) Recognize that cells are composed primarily of a few elements (carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur), and describe the basic molecular structures and the primary functions of carbohydrates, lipids, proteins and nucleic acids. SS.9.4.1.2.2(A) Recognize that the work of the cell is carried out primarily by proteins, most of which are enzymes, and that protein function depends on the amino acid sequence and the shape it takes as a consequence of the interactions between those amino acids. SS.9.4.2.2.1(A) Use words and equations to differentiate between the processes of photosynthesis and respiration in terms of energy flow, beginning reactants and end products.</p>	<p>What are the characteristics of life?</p>	<p>Students will: Understand how the principles of biology are directly connected to the fundamentals of chemistry Identify basic chemistry terms Identify properties of water essential in sustaining life Explain how water plays an important role in homeostasis Identify process for positive and negative electrical charges of ions Identify organic compounds crucial for cell function Compare the structure and function of: carbohydrates, proteins, nucleic acids, lipids Analyze process for chemical reaction Describe energy Identify reactants and products Explain how energy is activated</p>	<p>direct instruction graphic aids note taking</p>	<p>3.1: Nature of Matter 3.2: Water and Solutions 3.3: Chemistry of Cells 3.4: Energy and Chemical Reactions</p>	<p>CYU's</p>
<p>Module 4: The Structure of Cells <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.2.1(A) Recognize that cells are composed primarily of a few elements (carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur), and describe the basic molecular structures and the primary functions of carbohydrates, lipids, proteins and nucleic acids. SS.9.4.1.2.2(A) Recognize that the work of the cell is carried out primarily by proteins, most of which are enzymes, and that protein function depends on the amino acid sequence and the shape it takes as a consequence of the interactions between those amino acids. SS.9.4.1.2.3(A) Describe how viruses, prokaryotic cells, and eukaryotic cells differ in relative size, complexity and general structure. SS.9.4.1.2.4(A) Explain the function and importance of cell organelles for prokaryotic</p>	<p>What are the different types of cells and how are they different? What are the cell organelles and how do their structures relate to their functions?</p>	<p>Students will: Identify SI units to measure length Analyze characteristics of microscopes Compare types of microscopes *****</p>	<p>direct instruction graphic aids note taking</p>	<p>4.1: Looking at Cells 4.2: Cell Features 4.3: Cell Organelles</p>	<p>CYU's</p>

**Curriculum Map - Science - Biology Foundations**

	<p>and/or eukaryotic cells as related to the basic cell processes of respiration, photosynthesis, protein synthesis and cell reproduction.</p> <p>SS.9.4.2.2.1(A) Use words and equations to differentiate between the processes of photosynthesis and respiration in terms of energy flow, beginning reactants and end products.</p>					
<p><b>Module 5: Environment of Different Cells</b> <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.1.1(A) Explain how cell processes are influenced by internal and external factors, such as pH and temperature, and how cells and organisms respond to changes in their environment to maintain homeostasis.</p> <p>SS.9.4.1.2.4(A) Explain the function and importance of cell organelles for prokaryotic and/or eukaryotic cells as related to the basic cell processes of respiration, photosynthesis, protein synthesis and cell reproduction.</p> <p>SS.9.4.1.2.5(A) Compare and contrast passive transport (including osmosis and facilitated transport) with active transport such as endocytosis and exocytosis.</p>	<p>How does the structure of the cell membrane aid in its functions of protection, recognition, and transport? Why are both passive and active transport processes important in cell membranes?</p>	<p>Identify types of passive membrane transport Compare osmosis and diffusion Identify how cells maintain equilibrium Identify types of active membrane transport Explain how a sodium-potassium pump works Compare endocytosis and exocytosis</p>	<p>direct instruction graphic aids note taking</p>	<p>5.1: Passive Transport 5.2: Active Transport</p>	<p>CYU's</p>
<p><b>Module 6: Cellular Respiration and Photosynthesis</b> <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.2.3(A) Describe how viruses, prokaryotic cells, and eukaryotic cells differ in relative size, complexity and general structure.</p> <p>SS.9.4.1.2.4(A) Explain the function and importance of cell organelles for prokaryotic and/or eukaryotic cells as related to the basic cell processes of respiration, photosynthesis, protein synthesis and cell reproduction.</p> <p>SS.9.4.2.2.1(A) Use words and equations to differentiate between the processes of photosynthesis and respiration in terms of energy flow, beginning reactants and end products.</p>	<p>How do living organisms transform energy?</p>	<p>Explain why almost all organisms depend on photosynthesis. Identify how cellular respiration manufactures ATP Analyze the stages of photosynthesis Explain the Calvin Cycle Identify the stages of cellular respiration</p>	<p>direct instruction graphic aids note taking</p>	<p>6.1 Energy and Living Things 6.2 Photosynthesis 6.3 Cellular Respiration</p>	<p>CYU's</p>
<p><b>Module 7: Cell Reproduction and Chromosomes</b> <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.2.3(A) Describe how viruses, prokaryotic cells, and eukaryotic cells differ in relative size, complexity and general structure.</p> <p>SS.9.4.1.2.4(A) Explain the function and importance of cell organelles for prokaryotic and/or eukaryotic cells as related to the basic cell processes of respiration, photosynthesis, protein synthesis and cell reproduction.</p> <p>SS.9.4.1.2.6(A) Explain the process of mitosis in the formation of identical new cells and maintaining chromosome number during asexual reproduction.</p> <p>SS.9.4.3.2.2(A) Use the processes of mitosis and meiosis to explain the advantages and</p>	<p>What do the main events of the cell cycle reveal?</p>	<p>Students will: Compare prokaryotic and eukaryotic cell reproduction Describe the structure of of human chromosomes Explain the characteristics of sex chromosomes Identify the result of a change in chromosome numbers Identify the five-phase cell cycle Identify how cells division is controlled: cell growth, DNA synthesis, mitosis Explain how cancer results from cell division Explain the function of spindles during mitosis</p>	<p>direct instruction graphic aids note taking</p>	<p>7.1 Chromosomes 7.2 The Cell Cycle 7.3 Mitosis and Cytokinesis</p>	<p>CYU's Unit I Quiz</p>

