Biology I CP Curriculum Maps

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 1: Introduction to Science and Biology**
Big Idea/Rationale	• Scientists use the metric system for every quantitative measurement. • All life shares the same 8 characteristics. • The scientific method is used during scientific investigations and experiment. • Safety rules must be followed in the lab setting • Equipment must be properly used during experiments.

Enduring Understanding (Mastery Objective)	• SWBAT:
	  ○ Describe the metric system and use this system to convert measurements.
	  ○ Describe and compare all the characteristics are common in all life.
	  ○ List the steps involved when utilizing the scientific method.
	  ○ Compare the different parts of the scientific method and be able to identify their use in any scientific experiment.
	  ○ Describe the materials used in a lab and understand the proper behavior in the lab.

Essential Questions (Instructional Objective)	• How do scientists make quantitative observations? • How do scientists make qualitative observations? • How are quantitative and qualitative measurements different? • What is biology about? • What does science study? • What makes an organism alive? • What are the steps that are necessary for a scientific experiment? • What is the proper procedure for lab? • What materials will be used to perform experiments in the lab?
Content (Subject Matter)	• Safety in the Lab • Setting up a hypothesis • Steps in the Scientific Method • Creating a Theory • Characteristics of Life • Measuring and converting in the metric system • Equipment and methods used in the lab
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories

	• 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. • 5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations. • 5.1.12.C.1: Reflect on and revise understandings as new evidence emerges • 5.1.12.C.2: Use data representations and new models to revise predictions and explanations. • 5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments. • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.1.12.D.3: Demonstrate how to use scientific tools and instruments
Materials and Resources	• Metric Rulers, Yardstick, Water, Dropper, Penny, Paper Plate, Sponge, Marbles, Triple Balance, Graduated Cylinder, Cotton Ball, Straw, Powerpoint projector, overhead projector, Cup, Biology Textbook
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 2: Atoms, Molecules and Chemical Reactions**
Big Idea/Rationale	• All living and nonliving matter on earth is made of an atom. • All life needs water and is made of carbon. • Atoms combine during chemical reactions so they can become more stable.

Enduring Understanding (Mastery Objective)	• SWBAT:
	  ○ Identify matter as being made of atoms
	  ○ Describe how atoms become stable by bonding
	  ○ Illustrate that bonding creates compounds and molecules
	  ○ Draw the molecule of water
	  ○ Describe the fascinating characteristics found in water
	  ○ Analyze how water and other compounds dissociate
	  ○ Explain what organic means in Biology
	  ○ Describe each of the different types of organic molecules
	  ○ Identify that chemical reactions create molecules
	  ○ Describe how enzymes speed chemical reactions

Essential Questions (Instructional Objective)	• What is every living and non-living piece of matter made of? • Why do atoms bond? • What are some examples of chemical bonds? • What is the difference between a chemical and molecular bond? • How is pH measured? • Why does water exhibit such odd characteristics? • What are macromolecules and how are they related to nutrition? • What is a carbohydrate or sugar made of? • What is a lipid made of? • What is a nucleic acid made of? • What is a protein made of? • What is the glycemic index? • What is a chemical reaction? • What happens to energy in a chemical reaction? • How do enzymes work in a reaction and what are they effected by? • Are enzymes and catalysts related?
Content (Subject Matter)	• Atom structure • Ions and Isotopes • Chemical Bonding- ionic and covalent • Molecular Bonding-Van der Waals forces and hydrogen bonds • Polarity-water is an example • Measuring pH • Buffers

