Pasadena Unified School District

Secondary Curriculum Revision Workshop

COURSE-AT-A-GLANCE

Course Title: _____ Grade Span: _____

Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Standard 1: Cell Biology	**Cell Biology 1 c, d, f and h** c. Students know how prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure. d. Students know the central dogma of molecular biology outlines the flow of information from transcription of ribonucleic acid (RNA) in the nucleus to translation of proteins on ribosomes in the cytoplasm. f. Students know usable energy is captured from sunlight by chloroplasts and is stored through the synthesis of sugar from carbon dioxide. h. Students know most macromolecules (polysaccharides, nucleic acids,	*As a result of this unit, students will know…* • The processes of transcription and translation • How energy is captured and stored • How various macromolecules are synthesized and secreted. • How the cell works to regulate cell processes. • How reactions are catalyzed. • How altering the cell's environment affects homeostasis **Key Vocabulary** • Prokaryotic cells • Eukaryotic cells • Viruses • RNA • Nucleus • Protein • Ribosomes • Cytoplasm • Sunlight • Chloroplast • Sugar • Carbon dioxide • Macromolecules	*As a result of this unit, students will be able to…* • Understand how cell structure relates to cell function. • Understand how each of the different macromolecules are important for life processes. • Generate questions that can be explored through scientific investigation. • Understand how energy flows through living systems. • Distinguish between the structure and function of DNA, RNA and protein. • Differentiate between prokaryotic vs. eukaryotic and animal vs. plant cells.	

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Standard 1: Cell Biology	proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors. **Supporting Standards** a. Students know cells are enclosed within semi-permeable membranes that regulate their interaction with their surroundings. b. Students know enzymes are proteins that catalyze biochemical reactions without altering the reaction equilibrium and the activities of enzymes depend on the temperature, ionic conditions, and the pH of the surroundings. e. Students know the role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins.	(polysaccharides, nucleic acids, proteins, lipids) • Cells • Organisms • Membranes • Enzymes • Biochemical reactions • Temperature • Ionic • pH • endoplasmic reticulum • Golgi apparatus **Key Labs** • Catalase/Enzyme Lab (O_2) • Photosynthesis Lab (spinach leaves, O_2) • Cellular Respiration Lab (CO_2)		

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Standard 2: Mendelian Genetics	**Genetic Standards 2 a, b and g** 2a. Meiosis and sexual reproduction, including types of cells that undergo meiosis. 2g. Punnett squares and genetic probabilities. 2b. Understand and be able to apply Mendel's laws of segregation and independent assortment. **Supporting Standards** b. Students know only certain cells in a multicellular organism undergo meiosis. c. Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete. d. Students know new combinations of alleles may be generated in a zygote through the	*As a result of this unit, students will know…* ***Key Vocabulary – Mendelian Genetics*** • Mendelian laws • Meiosis • Sexual reproduction (meiosis) • Recombination • Genetic variation • Predicting possible genetic outcomes • Pedigree analysis • Reproduction • Segregate (segregation) • Division • Probability • Fusion • Fertilization • Crossing-over • Chromosomes • Gametes • Alleles • Dominant • Recessive • Homozygous • Heterozygous • Codominance • Incomplete dominance	*As a result of this unit, students will be able to…* • Identify the differences between the various inheritance patterns. • Know how traits are inherited from one generation to the next. • Determine the probability of inheritance of specific traits using Punnett squares. • Apply Mendel's laws of inheritance. • Analyze, determine and predict the inheritance patterns (sex-linked or autosomal) of a trait using a pedigree diagram.	

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Standard 2: Mendelian Genetics	fusion of male and female gametes (fertilization). e. Students know why approximately half of an individual's DNA sequence comes from each parent. f. Students know the role of chromosomes in determining an individual's *sex*.	• Sex-linked inheritance (X-linked inheritance) • Phenotype • Genotype • Zygote • Test-cross • True-breeding • Hybrid • Homologous chromosomes • Sister chromatids • Centromere • Genes • Punnett squares • Monohybrid • Dihybrid • Parental generation • First filial (F1) • Second filial (F2) • Pollination (cross-pollination) • Mendel's Laws • Independent Assortment **Key Labs** • Drosophila Lab		