**Curriculum Map - Science - Biology Foundations**

	<p>disadvantages of asexual and sexual reproduction.</p> <p>SS.9.4.3.2.3(A) Explain how mutations like deletions, insertions, rearrangements or substitutions of DNA segments in gametes may have no effect, may harm, or rarely may be beneficial, and can result in genetic variation within a species.</p> <p>SS.9.4.4.2.5(A) Recognize that a gene mutation in a cell can result in uncontrolled cell division called cancer, and how exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.</p>		Summarize the four stages of mitosis			
Unit	Benchmarks	Essential Questions	Learning Objectives	Instructional Strategies	Resources	Assessments
Unit 2: Genetics and Biology, Months 1-12						
<p>Module 8: Reproduction and Meiosis</p> <p><i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.2.3(A) Describe how viruses, prokaryotic cells, and eukaryotic cells differ in relative size, complexity and general structure.</p> <p>SS.9.4.3.2.1(A) Use concepts from Mendel's laws of segregation and independent assortment to explain how sorting and recombination (crossing over) of genes during sexual reproduction (meiosis) increases the occurrence of variation in a species.</p> <p>SS.9.4.3.2.2(A) Use the processes of mitosis and meiosis to explain the advantages and disadvantages of asexual and sexual reproduction.</p>	<p>What processes are responsible for life's unity and diversity? How is genetic information carried from one organism to its offspring?</p>	<p>Students will: Summarize meiosis Identify the eight phases of meiosis Analyze meiosis and genetic variation Explain crossing over and how it contributes to the production of unique individuals Compare spermatogenesis and oogenesis Compare sexual and asexual reproduction Identify types of asexual reproduction: fission, fragmentation, budding Compare haploid and diploid life cycle Explain the cellular life cycle of a plant</p>	<p>direct instruction graphic aids note taking</p>	<p>8.1 Meiosis 8.2 Sexual Reproduction</p>	<p>CYU's</p>
<p>Module 9: Heredity and Mendel's Research</p> <p><i>(updated 1/28/21)</i></p>	<p>SS.9.4.3.1.2(A) In the context of a monohybrid cross, apply the terms phenotype, genotype, allele, homozygous and heterozygous.</p> <p>SS.9.4.3.2.1(A) Use concepts from Mendel's laws of segregation and independent assortment to explain how sorting and recombination (crossing over) of genes during sexual reproduction (meiosis) increases the occurrence of variation in a species.</p> <p>SS.9.4.3.2.3(A) Explain how mutations like deletions, insertions, rearrangements or substitutions of DNA segments in gametes may have no effect, may harm, or rarely may be beneficial, and can result in genetic variation within a species.</p> <p>SS.9.4.4.2.1(A) Describe how some diseases can sometimes be predicted by genetic testing and how this affects parental</p>	<p>How can we determine the possible traits from a genetic cross of two organisms?</p>	<p>Students will: Explain the importance of Mendel's breeding experiments Summarize Mendel's breeding experiments Explain ****</p>	<p>direct instruction graphic aids note taking</p>	<p>9.1 The Origin of Genetics 9.2 Mendel's Theory 9.3 The Study of Heredity 9.4 Heredity's Complex Designs</p>	<p>CYU's</p>