	• Macromolecules • Chemical Reactions-endergonic and exergonic • Catalysts-enzymes
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.15.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. • 5.1.12.D.3: Demonstrate how to use scientific tools and instruments • 5.2.12.A.1: Use atomic models to predict the behaviors of atoms in interactions. • 5.2.12.A.2: Account for the differences in the physical properties of solids, liquids, and gases. • 5.2.12.A.3: Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties. • 5.2.12.A.4: Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes. • 5.2.12.A.5: Describe the process by which solutes dissolve in solvents. • 5.2.12.A.6: Relate the pH scale to the concentrations of various acids and bases. • 5.2.12.B.1: Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form • 5.2.12.D.2: Describe the potential commercial applications of exothermic and endothermic reactions. • 5.3.12 A.1: Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models. • 5.3.12.A.2: Demonstrate the properties and functions of enzymes by designing and carrying out an experiment. • 5.3.12.B.2: Use mathematical formulas to justify the concept of an efficient diet.
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 3: Cells and their Internal Structures**
Big Idea/Rationale	• All life is made of the basic unit called a cell • The cell is made up of complex materials that are organized into organelles • Cells use their outside membrane to interact with their environment • Cells combine together to form organs, tissues, organ systems and organisms

Enduring Understanding (Mastery Objective)	• SWBAT:
	  ○ Describe the basic structure of every cell
	  ○ Describe the difference between a prokaryote and eukaryote
	  ○ List and describe each basic cellular structure that is found in the cell
	  ○ Compare the structures and functions of a cell to the structures and functions of a city
	  ○ Compare and contrast the differences between the animal and plant cell
	  ○ Compare and contrast unicelled and multicelled organisms
	  ○ Compare and contrast active and passive transport
	  ○ Describe diffusion, osmosis, facilitated diffusion and active transport
	  ○ Identify the various levels of organization that are found within an organism

Essential Questions (Instructional Objective)	• What is all life made of? • How do cells perform their functions? • What part of the cell is responsible for each function of the cell? • What is the difference between a prokaryotic and eukaryotic cell? • How are animal and plant cells different? • How do small things enter and leave the cell? • How does water move through a cell? • How do large molecules exit and enter the cell? • Does the cell use energy when transporting materials? • How do cells combine together to produce an organism?

Content (Subject Matter)	• Cell Theory
	• Prokaryotes
	• Eukaryotes
	• Cell structures
	  ○ Nucleus
	  ○ Cell wall
	  ○ Cell membrane
	  ○ Cytoskeleton

	○ Organelles of the cytoplasm • Animal cells • Plant cells • Cell Membrane • Lipid Bilayer • Concentration • Diffusion • Selective Permeability • Osmosis • Facilitated Diffusion • Active Transport • Endocytosis • Phagocytosis • Pinocytosis • Exocytosis • Unicellular organism • Multicellular organism • Levels of Organization within an Organism
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. • 5.1.12.A.3 Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence. • 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data • 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories. • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.3.12.A.3: Predict a cell's response in a given set of environmental conditions • 5.3.12.A.4: Distinguish between the processes of cellular growth (cell division) and development (differentiation). • 5.3.12 A.1: Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models. • 5.3.12.A.5: Describe modern applications of the regulation of cell differentiation and analyze the benefits and risks (e.g., stem cells, sex determination). • 5.3.12.A.6: Describe how a disease is the result of a malfunctioning

	system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 4: Photosynthesis**
Big Idea/Rationale	• Plants are autotrophs which means they produce their own organic material for sustenance by performing photosynthesis • ATP is the cell's currency for energy • Much research has been done to acquire the common knowledge that we know today • The chloroplast is the area where photosynthesis occurs • Concentration gradients, powered by sunlight, are used to make energy carriers • Carbon can be fixed in an autotroph without the use of light
Enduring Understanding (Mastery Objective)	• SWBAT o Explain where plants get the energy they need to produce food. o Describe the role of ATP in cellular activities o Explain what the experiments of van Helmont, Priestly and Ingenhousz reveal about what plants use to grow o State the overall equation for photosynthesis o Describe the role of light and chlorophyll in photosynthesis o Describe the structure and function of a chloroplast o Describe what happens in the light-dependent reactions o Explain what the Calvin Cycle is o Identify the factors that affect the rate at which photosynthesis occurs
Essential Questions (Instructional Objective)	• How and where do plants get their energy? • What is needed for photosynthesis to begin? • What does photosynthesis produce or make? • What happens in photosynthesis • What can effect photosynthesis
Content (Subject Matter)	• Energy • Autotroph • Heterotroph • Chemical Energy • ATP • Glucose • Photosynthesis Equation • Makeup of white light • Light absorption • Chlorophyll • Chloroplast o Stroma o Thylakoid