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Standards 4 and 5: Molecular Genetics and Biotechnology	4c. Students know how mutations in the DNA sequence of a gene may or may not affect the expression of the gene or the sequence of amino acids in an encoded protein. 4e. Students know proteins can differ from one another in the number and sequence of amino acids. 5a.Students know the general structures and functions of DNA, RNA, and protein. 5c.Students know how genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products. **Supporting Standards** 3a. Students know how to predict	*As a result of this unit, students will know…* • Structure and function of DNA, RNA, amino acids • How the process of DNA replication is semi-conservative. • Role of transcription and translation in the process of determining the amino acid sequence. • Role of amino acids in protein synthesis DNA replication. • How mutations lead to genetic recombination. • How the process of gene expression leads to an organism's phenotype. • How DNA technology is used and applied in the biomedical and	*As a result of this unit, students will be able to…* • Appreciate the importance of the discovery of DNA as the genetic material. • Understand the process of DNA replication, transcription, and translation. • Understand and appreciate the value in the discovery of the structure and function of a molecule of DNA. • Understand how DNA influences heredity. • Explain the role of the various forms of RNA in protein synthesis. • Relate how the environment can influence the physical expression of genetic traits. • The role that DNA technology currently in our society.	

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Standards 4 and 5: Molecular Biology and Biotechnology	the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive). 3c. * Students know how to predict the probable mode of inheritance from a pedigree diagram showing phenotypes. 4a. Students know the general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA. 4b. Students know how to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA. 5b. Students know how to apply base-pairing rules to explain	environmental fields. • Know how the various processes and procedures used in the field of biotechnology (gel electrophoresis, transformation, ligation, restriction enzyme analysis). Understand the impact of bioengineering (positive and negative) on the environment, biomedical field and ethics. **Key Vocabulary** • Mutations • Codons • Anticodons • DNA construct • Recombinant DNA molecules • Transcription • Translation • Genetic coding rules • Base-pairing rules • Semi-conservative • Restriction enzymes (endonucleases) • Restriction enzyme	• Understand the positive and negative consequences of DNA technology and its products. • Understand how mutations provide new genetic combinations. • Understand the connection between DNA, genetics, heredity and evolution.	

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Standards 4 and 5: Molecular Biology and Biotechnology	precise copying of DNA during semi conservative replication and transcription of information from DNA into mRNA. 5d. *Students know how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, ligation, and transformation) is used to construct recombinant DNA molecules. 5e. *Students know how exogenous DNA can be inserted into bacterial cells to alter their genetic makeup and support expression of new protein products.	digestion (and analysis) • Gel electrophoresis (gel electrophoresis, transformation, ligation, restriction enzyme analysis). **Key Labs** • DNA Extraction • Amgen Biotechnology Kit (Restriction Enzyme Analysis and Electrophoresis)		

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Standards 7 and 8: Evolution and Populations	7a. Students know why natural selection acts on the phenotype rather than the genotype of an organism. 7d. Students know variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions. 7f. * Students know how to solve the Hardy-Weinberg equation to predict the frequency of genotypes in a population, given the frequency of phenotypes. 8a. Students know how natural selection determines the differential survival of groups of organisms.	*As a result of this unit, students will know…* • Natural selection favors organisms that are better suited to survive in an environment. • Populations can change over time as a result of natural selection. • Diversity is generated in a gene pool through mutations. • Lethal alleles are maintained in a gene pool by carriers. • Diversity increases the chances of a population and community survival. **Key Vocabulary** • Lethal • Mutation • Reproductive isolation • Geographic isolation • Speciation • Extinction • Natural selection • Phenotype	*As a result of this unit, students will be able to…* • Students will understand the role that evolution plays in the organization of living things. • Students will understand how the process of evolution drives diversity and the unity of life and how life evolves in changing environments. • Students will know how to evaluate data-based evidence that describes evolutionary changes in the genetic makeup of a population over time. • Students will be able to make predictions about the effects of genetic drift, migration, and artificial selection on the genetic makeup of a population. • Students will apply mathematical methods to data from a real or simulated	

