



Wyoming Department of Education Required Virtual Education Course Syllabus

Converse County School District # 1

Course Information

Program Name	Biology
Course ID	H427
Course Name	Biology II CC (EWC BIOL 100)
SCED Code	03052E0.5012
Content Area	Science
Grade Level	12
# of Credits	4 college
Curriculum Type	District Developed

Please give a concise description of this course including the purpose and what students will demonstrate and/or gain from this course.

This course covers basic principles of biology as per the parameters set forth by Eastern Wyoming College. Cells, Cell Chemistry, cell division, Genetics, evolution, ecology, classification.

Wyoming Content and Performance Standards

Standard

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 within multi-cellular organisms.
HS-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

Wyoming Content and Performance Standards

HS-LS1-6	Construct explanations and revise, as needed, based on evidence for: 1) how carbon, hydrogen, and oxygen may combine with other elements to form amino acids and other hydrocarbon molecules.
HS-LS1-7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of sugar molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
HS-LS2-3	Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions, and revise as needed.
HS-LS2-7	Evaluate and assess impacts on the environment and biodiversity in order to refine or design a solution for detrimental impacts or enhancement for positive impacts.
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
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
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:
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Scope and Sequence

Unit Outline	Standard #	Outcomes Objectives/Student Centered Goals
What is Biology Chapter 1 1.1 Why the Study of Biology Is Important 1.2 Science and the Scientific Method	HS-LS 2-3	GOALS AND OBJECTIVES Understand the process of science. <input type="checkbox"/> State two characteristics of a good hypothesis.

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<p>Basic Assumptions in Science Cause-and-Effect Relationships The Scientific Method</p> <p>1.3 Science, Nonscience, and Pseudoscience Fundamental Attitudes in Science Theoretical and Applied Science Science and Nonscience Pseudoscience The Limitations of Science</p> <p>1.4 The Science of Biology What Makes Something Alive?</p> <p>The Levels of Biological Organization and Emerging Properties The Significance of Biology in Our Lives The Consequences of Not Understanding Biological Principles Future Directions in Biology HOW SCIENCE WORKS 1.1: Edward Jenner and the Control of Smallpox</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Explain why events that are correlated may not show a cause-and-effect relationship. <input type="checkbox"/> List and describe five elements of the scientific method. <input checked="" type="checkbox"/> Differentiate among a hypothesis, a theory, and a scientific law. <p>Recognize the difference between scientific and nonscientific areas of study.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List characteristics that differentiate science from nonscience. <input type="checkbox"/> Define and give an example of pseudoscience. <input checked="" type="checkbox"/> Differentiate between applied and theoretical science. <p>Recognize that science has limitations.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Give examples of problems caused by unwise use of biological information. <input checked="" type="checkbox"/> Identify questions that science is not able to answer. <p>Understand how living and nonliving things differ.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List and give an example of five characteristics typical of living things. <input type="checkbox"/> State the differences among a cell, an organ, and an organism. <input checked="" type="checkbox"/> Explain why a cell can be an organism. <p>Appreciate the significance of the science of biology in modern society.</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> List three ways in which the science of biology has improved your quality of life. <input type="checkbox"/> Describe two historical examples that illustrate how a lack of understanding of biology resulted in major problems.
<p>The Basics of Life: Chemistry Organic Molecules Chapter 3 3.1 Molecules Containing Carbon</p>	<p>HS-LS1-6</p>	<p>GOALS AND OBJECTIVES</p>