**Curriculum Map - Science - Biology Foundations**

<b>Unit</b>	<b>Benchmarks</b>	<b>Essential Questions</b>	<b>Learning Objectives</b>	<b>Instructional Strategies</b>	<b>Resources</b>	<b>Assessments</b>
Module 10: DNA - Where Genes Reside <i>(updated 1/28/21)</i>	<p>SS.9.4.3.1.1(A) Explain the relationships among DNA, genes and chromosomes.</p> <p>SS.9.4.3.1.3(A) Describe the process of DNA replication and the role of DNA and RNA in assembling protein molecules.</p>	How does DNA control growth and function of cells?	<p>Students will: Identify scientific contributions regarding DNA of Griffith, Avery and Hershey and Chase Explain transformation, bacteriophage Explain Franklin, Wilkins, Watson and Cricks findings regarding shape of DNA molecule Identify main parts of nucleotides Explain base-pairing rules Explain how DNA is replicated Compare prokaryotes and eukaryotic replication</p>	direct instruction graphic aids note taking video	10.1 Genetic Material and its Functions 10.2 How DNA is Constructed 10.3 How DNA is Replicated Video: How is DNA Organized	CYU's
Module 11: The Creation of Proteins <i>(updated 1/28/21)</i>	<p>SS.9.4.3.1.1(A) Explain the relationships among DNA, genes and chromosomes.</p> <p>SS.9.4.3.1.3(A) Describe the process of DNA replication and the role of DNA and RNA in assembling protein molecules.</p> <p>SS.9.4.3.2.3(A) Explain how mutations like deletions, insertions, rearrangements or substitutions of DNA segments in gametes may have no effect, may harm, or rarely may be beneficial, and can result in genetic variation within a species.</p> <p>SS.9.4.4.2.1(A) Describe how some diseases can sometimes be predicted by genetic testing and how this affects parental and community decisions.</p>	How does a change in DNA affect living things?	<p>Students will: Explain the process of gene expression Identify the process of transferring information from DNA to RNA Analyze similarities and differences between DNA and RNA Explain genetic code Compare processes of gene construction and regulation in prokaryotic and eukaryotic cell Describe types of genetic mutation</p>	direct instruction graphic aids note taking videos	11.1 Transforming a Gene to a Protein 11.2 How Genes are Constructed and Regulated Video: RNA Transcription and Translation Video: Types of Genetic Mutations	CYU's
Module 12: Technology and Genetics <i>(updated 1/28/21)</i>	<p>SS.9.4.3.3.3(A) Recognize that artificial selection has led to offspring through successive generations that can be very different in appearance and behavior from their distant ancestors.</p> <p>SS.9.4.4.1.1(A) Describe the social, economic, and ecological risks and benefits of biotechnology in agriculture and medicine. For example: Selective breeding, genetic engineering, and antibiotic development and use.</p> <p>SS.9.4.4.2.1(A) Describe how some diseases can sometimes be predicted by genetic testing and how this affects parental and community decisions.</p> <p>SS.9.4.4.2.2(A) Explain how the body produces antibodies to fight disease and how vaccines assist this process</p>	How does the interaction of science and technology affect society?	Students will: *****	direct instruction graphic aids note taking	12.1 Genetic Engineering 12.2 Genetic Engineering in Humans 12.3 Agricultural Uses for Genetic Engineering Video: Genetic Engineering Basics	CYU's Unit 2 Quiz