	○ Granum • NADPH • Light-Dependent Reactions • Concentration Gradient • Calvin Cycle • Carbon Fixing
Skills/ Benchmarks (CCSS Standards)	• 5.3.12.B.1: Cite evidence that the transfer and transformation of matter and energy links organisms to one another and to their physical setting. • 5.3.12.B.4: Explain how environmental factors (such as temperature, light intensity, and the amount of water available) can affect photosynthesis as an energy storing process. • 5.3.12.B.3: Predict what would happen to an ecosystem if an energy source was removed • 5.3.12.B.5: Investigate and describe the complementary relationship (cycling of matter and flow of energy) between photosynthesis and cellular respiration.
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 5: Cellular Respiration**
Big Idea/Rationale	• Food's energy is measured in calories or the amount of energy it takes to raise 1 gram of water 1 degree Celsius • NADH is a cofactor in reactions it is used to carry electrons or protons. • Cell respiration is a controlled breakdown of food in the presence of oxygen that provides energy, and water for a cell. Carbon dioxide is released. • Glycolysis is the first step in cell respiration. Its product is pyruvic acid. • Once glycolysis happens the next step is dependent on whether oxygen is present or not. • The pathway that does not use oxygen is called the anaerobic pathway or fermentation. This is where pyruvic acid is turned to either lactic acid or ethyl alcohol. • The pathway that does use oxygen is called the aerobic pathway or cellular respiration. This is where pyruvic acid is harnessed for ATP in the Krebs cycle and the electron transport chain. • Cellular respiration generates a lot of energy in the cell • Exercise affects cellular respiration • Photosynthesis and Cellular Respiration are connected but are essentially opposite reactions.

Enduring Understanding (Mastery Objective)	• SWBAT:
	  ○ Explain what a calorie is and how it relates to what they eat
	  ○ Explain what cellular respiration is
	  ○ Describe what happens during glycolysis
	  ○ Name the two main types of fermentation
	  ○ Describe what happens during the Krebs Cycle
	  ○ Explain how high-energy electrons are used by the electron transport chain
	  ○ Identify three pathways the body uses to release energy during exercise
	  ○ Compare photosynthesis and respiration

Essential Questions (Instructional Objective)	• How do we measure the energy in food? • How are calories related to your health? • How is cellular respiration related to food? • What occurs in cellular respiration? • Does oxygen affect cellular respiration? • How are photosynthesis and respiration similar and different?
Content (Subject Matter)	• Calorie • Glycolysis • Cellular Respiration