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<p>Carbon: The Central Atom The Complexity of Organic Molecules The Carbon Skeleton and Functional Groups Macromolecules of Life</p> <p>3.2 Carbohydrates Simple Sugars Complex Carbohydrates</p> <p>3.3 Proteins The Structure of Proteins What Do Proteins Do?</p> <p>3.4 Nucleic Acids DNA RNA</p> <p>3.5 Lipids True (Neutral) Fats Phospholipids Steroids</p> <p>HOW SCIENCE WORKS 3.1: Organic Compounds: Poisons to Your Pets! OUTLOOKS 3.1: Chemical Shorthand OUTLOOKS 3.2: So You Don't Eat Meat! How to Stay Healthy OUTLOOKS 3.3: What Happens When You Deep-Fry Food? OUTLOOKS 3.4: Fat and Your Diet</p>		<p>Understand carbon atoms and their chemical nature.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Distinguish between molecules that are organic and inorganic. <input type="checkbox"/> State the features of a carbon atom that make it able to bond in chains and rings. <input type="checkbox"/> Describe how single and double covalent bonds are formed in organic molecules. <input type="checkbox"/> Draw an example of a carbon skeleton. <input type="checkbox"/> Recognize the main functional groups. <p>Recognize different molecular structures common to organic molecules.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List the major group of organic molecules associated with living things. <input type="checkbox"/> Recognize the basic subunit of each of the major groups of organic molecules. <input type="checkbox"/> Describe the function played by each of the major groups of organic molecules. <input type="checkbox"/> Give examples of each of the major groups of organic molecules. <input type="checkbox"/> Explain why certain organic molecules are considered monomers and others polymers. <input type="checkbox"/> Diagram a simple structure of the monomers of monosaccharide, amino acid, and nucleotide. <p>Know the ways that molecules can react with one another.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain the difference between dehydration synthesis and hydrolysis. <input type="checkbox"/> Diagram simple dehydration synthesis and hydrolysis reactions. <input type="checkbox"/> Describe how organic molecules such as proteins can have primary, secondary, tertiary, and quaternary structures.
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<p>Cell Structure and Function Chapter 4 4.1 The Development of the Cell Theory Some History Basic Cell Types 4.2 Cell Size 4.3 The Structure of Cellular Membranes 4.4 Organelles Composed of Membranes Plasma Membrane Endoplasmic Reticulum Golgi Apparatus Lysosomes Peroxisomes Vacuoles and Vesicles Nuclear Membrane The Endomembrane System—Interconversion of Membranes Energy Converters— Mitochondria and Chloroplasts 4.5 Nonmembranous Organelles Ribosomes Microtubules, Microfilaments, and Intermediate Filaments Centrioles Cilia and Flagella Inclusions 4.6 Nuclear Components 4.7 Exchange Through Membranes</p>	<p>HS-LS1-2</p>	<p>GOALS AND OBJECTIVES</p> <p>Understand how the concept of surface area-to-volume ratio is related to human physiology.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain why cells are small. <input type="checkbox"/> Describe structural characteristics that increase the surface area of the gut. <input type="checkbox"/> Explain why the lungs, gut, and kidneys have large numbers of capillaries and a large surface area. <p>Understand the historical perspective of the development of the cell theory.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain the cell theory. <input type="checkbox"/> Diagram the generalized structure of all noneukaryotic cells and label the parts. <input type="checkbox"/> Diagram the generalized structure of all eukaryotic cells and label the parts. <input type="checkbox"/> Draw a flow chart that illustrates the classification of cellular forms of life. <p>Know the molecular structure of a cell membrane and relate this structure to its function.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List the components and molecular parts of a typical cell membrane. <input type="checkbox"/> Explain the fluid mosaic model of membrane structure. <input type="checkbox"/> List the possible roles played by molecules that extend from the cell surface. <input type="checkbox"/> Contrast diffusion, osmosis, and dialysis. <input type="checkbox"/> List the controlled methods by which materials can be transported through a cell membrane. <p>Learn to associate cellular organelles with their major functions in eukaryotic cells.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List the typical organelles associated with eukaryotic cells. <input type="checkbox"/> Draw the structure of each of the organelles associated with eukaryotic cells.
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Scope and Sequence

<p>Diffusion Osmosis Controlled Methods of Transporting Molecules</p> <p>4.8 Prokaryotic and Eukaryotic Cells Revisited Prokaryotic Cell Structure Eukaryotic Cell Structure</p> <p>The Cell—The Basic Unit of Life HOW SCIENCE WORKS 4.1: Developing the Fluid-Mosaic Model HOW SCIENCE WORKS 4.2: Cell Membrane Structure and Tissue Transplants</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Describe the function of each of the organelles associated with eukaryotic cells. <p>Understand the basic differences between noneukaryotic and eukaryotic cells.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List the differences in organelles found in prokaryotic and eukaryotic cells. <input type="checkbox"/> Give examples of organisms composed of prokaryotic and eukaryotic cells.
<p>Enzymes, Coenzymes & Energy Chapter 5 5.1 How Cells Use Enzymes 5.2 How Enzymes Speed Chemical Reaction Rates Enzymes Bind to Substrates Naming Enzymes</p> <p>5.3 Cofactors, Coenzymes, and Vitamins 5.4 How the Environment Affects Enzyme Action Temperature pH Enzyme-Substrate Concentration</p> <p>5.5 Cellular-Control Processes and Enzymes Enzymatic Competition for Substrates Gene Regulation Inhibition</p>	<p>HS-LS1-6</p>	<h2>GOALS AND OBJECTIVES</h2> <p>Understand the nature of enzyme structures and how they work.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain why enzymes are so important to all organisms. <input type="checkbox"/> Describe to which group of organic molecules enzymes belong. <input type="checkbox"/> Contrast active site and binding site. <input type="checkbox"/> Relate the shape of an enzyme to its ability to help in a chemical reaction. <input type="checkbox"/> Define the term <i>activation energy</i>. <input type="checkbox"/> Describe what happens when an enzyme and a substrate combine. <p>Understand how other molecules can assist in enzyme activity.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Contrast cofactors, vitamins, and coenzymes. <input type="checkbox"/> Define the term <i>denature</i>. <p>Know how the environment can affect enzyme action.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe why enzymes work in some situations and not in others. <input type="checkbox"/> Define the term <i>turnover number</i>.