Unit 3: Theory and Study of Evolution, Months 1-12

**Curriculum Map - Science - Biology Foundations**

<p>Module 13: Earth's Life - A Timeline  <i>(updated 1/28/21)</i></p>	<p>SS.9.4.3.3.1(A) Describe how evidence led Darwin to develop the theory of natural selection and common descent to explain evolution.</p> <p>SS.9.4.3.3.2(A) Use scientific evidence, including the fossil record, homologous structures, and genetic and/or biochemical similarities, to show evolutionary relationships among</p> <p>SS.9.4.3.3.3(A) Recognize that artificial selection has led to offspring through successive generations that can be very different in appearance and behavior from their distant ancestors.</p>	<p>How did life begin?</p>	<p>Explain the scientific explanation for the development of life on earth Summarize the Primordial Soup Model and identify flaw Summarize Lerman's Bubble Model Compare microspheres and coacervates Compare eubacteria and archaeobacteria Summarize the theory of endosymbiosis Analyze multicellularity List examples of mass extinction Identify importance of the ozone layer Describe characteristics of: plants, fungi, arthropods, vertebrates, fish, amphibians, reptiles, mammals, and birds Explain the role continental drift played in evolution</p>	<p>direct instruction graphic aids note taking</p>	<p>13.1 Life's Origins on the Planet 13.2 Cellular Life and its Evolution 13.3 The Land is Overwhelmed by Life</p>	<p>CYU's</p>
<p>Module 14: Evolution and Darwin's Theory  <i>(updated 1/28/21)</i></p>	<p>SS.9.4.3.3.1(A) Describe how evidence led Darwin to develop the theory of natural selection and common descent to explain evolution.</p> <p>SS.9.4.3.3.2(A) Use scientific evidence, including the fossil record, homologous structures, and genetic and/or biochemical similarities, to show evolutionary relationships among</p> <p>SS.9.4.3.3.4(A) Explain why genetic variation within a population is essential for evolution to occur.</p> <p>SS.9.4.3.3.5(A) Explain how competition for finite resources and the changing environment promotes natural selection on offspring survival, depending on whether the offspring have characteristics that are advantageous or disadvantageous in the new environment.</p>	<p>How did Darwin's discoveries lead to the Theory of Evolution?</p>	<p>Students will: Summarize Darwin's Theory of Evolution Explain how contemporary scientists expanded on Darwin's theory Explain reproductive isolation Compare gradualism and punctuated equilibrium Explain how fossils support Darwin's theory Identify how paleontologists determine evolution Explain homologous structures Summarize four factors in natural selection Explain how tuberculosis illustrates natural selection Summarize Darwin's study of finches and subsequent findings Define divergence and speciation Explain how subspecies evolve</p>	<p>direct instruction graphic aids note taking</p>	<p>14.1 Natural Selection's Role in Evolution 14.2 Evolution: Clues Around Us 14.3 Patterns of Evolution in Nature</p>	<p>CYU's</p>
<p>Module 15: How Organisms are Classified  <i>(updated 3/13/20)</i></p>		<p>Why is a scientific method of classification useful to study living organisms? What makes up the scientific name of a species?</p>	<p>Students will: Summarize the history of taxonomy Explain Linnaeus's binomial nomenclature Summarize organism classification: domain, kingdom, phylum, class, order, family, genus, species Summarize Mayr's biological species concept Compare cladistics and</p>	<p>direct instruction graphic aids note taking</p>	<p>15.1 Classification Categories in Biology 15.2 The Organism Classification Process</p>	<p>CYU's Unit 3 Quiz</p>

**Curriculum Map - Science - Biology Foundations**

<b>Unit</b>	<b>Benchmarks</b>	<b>Essential Questions</b>	<b>Learning Objectives</b>	<b>Instructional Strategies</b>	<b>Resources</b>	<b>Assessments</b>
Unit 4: Ecology in Practice, Months 1-12						
Module 16: Explaining Populations  <i>(updated 1/28/21)</i>	SS.9.4.3.3.5(A) Explain how competition for finite resources and the changing environment promotes natural selection on offspring survival, depending on whether the offspring have characteristics that are advantageous or disadvantageous in the new environment.  SS.9.4.3.3.6(A) Explain how genetic variation between two populations of a given species is due, in part, to different selective pressures acting independently on each population and how, over time, these differences can lead to the development of new species.	What factors affect population density, distribution & age structure?	Students will: Analyze characteristics and trends in populations Explain population size, population density, and dispersion Evaluate population models used to explain growth rate and resources Compare r-strategists and k-strategists Summarize allele frequencies Summarize the Hardy-Weinberg Principle Analyze evolutionary forces which invalidate the Hardy-Weinberg Principle Compare population normal distribution, directional selection, and stabilizing selection	direct instruction graphic aids note taking videos	16.1 Growth Mechanisms in Populations 16.2 The Evolution of Populations Video: The Change of Population Allele Frequencies Video: The Hardy-Weinberg Principle	CYU's
Module 17: Earth's Ecosystems  <i>(updated 1/28/21)</i>	SS.9.4.2.1.1(A) Describe factors that affect the carrying capacity of an ecosystem and relate these to population growth.  SS.9.4.2.1.2(A) Explain how ecosystems can change as a result of the introduction of one of more new species. For example: The effect of migration, localized evolution or disease organism.  SS.9.4.2.2.2(A) Explain how matter and energy is transformed and transferred among organisms in an ecosystem, and how energy is dissipated as heat into the environment.  SS.9.4.4.1.2(A) Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity. For example: Changing the temperature or composition of water, air or soil; altering the populations and communities, developing artificial ecosystems; or changing the use of land or water.	How do organisms and ecosystems interact?	Students will: Analyze characteristics of ecosystems Explain the difference between abiotic factors and biotic factors Explain biodiversity Identify effects of ecosystem changes Describe succession Analyze energy movement through ecosystems Compare producers and consumers Explain four trophic levels Explain energy pyramid Analyze how material in ecosystems cycle Compare biochemical cycle, water cycle, carbon cycle, phosphorus and nitrogen cycles	direct instruction graphic aids note taking	17.1 Ecosystems Defined 17.2 Energy Movement Through Ecosystems 17.3 How Matter is Cycled Through Ecosystems	CYU's
Module 18: Communities in the Biological World  <i>(updated 1/28/21)</i>	SS.9.4.2.1.1(A) Describe factors that affect the carrying capacity of an ecosystem and relate these to population growth.  SS.9.4.2.1.2(A) Explain how ecosystems can change as a result of the introduction of one of more new species. For example:	Why is there not one most important member of an ecosystem?	Analyze how organisms interact Explain coevolution Compare predation and parasitism Explain the relationship between plants and herbivores Explain symbiosis, mutualism,	direct instruction graphic aids note taking	18.1 Interactions Between Organisms in Communities 18.2 Communities Transformed by Competition 18.3 Main Biological	CYU's