	• Fermentation • Krebs Cycle • Electron Transport • Concentration Gradient • Exercise and Cell Respiration • Difference between Cell Respiration and Photosynthesis
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. • 5.1.12.A.3 Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence. • 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.1.12.D.3: Demonstrate how to use scientific tools and instruments • 5.3.12.B.2: Use mathematical formulas to justify the concept of an efficient diet. • 5.3.12.B.1: Cite evidence that the transfer and transformation of matter and energy links organisms to • one another and to their physical setting. • 5.3.12.B.5: Investigate and describe the complementary relationship (cycling of matter and flow of energy) between photosynthesis and cellular respiration. • 5.3.12.B.6: Explain how the process of cellular respiration is similar to the burning of fossil fuels
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 6: Cellular Growth and Division**
Big Idea/Rationale	• Cells grow and this causes a strain on the cell's DNA. The cell begins to be ineffective and inefficient. • As a cell grows its volume increases at a faster rate than its surface area. • Cells divide so they can maintain their efficiency. • Chromosomes are super coiled chromatin. • There are 4 phases found in Mitosis (the division of the nucleus). • During the last phases of Mitosis a process that occurs called Cytokinesis that divides the cytoplasm of the nucleus. • Before Mitosis there is a distinct cell cycle called Interphase. • The cell regulates and controls the process of cell division with cyclins. • Uncontrolled cell growth leads to a disease called cancer.
Enduring Understanding (Mastery Objective)	• SWBAT: o Explain the problem that growth causes for cells. o Describe how cell division solves the problems of cell growth. o Describe the structure of a chromosome. o Name the main events of the cell cycle. o Describe what happens during the four phases of mitosis. o Identify a factor that can stop cells from growing. o Describe how the cell cycle is regulated. o Explain how cancer cells are different from other cells.
Essential Questions (Instructional Objective)	• What causes cells to divide? • What are the steps of cell division? • What does a cell's life look like? • How does the cell controls it's growth? • What is cancer and how does it affect individuals?
Content (Subject Matter)	• Cell Growth • Cell Division • Chromosome • Cell Cycle • Mitosis • Cytokinesis • Regulation of the cell cycle • Stem Cells • Cancer Cells
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.3: Revise predictions and explanations using evidence, and

	connect explanations/arguments to established scientific knowledge, models, and theories • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.3.12.A.3: Predict a cell's response in a given set of environmental conditions • 5.3.12.A.4: Distinguish between the processes of cellular growth (cell division) and development (differentiation).
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 7: DNA and RNA**
Big Idea/Rationale	• Much research has been done to find out about DNA. • DNA makes up our genes and gives us our heredity. • DNA has a basic structure of a phosphate group, with deoxyribose sugar and 4 different kinds of bases (adenine, guanine, cytosine, and thymine). • DNA coils itself with histone proteins and becomes chromosomes. • DNA replicates by opening at the bases and making a new copy from the old copy. • RNA and DNA differ because RNA has a sugar called ribose, thymine is replaced with uracil, RNA is also single stranded. • The three main types of RNA are mRNA, tRNA and rRNA. • DNA sends its message to make a protein by going through the process of transcription. • Transcription is the process where DNA is turned into RNA • Translation is when the cell turns RNA into amino acids with combine to form proteins. • RNA is translated with a set genetic code that is made up of three nucleic bases. • All forms of RNA are involved in translation. mRNA carries the message from DNA. rRNA reads the piece of DNA. tRNA brings the appropriate amino acid to the ribosome. • Mutations are when a DNA's bases are changed. They happen on an individual gene level and a chromosomal level.

Enduring Understanding (Mastery Objective)	• SWBAT:
	  ○ Summarize the relationship between genes and DNA.
	  ○ Describe the overall structure of the DNA molecule.
	  ○ Contrast eukaryotic and prokaryotic DNA
	  ○ Summarize the folding of DNA
	  ○ Summarize the events of DNA replication.
	  ○ Relate the DNA molecule to the chromosome structure.
	  ○ Tell how RNA differs from DNA
	  ○ Name the three main types of RNA
	  ○ Describe transcription and the editing of RNA
	  ○ Identify the genetic code
	  ○ Summarize translation
	  ○ Explain the relationship between genes and proteins
	  ○ Contrast gene mutations and chromosomal mutations

Essential Questions (Instructional Objective)	• How are genes and DNA related? • What does DNA look like? • How does DNA express itself and make us look the way that we do? • How can disease and disorders arise from our DNA?