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<p>5.6 Enzymatic Reactions Used in Processing Energy and Matter Biochemical Pathways Generating Energy in a Useful Form: ATP Electron Transport Proton Pump</p> <p>OUTLOOKS 5.1: Passing Gas, Enzymes, and Biotechnology HOW SCIENCE WORKS 5.1: Don't Be Inhibited—Keep Your Memory Alive</p>		<ul style="list-style-type: none"> <input type="checkbox"/> List what environmental factors are able to alter enzyme activity. <p>Understand how enzymes can be controlled by the cell.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Define the terms negative and positive feedback. <input type="checkbox"/> Describe enzymatic competition. <input type="checkbox"/> Explain the role played by gene-regulator proteins in enzyme action. <p>Recognize that there are metabolic processes basic to all organisms.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain the importance of ATP. <input type="checkbox"/> Describe how the proton pump mechanism generates ATP.
<p>Exam 1: Chapters 1-5 September</p>		
<p>Cellular Respiration Photosynthesis Chapter 6 6.1 Energy and Organisms 6.2 An Overview of Aerobic Cellular Respiration Glycolysis The Krebs Cycle The Electron-Transport System (ETS) 6.3 The Metabolic Pathways of Aerobic Cellular Respiration Fundamental Description Detailed Description 6.4 Aerobic Cellular Respiration in Prokaryotes 6.5 Anaerobic Cellular Respiration Alcoholic Fermentation Lactic Acid Fermentation</p>	<p>HS-LS-1-5 & 7</p>	<p>GOALS AND OBJECTIVES</p> <p>Recognize that organisms have several ways to obtain energy.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the differences between autotrophs and heterotrophs. <input type="checkbox"/> List the sources of energy used by chemosynthetic and photosynthetic organisms. <p>Recognize that organisms have several ways to obtain energy.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the differences between autotrophs and heterotrophs. <input type="checkbox"/> List the sources of energy used by chemosynthetic and photosynthetic organisms. <p>Understand the process of aerobic cellular respiration.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain the role of oxygen in aerobic respiration. <input type="checkbox"/> Describe the reactants and products of glycolysis, the Krebs cycle, and the

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<p>6.6 Metabolic Processing of Molecules Other Than Carbohydrates Fat Respiration Protein Respiration OUTLOOKS 6.1: What Happens When You Drink Alcohol OUTLOOKS 6.2: Souring vs. Spoilage OUTLOOKS 6.3: Body Odor and Bacterial Metabolism HOW SCIENCE WORKS 6.1: Applying Knowledge of Biochemical Pathways Chapter 7 7.1 Photosynthesis and Life 7.2 An Overview of Photosynthesis 7.3 The Metabolic Pathways of Photosynthesis Fundamental Description Detailed Description Glyceraldehyde-3-Phosphate: The Product of Photosynthesis 7.4 Other Aspects of Plant Metabolism 7.5 Interrelationships Between Autotrophs and Heterotrophs OUTLOOKS 7.1: The Evolution of Photosynthesis OUTLOOKS 7.2: Even More Ways to Photosynthesize HOW SCIENCE WORKS 7.1: Solution to Global Energy Crisis Found in Photosynthesis?</p>		<p>electron-transport system.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain the role of NAD⁺ and FAD in cellular respiration. <p>Understand the process of anaerobic cellular respiration.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration. <input type="checkbox"/> Describe two variations of anaerobic respiration. <p>Recognize the role of glycolysis and the Krebs cycle in fat and protein respiration.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List subunits from fats and proteins that are metabolized by aerobic respiration. <input type="checkbox"/> Describe how energy is derived from fats and proteins. <p>GOALS AND OBJECTIVES</p> <p>Understand the process of photosynthesis.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the reactants and products of the light-dependent and light-independent reactions of photosynthesis. <input type="checkbox"/> Explain the role of pigments in photosynthesis. <input type="checkbox"/> Explain the role of glyceraldehyde-3-phosphate in plant metabolism. <input type="checkbox"/> Describe other aspects of plant metabolism.
<p>DNA & RNA Chapter 8 8.1 DNA and the Importance of Proteins 8.2 DNA Structure and Function DNA Structure</p>	<p>HS-LS1-1</p>	<p>GOALS AND OBJECTIVES</p> <p>Understand the typical flow of genetic information in a cell.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Define gene, transcription, translation.