**Curriculum Map - Science - Biology Foundations**

	<p>The effect of migration, localized evolution or disease organism.</p> <p><b>SS.9.4.3.3.5(A)</b> Explain how competition for finite resources and the changing environment promotes natural selection on offspring survival, depending on whether the offspring have characteristics that are advantageous or disadvantageous in the new environment.</p> <p><b>SS.9.4.3.3.6(A)</b> Explain how genetic variation between two populations of a given species is due, in part, to different selective pressures acting independently on each population and how, over time, these differences can lead to the development of new species.</p>		<p>and commensalism</p> <p>Analyze how competition transforms communities</p> <p>Summarize implications of Joseph Connell's research on barnacles</p> <p>Explain competitive exclusion</p> <p>Analyze various effects of competition in ecosystems</p> <p>Explain climate's effect on species</p> <p>Identify Earth's seven major biomes</p> <p>Compare terrestrial biomes</p> <p>Identify three zones of marine communities</p>		Communities on Earth	
<p><b>Module 19: Earth's Environment</b></p> <p><i>(updated 1/28/21)</i></p>	<p><b>SS.9.4.2.1.1(A)</b> Describe factors that affect the carrying capacity of an ecosystem and relate these to population growth.</p> <p><b>SS.9.4.2.1.2(A)</b> Explain how ecosystems can change as a result of the introduction of one of more new species. For example: The effect of migration, localized evolution or disease organism.</p> <p><b>SS.9.4.2.2.2(A)</b> Explain how matter and energy is transformed and transferred among organisms in an ecosystem, and how energy is dissipated as heat into the environment.</p> <p><b>SS.9.4.4.1.2(A)</b> Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity. For example: Changing the temperature or composition of water, air or soil; altering the populations and communities, developing artificial ecosystems; or changing the use of land or water.</p> <p><b>SS.9.4.4.1.3(A)</b> Describe contributions from diverse cultures, including Minnesota American Indian tribes and communities, to the understanding of interactions among humans and living systems. For example: American Indian understanding of sustainable land use practices.</p>	<p>How is Earth's environment changing over time and how are humans impacted?</p>	<p>Students will:</p> <p>Analyze the relationship between the atmosphere and ecosystems</p> <p>Explain the effects of acid rain</p> <p>Explain why the ozone layer is being reduced</p> <p>Explain the greenhouse effect</p> <p>Analyze causes of the rise in Earth's temperature</p> <p>Identify effects of agriculture chemicals on ecosystems</p> <p>Summarize cause and effects of human population growth</p> <p>Analyze efforts to reduce environmental pollution</p> <p>Identify the steps involved in solving environmental problems</p>	<p>direct instruction</p> <p>graphic aids</p> <p>note taking</p>	<p>19.1 Changes That Impact Our Planet</p> <p>19.2 Ecosystem Transformations</p> <p>19.3 Fixing Issues in the Environment</p>	<p>CYU's Unit 4 Quiz</p>
<b>Unit</b>	<b>Benchmarks</b>	<b>Essential Questions</b>	<b>Learning Objectives</b>	<b>Instructional Strategies</b>	<b>Resources</b>	<b>Assessments</b>
Unit 5: Diversity in the Biological World, Months 1-12						
<p><b>Module 20: Kingdoms of Life in Biology</b></p> <p><i>(updated 3/18/20)</i></p>		<p>What are the distinguishing characteristics of kingdoms?</p>	<p>Students will:</p> <p>Analyze how the six kingdoms of life are related</p> <p>Identify the characteristics of the three domains of life</p> <p>Identify forms of multicellularity</p> <p>Identify six groups of protists</p> <p>Explain how fungi is</p>	<p>direct instruction</p> <p>graphic aids</p> <p>note taking</p>	<p>20.1 Kingdoms and Domains: An Overview</p> <p>20.2 Evolution of Multicellularity</p> <p>20.3 Complex Multicellularity</p>	<p>CYU's</p>