Content (Subject Matter)	• Heredity • Nucleotide • DNA • Double Helix • Chromosome • Nucleosome • DNA replication • RNA • Transcription • Editing of RNA • Genetic Code • Translation • Genes and protein • Mutations
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories • 5.1.12.C.1: Reflect on and revise understandings as new evidence emerges. • 5.1.12.C.2: Use data representations and new models to revise predictions and explanations. • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experience • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.3.12 A.1: Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models. • 5.3.12.D.1: Explain the value and potential applications of genome projects. • 5.3.12.D.2: Predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, and provide specific real world examples of conditions caused by mutations.
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 8: Meiosis**
Big Idea/Rationale	• Gametes are haploid and are produced in a process called Meiosis • Meiosis is similar to Mitosis

Enduring Understanding (Mastery Objective)	• SWBAT:
	  ○ Contrast the chromosome number of body cells and gametes
	  ○ Summarize the events of meiosis
	  ○ Contrast meiosis and mitosis
	  ○ Describe nondisjunction and its effects on individuals

Essential Questions (Instructional Objective)	• How are sperm and egg cells produced? • How many chromosomes do humans have? • How does that compare to other organisms?
Content (Subject Matter)	• Meiosis I • Crossing Over • Independent Assortment • Meiosis II • Nondisjunction
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. • 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories. • 5.1.12.C.1: Reflect on and revise understandings as new evidence emerges. • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.3.12.A.6: Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).
Materials and	

Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 9: Genetics**
Big Idea/Rationale	• Mendel is the father of genetics • Mendel performed experiments with pea plants that showed basic genetic inheritance • Probability can predict genetic crosses • Genes independently assort from each other • Some genes are inherited in a manner that does not show simple dominance

Enduring Understanding (Mastery Objective)	• SWBAT
	  ○ Describe how Mendel studied the inheritance in peas
	  ○ Summarize Mendel's conclusion about inheritance
	  ○ Explain the principle of dominance
	  ○ Describe what happens during segregation
	  ○ Explain how geneticists use the principles of probability
	  ○ Describe how geneticists use Punnett squares
	  ○ Explain the principle of independent assortment
	  ○ Describe inheritance patterns aside from dominance
	  ○ Explain how Mendel's principles apply to all organisms

Essential Questions (Instructional Objective)	• Who is Mendel and what did he do? • What does it mean when a gene is dominant? • Are all genes inherited in a simple dominant recessive manner?
Content (Subject Matter)	• Mendel's Pea Plant Experiment • Law of Segregation • Law of Independent Assortment • Medelian Genetics • Monohybrid Crosses • Dihybrid Crosses • Non-Mendelian Genetics • Incomplete Dominance • Codominance • Multiple Alleles • Polygenic Traits
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories • 5.3.12.D.1: Explain the value and potential applications of genome

	projects. • 5.3.12.D.3: Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization). • 5.3.12.E.1: Account for the appearance of a novel trait that arose in a given population.
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 10: Human Genetics**
Big Idea/Rationale	• Some genes are more likely to be separated during meiosis than others • Humans have two different kinds of chromosomes • Females form Barr bodies • Sex-Linked disorders follow a different pattern of inheritance than non-linked inheritance • Family inheritance is traced with pedigrees • Mutations affect individuals and can cause disease • Nondisjunction causes human disorders

Enduring Understanding (Mastery Objective)	• SWBAT
	  ○ Identify the types of human chromosomes in a karyotype
	  ○ Explain how sex is determined
	  ○ Explain the process of X-chromosome inactivation
	  ○ Describe some sex-linked disorders and explain why they are more common in males than in females
	  ○ Explain how gene maps are produced
	  ○ Explain how pedigrees are used to study human traits
	  ○ Describe examples of the inheritance in human traits
	  ○ Explain how small changes in DNA cause genetic disorders
	  ○ Identify characteristics of human disorders
	  ○ Summarize nondisjunction and the problems it causes

Essential Questions (Instructional Objective)	• What determines a person's gender? • Can genes separate when they are close together on a chromosome? • Do males and females have different genetics because of their sex chromosomes? • Can we predict the inheritance of genes that are found on the same chromosome? • How can we figure out where genes are found on a chromosome? • Can we trace inheritance in a family to help predict a child's phenotype? • What changes in DNA and chromosomes affect an individual?
Content (Subject Matter)	• Autosome • Sex Chromosome • Barr Body • Linkage • Linkage Maps • Sex-Linked Traits • Pedigrees • Mutation • NonDisjunction