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<p>Base Pairing in DNA Replication The Repair of Genetic Information The DNA Code</p> <p>8.3 RNA Structure and Function</p> <p>8.4 Protein Synthesis Step One: Transcription—Making RNA Step Two: Translation—Making Protein The Nearly Universal Genetic Code</p> <p>8.5 The Control of Protein Synthesis Controlling Protein Quantity Controlling Protein Quality Epigenetics</p> <p>8.6 Mutations and Protein Synthesis Point Mutations Insertions and Deletions Chromosomal Aberrations Mutations and Inheritance</p> <p>HOW SCIENCE WORKS 8.1: Scientists Unraveling the Mystery of DNA OUTLOOKS 8.1: Life in Reverse—Retroviruses OUTLOOKS 8.2: Telomeres OUTLOOKS 8.3: One Small Change—One Big Difference!</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Describe how the processes of transcription and translation relate. <p>Understand how DNA and RNA direct transcription and translation.</p> <ul style="list-style-type: none"> <input type="checkbox"/> State the nucleotides commonly found in DNA and RNA. <input type="checkbox"/> Apply the base-pairing rule to predict the nucleotide structure of RNA. <input type="checkbox"/> Explain the use of mRNA and tRNA in the process of translation. <input type="checkbox"/> Accurately use the codon table to predict the amino acid sequence of a protein. <p>Learn the importance of controlling gene expression.</p> <ul style="list-style-type: none"> <input type="checkbox"/> State why single cellular and multicellular organisms control gene expression. <input type="checkbox"/> Explain how promoters, transcription factors, and splicing affect transcription. <p>Understand how mutations affect protein synthesis.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Provide examples of silent mutations. <input type="checkbox"/> Provide examples of insertions, deletions, and frameshift mutations. <p>Understand the relationship between DNA replication and cell division.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe DNA replication using base-pairing rules and DNA polymerase. <input type="checkbox"/> Describe how DNA is organized differently in various types of cells.
<p>Cell Division Chapter 9 9.1 Cell Division: An Overview Asexual Reproduction Sexual Reproduction</p>	<p>HS=LS1-4</p>	<p>GOALS AND OBJECTIVES</p> <p>Know the purposes of cell division.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List three important purposes of cell division.