**Curriculum Map - Science - Biology Foundations**

			categorized Analyze complex multicellularity of Plantae Kingdom and Animalia Kingdom			
Module 21: Bacteria and Viruses  <i>(updated 1/28/21)</i>	SS.9.4.1.2.3(A) Describe how viruses, prokaryotic cells, and eukaryotic cells differ in relative size, complexity and general structure.  SS.9.4.4.2.2(A) Explain how the body produces antibodies to fight disease and how vaccines assist this process	How does disease spread?	Students will: Compare viruses and bacteria Compare lytic cycle and lysogenic cycle Explain why HIV virus is unique Identify the seven characteristics which makes bacteria different from eukaryotes Describe bacteria cell shapes Explain how bacteria obtains energy Explain the relationship between bacteria and antibiotics Identify the importance of bacteria	direct instruction graphic aids note taking	Module 21.1: Introduction to Viruses Module 21.2: Bacteria: An Overview	CYU's
Module 22: The Kingdom of Protists  <i>(updated 3/18/20)</i>		What makes protists unique and why are they beneficial?	Students will: ***** Describe protist's unique features Explain the evolution of protists	direct instruction graphic aids note taking	21.1 Protists' Unique Features 22.2 Diversity in Kingdom Protista 22.3 Your Health and Protists	CYU's
Module 23: Kingdom Fungi  <i>(updated 3/16/20)</i>		What makes fungi have their own kingdom?	Students will: Identify characteristics of fungi: structure, nutrients, reproduction Contrast fungi and plants Analyze the diversity of fungi's reproductive structures Explain the symbiotic relationship between fungi and plants	direct instruction graphic aids note taking	23.1 Fungi: Unique Traits 23.2 Diversity in Kingdom Fungi 23.3 Symbiosis in Kingdom Fungi	CYU's Unit 5 Quiz
<b>Unit</b>	<b>Benchmarks</b>	<b>Essential Questions</b>	<b>Learning Objectives</b>	<b>Instructional Strategies</b>	<b>Resources</b>	<b>Assessments</b>
Unit 6: Characteristics of Plants, Months 1-12						
Module 24: The Kingdom Plantae  <i>(updated 3/16/20)</i>		How do plants provide for their basic needs?	Students will: Identify how and why plants are able to adapt to their environment Explain how seeds provide benefits to plant's offspring Identify the characteristics of sporophytes	direct instruction graphic aids note taking	Module 24.1 How Plants Adapt Module 24.2 Different Varieties of Plants Module 24.3 Human Life and Plants	CYU's
Module 25: Plant Reproduction  <i>(updated 3/16/20)</i>		How does the process of sexual reproduction differ from the process of asexual reproduction in plants?	Students will: Analyze methods of plant reproduction Compare reproduction in nonvascular plants with vascular plants Identify reproductive structures of seed plants	direct instruction graphic aids note taking	25.1 Sexual Reproduction in Seedless Plants 25.2 Sexual Reproduction in Seed Plants 25.3 Asexual Reproduction	CYU's

**Curriculum Map - Science - Biology Foundations**

			Identify function of seeds flowers *****25.2 Define asexual reproduction Explain methods of plant propagation			
Module 26: Plant Structure and Function <i>(updated 3/17/20)</i>		How are plants unique in their structure and function?	Identify and explain characteristics of the vascular plant body Compare vascular plant tissues Compare stems Summarize characteristics of leaves Compare the movement of water and organic compounds in plants	direct instruction graphic aids note taking	26.1 The Vascular Plant Body 26.2 Transport in Plants	CYU's
Module 27: Plant Growth and Development <i>(updated 3/16/20)</i>		What is unique about plant growth?	Students will: Explain how plants grow and develop Classify plant life spans Explain how meristems cause primary and secondary growth Identify mineral nutrients that regulate plant growth Summarize Went's experiment Explain tropism	direct instruction graphic aids note taking	27.1 How Plants Grow and Develop 27.2 Regulating Growth and Development	CYU's Unit 6 Quiz
<b>Unit</b>	<b>Benchmarks</b>	<b>Essential Questions</b>	<b>Learning Objectives</b>	<b>Instructional Strategies</b>	<b>Resources</b>	<b>Assessments</b>
Unit 7: Invertebrates and Their Traits, Months 1-12						
Module 28: Introduction to Animals <i>(updated 3/16/20)</i>		How are the themes of biology vital to the successful survival of animals?	Identify common biological features of animals Compare radial symmetry and bilateral symmetry Explain how scientists classify animals Describe each of the six most important body system functions of animals Identify types of animal skeletons Explain animals reproductive strategies	direct instruction graphic aids note taking	28.1 Characteristics of Animals 28.2 Animal Body System	
Module 29: Simple Invertebrates <i>(updated 3/17/20)</i>		How do simple invertebrates interact with the environment?	Describe the biological make-up of sponges Explain sponge skeletons Explain how sponges reproduce Analyze characteristics of the phylum Cnidarian Compare freshwater and marine hydrozoa Explain reproduction in hydrozoans Identify characteristics of scyphozoans Analyze characteristics of flatworms and roundworms	direct instruction graphic aids note taking	29.1 Sponges 29.2 Cnidarians 29.3 Flatworms and Roundworms	