Skills/ Benchmarks (CCSS Standards)	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories • 5.1.12.C.1: Reflect on and revise understandings as new evidence emerges • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences • 5.3.12.A.5: Describe modern applications of the regulation of cell differentiation and analyze the benefits and risks (e.g., stem cells, sex determination). • 5.3.12.A.6: Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance) • 5.3.12.D.2: Predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, and provide specific real world examples of conditions caused by mutations. • 5.3.12.D.3: Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization). • 5.3.12.E.1: Account for the appearance of a novel trait that arose in a given population.
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 11: DNA Technology**
Big Idea/Rationale	• What technology is used to help genetic disorders? • How is DNA analyzed? • How are plants and animals modified? • What is a clone and how is it produced?

Enduring Understanding (Mastery Objective)	• SWBAT
	  ○ State the goal of the Human Genome Project
	  ○ Describe how researcher are attempting to cure genetic disorders
	  ○ Explain how scientists manipulate DNA
	  ○ Summarize methods of human DNA analysis
	  ○ Summarize what happens during transformation
	  ○ Explain how you can tell if a transformation experiment has been successful
	  ○ Describe the usefulness of some transgenic organisms to humans
	  ○ Summarize the main steps in cloning

Essential Questions (Instructional Objective)	• What is a genome? • Do we know the sequence of the human genome? • How do breeders manipulate generations of organisms to produce the best crops, livestock and breeds? • Do breeders do anything else to DNA to manipulate organisms? • What is a DNA fingerprint? • What the steps involved in producing one? • How is a DNA fingerprint used ? • What is transformation? • What vehicle is used to cause transformation? • How do you know if a transformation experiment is successful? • What is a transgenic organism? • How are transgenic organisms useful? • What is gene therapy? • What is cloning?
Content (Subject Matter)	• Detecting Mutated Alleles • Human Genome Project • DNA fingerprinting • PCR • Transgenic Organisms • Gene Therapy • Cloning

Skills/ Benchmarks (CCSS Standards)	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories • 5.1.12.C.1: Reflect on and revise understandings as new evidence emerges. • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams • 5.3.12.D.1: Explain the value and potential applications of genome projects.
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 12: Evolution**
Big Idea/Rationale	• Who developed evolution and what led him to believe in the process? • Are there any other forms of selection that do not occur naturally? • What allows some organisms to adapt better to the environment than others? • What is the mechanism behind evolution? • Is there proof for evolution? • Are there any forms of proof for evolution that were not available for Darwin? • How do you adaptations and traits arise in a population? • Why do some traits vary greatly between individuals while other traits are simply inherited or not? • Does evolution always occur? If not then what limits evolution? • What must occur to allow new species form?
Enduring Understanding (Mastery Objective)	• SWBAT o Describe the voyage of the *Beagle* o Identify Charles Darwin's contribution to science o Describe the pattern Darwin observed among organisms of the Galapagos Islands o Identify the ideas and scientists who influenced Darwin o List events leading to Darwin's publication of On the *Origin of Species* o Describe how natural selection is used in artificial selection o Explain how natural selection is related to species' fitness o Identify evidence Darwin used to present his case for evolution o State Darwin's theory of evolution by natural selection o Explain what a gene pool is o Identify the main sources of inheritable variation in a population o State what determines the number of phenotypes for a given trait o Explain how natural selection affects a single-gene and polygenic genes o Describe genetic drift o List the five conditions needed to maintain genetic equilibrium o Identify the factors involved in the formation of new species o Describe the process of speciation in the Galapagos finches
Essential Questions (Instructional Objective)	• Who is Charles Darwin and what is his contribution to science? • On Darwin's voyage what place influenced and intrigued him the most? • Did anyone influence Charles Darwin? • What is evolution? • How does evolution act on natural variation in a population? • Do we as humans perform our own form of evolution by acting on