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<p>9.2 The Cell Cycle and Mitosis The G 1 Stage of Interphase The S Stage of Interphase The G 2 Stage of Interphase</p> <p>9.3 Mitosis—Cell Replication Prophase Metaphase Anaphase Telophase Cytokinesis Summary</p> <p>9.4 Controlling Mitosis</p> <p>9.5 Cancer Mutagenic and Carcinogenic Agents Epigenetics and Cancer Treatment Strategies</p> <p>9.6 Determination and Differentiation</p> <p>9.7 Cell Division and Sexual Reproduction</p> <p>9.8 Meiosis—Gamete Production Meiosis I Meiosis II</p> <p>9.9 Genetic Diversity—The Biological Advantage of Sexual Reproduction Mutation Crossing-Over Segregation</p>		<p><input type="checkbox"/> Explain the differences between asexual and sexual reproduction.</p> <p>Understand and describe the events that occur during Interphase.</p> <p><input type="checkbox"/> Identify the types of cellular activities that occur during G₁.</p> <p><input type="checkbox"/> Identify the types of cellular activities that occur during S phase.</p> <p><input type="checkbox"/> Identify the types of cellular activities that occur during G₂.</p> <p>Understand and describe the events that occur during mitosis.</p> <p><input type="checkbox"/> List the stages of mitosis in their proper order.</p> <p><input type="checkbox"/> Describe the events that uniquely define each stage.</p> <p>Describe how mitosis is controlled by the cell.</p> <p><input type="checkbox"/> Describe the role of tumor-suppressor genes in controlling cell division.</p> <p><input type="checkbox"/> Describe the role of oncogenes in controlling cell division.</p> <p><input type="checkbox"/> Describe the role of p53 in controlling cell division.</p> <p>Describe the cellular basis of cancer and why its treatments can be effective.</p> <p><input type="checkbox"/> Describe how cancer is caused by a failure to control cell division.</p> <p><input type="checkbox"/> Describe how chemotherapy and radiation can be effective treatments for cancer.</p> <p>Identify the role of determination and differentiation in the growth and development of an organism.</p> <p><input type="checkbox"/> Explain the difference between a differentiated cell and a stem cell.</p> <p><input type="checkbox"/> Explain how the process of determination relates to stem cells and differentiated cells.</p> <p>Understand and describe the events that occur during meiosis.</p> <p><input type="checkbox"/> List the stages of meiosis in their proper order.</p> <p><input type="checkbox"/> Identify if the cell is diploid or haploid for each stage.</p>
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<p>Independent Assortment Fertilization</p> <p>9.10 Nondisjunction and Chromosomal Abnormalities HOW SCIENCE WORKS 9.1: The Concepts of Homeostasis and Mitosis Applied</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Describe the events that uniquely define each stage. <p>Describe how sexual reproduction increases genetic diversity through:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mutations <input type="checkbox"/> Crossing-over <input type="checkbox"/> Segregation <input type="checkbox"/> Independent Assortment <input type="checkbox"/> Fertilization <p>Describe how abnormal events in meiosis can affect the cells produced by meiosis.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain how nondisjunction can result in loss of genetic material or the gain of genetic material. <input type="checkbox"/> Explain how chromosomal abnormalities can result in the loss of genetic material or the gain of genetic material.
<p>Patterns of Inheritance Chapter 10 10.1 Meiosis, Genes, and Alleles Various Ways to Study Genes What Is an Allele? Genomes and Meiosis</p> <p>10.2 The Fundamentals of Genetics Phenotype and Genotype Predicting Gametes from Meiosis Fertilization</p> <p>10.3 Probability vs. Possibility 10.4 The First Geneticist: Gregor Mendel 10.5 Solving Genetics Problems Single-Factor Crosses Double-Factor Crosses</p>	<p>HS-LS- 3-1 HS-LS- 3-2 HS-LS- 3-3</p>	<p>GOALS AND OBJECTIVES</p> <p>Understand the concepts of genotype and phenotype.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain how a person can have the allele for a particular gene but not show it. <p>Understand the basis of Mendelian genetics.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Define the concepts of dominant alleles and recessive alleles. <input type="checkbox"/> Determine if the children of a father and mother with a certain gene combination will automatically show that trait. <input type="checkbox"/> Explain how people inherit varying degrees of traits such as skin color. <p>Know single-gene and double factor genetic methods of inheritance.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain the likelihood that a particular trait will be passed on to the next generation.

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<p>10.6 Modified Mendelian Patterns Codominance Incomplete Dominance Multiple Alleles Polygenic Inheritance Pleiotropy</p> <p>10.7 Linkage Linkage Groups Autosomal Linkage Sex Determination Sex Linkage</p> <p>10.8 Other Influences on Phenotype HOW SCIENCE WORKS 10.1: Cystic Fibrosis— What Is the Probability? OUTLOOKS 10.1: The Inheritance of Eye Color OUTLOOKS 10.2: The Birds and the Bees . . . and the Alligators</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Determine the chances that children will carry two particular genes. <p>Understand how Mendel’s model of inheritance can be modified to account for other types of genetic influences.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Understand how a person’s sex can influence the expression of his or her genes. <input type="checkbox"/> Understand how codominant alleles and X-linkage explain inheritance patterns. <p>Understand other influences on phenotype.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain what <i>variable expressivity</i> means. <input type="checkbox"/> Understand how both external and internal environmental factors can influence the expression of genes.
<p>Exam 2: Chapters 6-10 October</p>		
<p>Diversity and Population Genetics Chapter 12 12.1 Genetics in Species and Populations 12.2 The Biological Species Concept Gene and Allele Frequencies Subspecies, Breeds, Varieties, Strains, and Races</p>	<p>HS-LS2-7</p>	<p>GOALS AND OBJECTIVES</p> <p>Recognize how the concepts of <i>species</i>, <i>gene pool</i>, and <i>population</i> are related.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain the difference between the biological species concept and the morphological species concept. <input type="checkbox"/> State why all organisms of a species are not the same. <input type="checkbox"/> Distinguish between gene pool and genetic diversity.