**Curriculum Map - Science - Biology Foundations**

<p>Module 30: Mollusks and Annelids <i>(updated 3/17/20)</i></p>		<p>What do mollusks and annelids have in common?</p>	<p>Students will: Identify and explain key features of mollusks Explain how mollusks are classified according to body plan specific for living conditions Compare gastropods, bivalves, and cephalopods Identify characteristics of annelids Compare marine worms and earthworms</p>	<p>direct instruction graphic aids note taking</p>	<p>30.1 Mollusks 30.2 Annelids</p>	
<p>Module 31: Arthropods <i>(updated 3/18/20)</i></p>		<p>Why is the phylum Arthropoda the largest phylum?</p>	<p>Students will: Identify characteristics of arthropods Explain an appendage Describe internal and external features common to most arthropods Identify characteristics of arachnids Compare spiders, scorpions, and mites Analyze characteristics of insects Identify main parts of insect body Describe insect life cycle Describe crustaceans Compare terrestrial and aquatic crustaceans</p>	<p>direct instruction graphic aids note taking</p>	<p>31.1 Features of Arthropods 31.2 Spiders and Other Arachnids 31.3 Insects and Their Relatives 31.4 Crustaceans</p>	
<p>Module 32: Echinoderms and Invertebrate Chordates <i>(updated 3/18/20)</i></p>		<p>How do echinoderms and invertebrate chordates enhance our understanding of the beginnings of vertebrate evolution?</p>	<p>Students will: Describe characteristics of echinoderms Describe six classes of echinoderm 32.2 *****</p>	<p>direct instruction graphic aids note taking</p>	<p>32.1 Echinoderms 32.2 Invertebrate Chordates</p>	<p>Unit 7 Quiz</p>
<b>Unit</b>	<b>Benchmarks</b>	<b>Essential Questions</b>	<b>Learning Objectives</b>	<b>Instructional Strategies</b>	<b>Resources</b>	<b>Assessments</b>
Unit 8: The World of Vertebrates, Months 1-12						
<p>Module 33: Introduction to Vertebrates <i>(updated 3/18/20)</i></p>		<p>How have vertebrates evolved?</p>	<p>Students will: Identify characteristics of vertebrae Explain the evolution of vertebrae Describe the evolution of fish, amphibians Identify terrestrial vertebrates Describe the evolution of dinosaurs, reptiles, and mammals Compare Ice Age mammals, later mammals, and modern mammals</p>	<p>direct instruction graphic aids note taking</p>	<p>33.1 Vertebrates in the Sea and on Land 33.2 Terrestrial Vertebrates 33.3 Evolution of Primates 33.4 The Genus Homo</p>	

**Curriculum Map - Science - Biology Foundations**

			Identify characteristics of primates Compare nonhuman primates Explain characteristics of the genus Homo			
Module 34: Fishes and Amphibians  <i>(updated 3/18/20)</i>		What characteristics allow fish and amphibians to survive in their environment?	Students will: Describe common characteristics of modern fish Explain gill function Identify fishes four chamber heart structure Explain spawning Compare jawless, cartilaginous, and bony fishes Identify and explain key characteristics of amphibians	direct instruction graphic aids note taking	34.1 The Fish Body 34.2 Today's Fishes 34.2 Amphibians	
Module 35: Reptiles and Birds  <i>(updated 3/17/20)</i>		What the the similariteis and differences between birds and reptiles?	Students will: Explain key characteristics of reptiles Identify types of modern reptiles Explain key characteristics of birds	direct instruction graphic aids note taking	35.1 The Reptilian Body 35.2 Today's Reptiles 35.3 Characteristics and Diversity of Birds	
Module 36: Mammals  <i>(updated 3/17/20)</i>		What are the main differences in mammal species?	Students will: Identify key characteristics of mammals Identify types of modern mammals Compare the 12 orders of mammal species	direct instruction graphic aids note taking	36.1 The Mammalian Body 36.2 Today's Mammals	
Module 37: Animal Behavior  <i>(updated 3/18/20)</i>		How do behavioral and physical adaptations help animals survive?	Students will: Analyze how animals respond to a stimulus Identify types of animal behavior	direct instruction graphic aids note taking	37.1 Evolution of Behavior 37.2 Types of Behavior	Unit 8 Quiz
<b>Unit</b>	<b>Benchmarks</b>	<b>Essential Questions</b>	<b>Learning Objectives</b>	<b>Instructional Strategies</b>	<b>Resources</b>	<b>Assessments</b>
Unit 9: Human Biology: An Overview , Months 1-12						
Module 38: Introduction to Body Structure  <i>(updated 1/28/21)</i>	SS.9.4.1.1.2(A) Describe how the functions of individual organ systems are integrated to maintain homeostasis in an organism.	How do human body systems work together?	Identify and describe four types of tissue Explain the function of stem cells Explain organ systems and their function Explain the importance of various body cavities Compare the axial skeleton and appendicular skeleton Describe bone structure and growth Identify main types of joints Explain the function of the muscular system Describe muscle structure Identify the characteristics and functions of skin, hair, and nails	direct instruction graphic aids note taking	38.1 Body Organization 38.2 Skeletal System 38.3 Muscular System 38.4 Skin, Hair, and Nails	