	natural variation? • Are heredity and evolution related to each other? • What is a gene pool? • How is variation generated in a population? • Are different forms of genetic inheritance influence by evolution in the same way? • Is there ever a time when a population is not evolving? • How are new species formed? • What mechanisms cause new species to form?
Content (Subject Matter)	• Charles Darwin • *Origin of Species* • Galapagos Islands • Lamarck • Lyell • Malthus • Wallace • Hutton • Evolution • Natural Variation • Artificial Selection • Natural Selection • Survival of the Fittest • Descent with Modification • Fossil • Homologous Structures • Analogous Structures • Vestigial Structures • Embryonic Differences • Gene Pool • Mutations and Genetic Shuffling • Single and Polygenic Traits • Natural selection effect on gene pools • Genetic Drift • Genetic Equilibrium • Speciation • Isolating Mechanisms
Skills/ Benchmarks (CCSS Standards)	• 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. • 5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories • 5.1.12.A.3 Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

	• 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. • 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories • 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools • 5.1.12.C.1: Reflect on and revise understandings as new evidence emerges. • 5.1.12.C.2: Use data representations and new models to revise predictions and explanations • 5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments • 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. • 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams. • 5.3.12.B.1: Cite evidence that the transfer and transformation of matter and energy links organisms to one another and to their physical setting. • 5.3.12.C.2: Model how natural and human-made changes in the environment will affect individual organisms and the dynamics of populations • 5.3.12.D.3: Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization). • 5.3.12.E.2: Estimate how closely related species are, based on scientific evidence (e.g., anatomical similarities, similarities of DNA base and/or amino acid sequence) • 5.3.12.E.1: Account for the appearance of a novel trait that arose in a given population. • 5.3.12.E.4: Account for the evolution of a species by citing specific evidence of biological mechanisms • 5.3.12.E.3: Provide a scientific explanation for the history of life on Earth using scientific evidence (e.g., fossil record, DNA, protein structures, etc.).
Materials and Resources	
Notes	

Grade: 10 and 11 **Subject:** Biology I CP	**Unit 13: Systems/Classifications/Frog Dissections**
Big Idea/Rationale	• What does each body system do and what would happen if that body system failed to work? • Is all life classified in a scientific way? • What are some characteristics that scientists look at while they are putting organisms into taxons? • What type of existence does an amphibian have?
Enduring Understanding (Mastery Objective)	• SWBAT research one body system to find out the following: o Describe the function of the body system o Identify the organs or structures that make up the body system o Illustrate the processes that happen within the body system o List disorders and diseases associated with the body system o Identify interesting facts about the body system • SWBAT o Explain how living things are organized for study o Describe binomial nomenclature o Explain Linnaeus's system of classification o Name the six kingdoms as they are now identified o Describe the three-domain system of classification o Describe what an amphibian is o Explain how amphibians are adapted for life on land o Describe essential life functions in amphibians
Essential Questions (Instructional Objective)	• What is the function of the body system? • What organs or structures are found in the body system? • Why is the body system necessary? • What would happen if there was a problem with your body system? • Is there anything interesting and surprising about your body system? • How do we organize all life on Earth? • How do we name organisms in a scientific manner? • Who is Linnaeus and what did he do? • What are the levels of classification of organisms? • What are the current kingdoms that are used today? • What is the domain naming system • What is an amphibian? • What are some characteristics that enable amphibians to be successful?
Content (Subject Matter)	• Body System • Functions • Organs/Structures • Facts about Body Systems

	• Taxonomy • Binomial Nomenclature • Linnaeus • Kingdom • Phylum • Class • Order • Family • Genus • Species • Archeabacteria • Bacteria • Eubacteria • Protista • Fungi • Plantae • Animalia • Eukarya • Domain • Amphibian • Cloaca • Nictating Membrane • Tympanic Membrane
Skills/ Benchmarks (CCSS Standards)	5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data. 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. 5.1.12.C.1: Reflect on and revise understandings as new evidence emerges. 5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. 5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams 5.1.12.D.3: Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
Materials and Resources	
Notes	