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<p>12.3 How Genetic Diversity Comes About Mutations Sexual Reproduction Migration The Importance of Population Size</p> <p>12.4 Why Genetically Distinct Populations Exist Adaptation to Local Environmental Conditions The Founder Effect Genetic Bottleneck Barriers to Movement</p> <p>12.5 Genetic Diversity in Domesticated Plants and Animals Cloning Selective Breeding Genetic Engineering The Impact of Monoculture</p> <p>12.6 Is It a Species or Not? The Evidence 12.7 Human Population Genetics 12.8 Ethics and Human Population Genetics OUTLOOKS 12.1: Your Skin Color, Gene Frequency Changes, and Natural Selection OUTLOOKS 12.2: Biology, Race, and Racism HOW SCIENCE WORKS 12.1: The Legal Implications of Defining a Species HOW SCIENCE WORKS 12.2: Bad Science: A Brief History of the Eugenics Movement</p>		<ul style="list-style-type: none"> <input type="checkbox"/> List three methods used to distinguish species from one another. <p>Know the factors that can cause differences in genetic diversity of different populations of the same species.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain how each of the following affects the genetic diversity within populations: mutation, sexual reproduction, population size, and migration. <input type="checkbox"/> Describe three processes that could result in different populations of the same species having different gene combinations. <p>Learn the processes used to produce specific varieties of domesticated plants and animals.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Relate cloning and hybridization to asexual and sexual reproduction. <input type="checkbox"/> Explain how hybrid plants and animals are produced. <input type="checkbox"/> Describe how genetic engineering differs from the development of intraspecific hybrids and clones. <input type="checkbox"/> Describe the value and potential danger of the practice of monoculture. <p>Recognize that population genetics principles apply to human populations.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe why certain diseases are more common in some groups of people than in others. <input type="checkbox"/> Describe how a lack of understanding about population genetics contributed to the eugenics movements. <input type="checkbox"/> Discuss the ethics matters in relation to human population genetics.
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<p>Evolution and Natural Selection Chapter 13 13.1 The Scientific Concept of Evolution 13.2 The Development of Evolutionary Thought Early Thinking About Evolution The Theory of Natural Selection Modern Interpretations of Natural Selection 13.3 The Role of Natural Selection in Evolution 13.4 Common Misunderstandings About Natural Selection 13.5 What Influences Natural Selection? The Mechanisms That Affect Genetic Diversity The Role of Gene Expression The Importance of Excess Reproduction 13.6 The Processes That Drive Selection Differential Survival Differential Reproductive Rates Differential Mate Choice—Sexual Selection 13.7 Patterns of Selection Stabilizing Selection Directional Selection Disruptive Selection 13.8 Evolution Without Selection—Genetic Drift 13.9 Gene-Frequency Studies and the Hardy-Weinberg Concept Determining Genotype Frequencies Why Hardy-Weinberg Conditions Rarely Exist</p>	<p>HS-LS4-1</p>	<p>GOALS AND OBJECTIVES</p> <p>Understand the relationship between natural selection and evolution.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the contributions of the following individuals to evolutionary thought: Lamarck, Buffon, Wallace, and Darwin. <input type="checkbox"/> List five assumptions by Darwin that were important to his developing the theory of natural selection. <p>Recognize that evolutionary change is the result of natural selection.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe how the concepts of evolution and natural selection are related. <p>Understand how natural selection works.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Explain why genetic diversity is essential for natural selection to occur. <input type="checkbox"/> Describe how individuals produced by sexual reproduction can have fitness different from that of their parents. <input type="checkbox"/> Explain how mutation and migration affect the genetic diversity of a population. <input type="checkbox"/> Explain why excess reproduction is important to the concept of natural selection. <input type="checkbox"/> List and describe three circumstances that can prevent a specific allele from being expressed in the phenotype of an organism. <input type="checkbox"/> Describe common misunderstandings about the nature of natural selection. <input type="checkbox"/> Explain how survival, reproductive success, and mate selection can alter gene frequency from one generation to the next. <p>Understand that evolution is the process of changing gene frequencies.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the conditions that can lead to genetic drift.
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<p>Using the Hardy-Weinberg Concept to Show Allele-Frequency Change</p> <p>13.10 A Summary of the Causes of Evolutionary Change</p> <p>OUTLOOKS 13.1: Common Misconceptions About the Theory of Evolution</p> <p>HOW SCIENCE WORKS 13.1: The Voyage of HMS Beagle, 1831–1836</p> <p>OUTLOOKS 13.2: Genetic Diversity and Health Care</p> <p>OUTLOOKS 13.3: The Reemerging of Infectious Diseases</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Explain how natural selection can change the nature of a species. <input type="checkbox"/> Provide examples that indicate that evolution is occurring. <p>Recognize the conditions under which the Hardy-Weinberg concept applies.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List the five conditions necessary to prevent gene frequency changes according to the Hardy-Weinberg concept. <input type="checkbox"/> Explain why Hardy-Weinberg conditions rarely occur.
<p>Species Formation</p> <p>Community Interactions</p> <p>Chapter 16</p> <p>16.1 The Nature of Communities</p> <p style="padding-left: 20px;">Defining Community Boundaries</p> <p style="padding-left: 20px;">Complexity and Stability</p> <p style="padding-left: 20px;">Communities Are Dynamic</p> <p>16.2 Niche and Habitat</p> <p style="padding-left: 20px;">The Niche Concept</p> <p style="padding-left: 20px;">The Habitat Concept</p> <p>16.3 Kinds of Organism Interactions</p> <p style="padding-left: 20px;">Competition</p> <p style="padding-left: 20px;">Competition and Natural Selection</p> <p style="padding-left: 20px;">Predation</p> <p style="padding-left: 20px;">Symbiotic Relationships</p> <p style="padding-left: 20px;">Parasitism</p>	<p>HS-LS4-4</p>	<p>GOALS AND OBJECTIVES</p> <p>Understand that organisms interact in a variety of ways within a community.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe differences among predation, mutualism, competition, parasitism, and commensalism. <input type="checkbox"/> Explain the difference between niche and habitat. <input type="checkbox"/> Describe an organism’s niche, habitat, and community. <p>Recognize the abiotic and biotic features that are typical of the major biomes of the world.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List typical abiotic and biotic characteristics of different biomes. <input type="checkbox"/> Explain why some plants and animals are found only in certain parts of the world. <input type="checkbox"/> Describe the effect of temperature and rainfall to the kind of biome that develops. <p>Understand the concept of succession.</p>