**Curriculum Map - Science - Biology Foundations**

			Explain skin disorders		
<p>Module 39: Circulatory and Respiratory Systems</p> <p><i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.1.2(A) Describe how the functions of individual organ systems are integrated to maintain homeostasis in an organism.</p>	<p>How do the circulatory and respiratory systems function together?</p>	<p>Identify the vessels, muscles and organs that comprise the cardiovascular system Explain the purpose of the lymphatic system Compare red blood cells, white blood cells, and platelets Identify blood types Explain how blood flow in the heart occurs Identify modes of monitoring the cardiovascular system Explain the respiratory process Explain oxygen transport Identify respiratory diseases</p>	<p>direct instruction graphic aids note taking</p>	<p>39.1 The Circulatory System 39.2 The Heart 39.3 The Respiratory System</p>
<p>Module 40: Digestive and Excretory Systems</p> <p><i>(updated 3/17/20)</i></p>		<p>What is the relationship between the the digestive and excretory systems?</p>	<p>Students will: Analyze how food is an essential source of nutrients. Explain why vitamins, minerals, and water are essential to health Compare water soluble and fat soluble vitamins Identify minerals required to maintain healthy body Explain the process of human digestion Identify the function of the excretory system Explain how the lungs, kidneys, and skin perform excretion functions</p>	<p>direct instruction graphic aids note taking</p>	<p>40.1 Your Body's Need for Food 40.2 Digestion 40.3 Excretion</p>
<p>Module 41: The Body's Defenses</p> <p><i>(updated 1/28/21)</i></p>	<p>SS.9.4.4.2.2(A) Explain how the body produces antibodies to fight disease and how vaccines assist this process</p> <p>SS.9.4.4.2.3(A) Describe how the immune system sometimes attacks some of the body's own cells and how some allergic reactions are caused by the body's immune responses to usually harmless environmental substances.</p> <p>SS.9.4.4.2.4(A) Explain how environmental factors and personal decisions, such as water quality, air quality and smoking affect personal and community health.</p> <p>SS.9.4.4.2.5(A) Recognize that a gene mutation in a cell can result in uncontrolled cell division called cancer, and how exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.</p>	<p>How are specific immune defenses are activated?</p>	<p>Students will: Compare the immune system's first and second line of nonspecific defenses Identify how white blood cells use different mechanisms to kill pathogens Summarize how cells trigger the immune response Explain disease transmission, resistance and immunity Explain autoimmune diseases Compare areas affected and symptoms of autoimmune diseases Explain HIV transmission and testing</p>	<p>direct instruction graphic aids note taking</p>	<p>41.1 Nonspecific Defenses 41.2 Immune Response 41.3 Disease Transmission and Prevention 41.4 Disorders of the Immune System</p>

**Curriculum Map - Science - Biology Foundations**

<p>Module 42 Nervous Systems  <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.1.2(A) Describe how the functions of individual organ systems are integrated to maintain homeostasis in an organism.</p>	<p>What is the structure and function of the nervous system and the special sense organs?</p>	<p>Students will: Explain the function and structure of neurons Compare neuron resting potential and action potential Identify how neurons communicate Explain the structures of the central nervous system Compare the peripheral, somatic , and autonomic nervous system Explain the sensory system processes Explain the effects of drugs on the central nervous center Identify common psychoactive drugs and explain their effects and risks</p>	<p>direct instruction graphic aids note taking</p>	<p>42.1 Neurons and Nerve Impulses 42.2 Structures of the Nervous Systems 42.3 Sensory Systems 42.4 Drugs and the Nervous System</p>	
<p>Module 43: Hormones and Endocrine System  <i>(updated 1/28/21)</i></p>	<p>SS.9.4.1.1.2(A) Describe how the functions of individual organ systems are integrated to maintain homeostasis in an organism.</p>	<p>What is the connection between hormones and the endocrine systems?</p>	<p>Students will: Explain the function of hormones Describe the endocrine system Identify hormone -like substances Compare amino-acid-based hormones and steroid hormones Identify and explain the major endocrine glands</p>	<p>direct instruction graphic aids note taking</p>	<p>43.1 Hormones 43.2 How Hormones Work 43.3 The Major Endocrine Glands</p>	
<p>Module 44: Reproduction and Development  <i>(updated 3/17/20)</i></p>		<p>What are the functions of the parts associated with the male and female reproductive system?</p>	<p>Students will: Describe the male reproductive system Explain how sperm is produced and stored Explain the function of semen Describe the female reproductive system Explain the phases of the ovarian cycle and menstrual cycle Identify the stages of pregnancy Compare bacterial and viral sexually transmitted diseases</p>	<p>direct instruction graphic aids note taking</p>	<p>44.1 Male Reproductive System 44.2 Female Reproductive System 44.3 Development 44.4 Sexually Transmitted Diseases</p>	<p>Unit 9 Quiz</p>