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<p>Special Kinds of Predation and Parasitism Commensalism Mutualism</p> <p>16.4 Types of Communities Temperate Deciduous Forest Temperate Grassland (Prairie) Savanna Mediterranean Shrublands (Chaparral) Tropical Dry Forest Desert Boreal Coniferous Forest Temperate Rainforest Tundra Tropical Rainforest The Relationship Between Elevation and Climate</p> <p>16.5 Major Aquatic Ecosystems Marine Ecosystems Freshwater Ecosystems</p> <p>16.6 Succession Primary Succession Secondary Succession Modern Concepts of Succession and Climax Succession and Human Activity</p> <p>16.7 The Impact of Human Actions on Communities Introduced Species Predator Control Habitat Destruction</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Explain the concept of a climax community. <input type="checkbox"/> Describe the effect humans have had on natural climax ecosystems. <input type="checkbox"/> Explain why a vacant lot becomes a tangle of plants. <p>Appreciate that humans alter and interfere with natural ecological processes.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the impact of introduced species, predator control, and habitat destruction on natural communities. <input type="checkbox"/> Explain why persistent organic chemicals reach higher levels in carnivores than in herbivores. <input type="checkbox"/> Relate extinctions to human activities.
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<p>Pesticide Use Biomagnification</p> <p>HOW SCIENCE WORKS 16.1: Whole Ecosystem Experiments OUTLOOKS 16.1: Varzea Forests—Seasonally Flooded Amazon Tropical Forests</p>		
<p>The Origin of Life Chapter 19 19.1 Early Thoughts About the Origin of Life 19.2 Current Thinking About the Origin of Life An Extraterrestrial Origin for Life on Earth An Earth Origin for Life on Earth</p> <p>19.3 The “Big Bang” and the Origin of the Earth The “Big Bang” The Formation of the Planet Earth Conditions on the Early Earth</p> <p>19.4 The Chemical Evolution of Life on Earth The Formation of the First Organic Molecules The Formation of Macromolecules RNA May Have Been the First Genetic Material The Development of Membranes The Development of Metabolic Pathways</p> <p>19.5 Major Evolutionary Changes in Early Cellular Life The Development of an Oxidizing Atmosphere The Establishment of Three Major Domains of</p>	<p>HS-LS4-1</p>	<p>GOALS AND OBJECTIVES</p> <p>Know the history of the scientific interest in the origin of life.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the differences between the concepts of spontaneous generation and biogenesis. <input type="checkbox"/> Discuss current thinking about the origin of life. <input type="checkbox"/> Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis. <p>Recognize that the nature of the Earth has changed considerably over the past 4.5 billion years.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist. <input type="checkbox"/> Describe the kinds of evidence used to suggest an extraterrestrial source for life on Earth. <input type="checkbox"/> Explain the experimental evidence for the origin of life from inorganic material. <input type="checkbox"/> Describe different hypotheses for what the first living thing might have been like. <input type="checkbox"/> Explain the chemical and physical events that must have occurred to have life originate on Earth.

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<p>Life The Origin of Eukaryotic Cells The Development of Multicellular Organisms</p> <p>19.6 The Geologic TimeLine and the Evolution of Life An Aquatic Beginning Adaptation to a Terrestrial Existence</p> <p>HOW SCIENCE WORKS 19.1: The Oldest Rocks on Earth</p>		<ul style="list-style-type: none"> <input type="checkbox"/> Describe the way in which organisms have caused the atmosphere of the Earth to change. <p>Recognize the evolutionary changes necessary to give rise to the variety of living things we see on Earth today.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the relationships among Bacteria, Archaea, and Eukarya. <input type="checkbox"/> Explain the endosymbiotic theory. <input type="checkbox"/> State the order and approximate times for major evolutionary events.
<p>Exam 3: Chapters 12-14, 16, 19 Available: 8:00 am Mon, Nov 25 through 11:55 pm Tues, Nov 26</p>		
<p>The Classification and Evolution of Organisms Microorganisms Chapter 20 20.1 The Classification of Organisms The Problem with Common Names Taxonomy Phylogeny</p> <p>20.2 A Brief Survey of the Domains of Life The Domain Bacteria The Domain Archaea The Domain Eucarya</p> <p>20.3 Acellular Infectious Particles Viruses Viroids: Infectious RNA Prions: Infectious Proteins</p>	<p>HS-LS4-2</p>	<h2 style="text-align: center;">GOALS AND OBJECTIVES</h2> <p>Understand why and how scientists categorize organisms.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe the scientific method for naming organisms. <input type="checkbox"/> Distinguish between taxonomy and phylogeny. <input type="checkbox"/> Describe the kinds of tools used to establish phylogenetic relationships. <input type="checkbox"/> List the domains of organisms. <p>Know the criteria used to classify organisms into different kingdoms.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List and give distinguishing characteristics of members of the Domain Bacteria. <input type="checkbox"/> List and give distinguishing characteristics of members of Domain Archaea. <input type="checkbox"/> List and give distinguishing characteristics of the kingdoms within the Domain Eukarya. <input type="checkbox"/> Distinguish between Bacteria and Archaea. <input type="checkbox"/> Distinguish among viruses, viroids, and prions.

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<p>HOW SCIENCE WORKS 20.1: New Information Causes Changes in Taxonomy and Phylogeny HOW SCIENCE WORKS 20.2: Cladistics: A Tool for Taxonomy and Phylogeny OUTLOOKS 20.1: A Bacterium that Controls Animal Reproduction</p>		<ul style="list-style-type: none"> <input type="checkbox"/> List diseases caused by the acellular infectious particles and discuss their impact on human population.
<p>The Plant Kingdom Chapter 22 22.1 What Is a Plant? 22.2 Alternation of Generations 22.3 The Evolution of Plants 22.4 Nonvascular Plants The Moss Life Cycle Kinds of Nonvascular Plants 22.5 The Significance of Vascular Tissue 22.6 The Development of Roots, Stems, and Leaves Roots Stems Leaves 22.7 Seedless Vascular Plants The Fern Life Cycle Kinds of Seedless Vascular Plants 22.8 Seed-Producing Vascular Plants Gymnosperms Angiosperms 22.9 The Growth of Woody Plants 22.10 Plant Responses to Their Environment</p>	<p>HS-LS4-2</p>	<p>GOALS AND OBJECTIVES</p> <p>Understand the nature and characteristics common to most plants.</p> <ul style="list-style-type: none"> <input type="checkbox"/> List the feature of an organism that is needed to qualify it as a plant. <input type="checkbox"/> List examples of plants. <input type="checkbox"/> Define the term <i>alternation of generations</i>. <input type="checkbox"/> Diagram the life cycle of a moss and compare it to the life cycle of a fern. <p>Recognize the basic characteristics of the major plant groups.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Know the differences among the plant groups. <input type="checkbox"/> Describe the evolutionary relationships among plants. <input type="checkbox"/> Explain how plants adapted to terrestrial habitats. <input type="checkbox"/> Describe the advantage of vascular tissue to plants. <p>Understand the basic structure of seed plants.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Differentiate among roots, stems, and leaves. <input type="checkbox"/> Distinguish between vascular and nonvascular tissue. <input type="checkbox"/> Compare gymnosperms and angiosperms.

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<p>Tropisms Seasonal Responses Responses to Injury</p> <p>22.11 The Coevolution of Plants and Animals OUTLOOKS 22.1: Plant Terminology HOW SCIENCE WORKS 22.1: Using Information from Tree Rings OUTLOOKS 22.2: Spices and Flavorings</p>		
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