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Standards 7 and 8: Evolutions and Populations	**Supporting Standards** 7b. Students know why alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool. 7c. Students know new mutations are constantly being generated in a gene pool. 7e. *Students know the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. 8b. Students know a great diversity of species increases the chance that at least some organisms survive major changes in the environment.	• Genotype • Organism • Variation • Species • Hardy-Weinberg Principle • Population • Alleles • Gene pool • Environment • Diversity • Genetic drift • Episodic • Comparative embryology • Evolutionary relationships • Diversity • Genetic drift • Episodic • Comparative embryology • DNA • Protein sequence • Cladogram • Evolutionary relationships **Key Labs** • Population Genetics (Hardy-Weinberg)	population to predict what will happen to the population in the future. • Students will use evidence to justify a claim that a variety of phenotypic responses to a single environmental factor can result from different genotypes within the population. • Students will use theories and models to make scientific claims and/or predictions about the effects of variation within populations on survival and fitness.	

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Standards 7 and 8: Evolution and Populations	8c. Students know the effects of genetic drift on the diversity of organisms in a population. 8d. Students know reproductive or geographic isolation affects speciation. 8e. Students know how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction. 8f. * Students know how to use comparative embryology, DNA or protein sequence comparisons, and other independent sources of data to create a branching diagram (cladogram) that shows probable evolutionary relationships.			

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Standard 6: Ecology	6a. Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats. 6d. Students know how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration. **Supporting Standards** 6b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size. 6c. Students know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and	*As a result of this unit, students will know…* • How distinguish between abiotic and biotic factors in an ecosystem. • Trace the flow energy through living systems. • Describe how nutrients move through living and nonliving parts of an ecosystem. • Analyze how rates of birth, immigration, emigration, and death affect population growth. • Explain how climate, human activity, non-native species or changes in population size affect an ecosystem. **Key Vocabulary** • Alterations • Cycle • Photosynthesis • Respiration • Analyze • Fluctuation • Immigration • Emigration • Dissipated	*As a result of this unit, students will be able to…* • Students will know how interactions between and within populations influence patterns of species distribution and abundance of local and global ecosystems changes over time. • Students will understand how the diversity of a species within an ecosystem influences the stability of the ecosystem. • Students will know different ways in which communities of organisms interact within their environment. • Students will understand the factors that govern energy capture, allocation, storage, and transfer between producers and consumers in a terrestrial ecosystem. Students will understand the	

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Standard 6: Ecology	death. 6e. Students know a vital part of an ecosystem is the stability of its producers and decomposers. 6f.Students know at each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid.	• Biodiversity • Organism • Habitat • Water cycle • Carbon cycle • Nitrogen cycle • Abiotic • Organic matter • Ecosystem • Climate • Human activity • Non-native species • Population size • Relative rates • Vital • Ecosystem • Producers • Decomposers • Link • Food web • Energy • Structures • Environment • Energy pyramid **Key Labs** • Acid Rain (pH Lab)	consequences of human actions on both local and global ecosystems.	

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Standards 9 and 10: Human Physiology	9a. Students know how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide. 9d. Students know the functions of the nervous system and the role of neurons in transmitting electrochemical impulses. 10d. Students know there are important differences between bacteria and viruses with respect to their requirements for growth and replication, the body's primary defenses against bacterial and viral infections, and effective treatments of these infections. 10e. Students know why an individual with a compromised	*As a result of this unit, students will know…* • Structure and function of the following major organ systems: circulatory, respiratory, digestive, excretory, nervous, endocrine, immune • How body systems work together to maintain homeostasis • Difference between central and peripheral nervous system • Roles of sensory neurons, interneurons, and motor neurons • Structure and function of hormones • Purpose of negative and positive feedback loops • Difference between non-specific and specific immune defenses • Roles of phagocytes, B-lymphocytes, and T-lymphocytes in immune system • Effect of HIV/AIDS on immune responses	*As a result of this unit, students will be able to…* • Identify levels of structural organization in the human body. • Analyze how the human body maintains homeostasis despite changes in the outside environment through the function of major organ systems. • Synthesize how the circulatory and respiratory systems work together to supply oxygen to and remove carbon dioxide from the body. • Synthesize how the digestive, circulatory, and excretory systems work together to supply the body with nutrients and energy and remove waste products. • Differentiate between positive	

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Standards 9 and 10: Human Physiology	immune system (for example, a person with AIDS) may be unable to fight off and survive infections by microorganisms that are usually benign. **Supporting Standards** 9b. Students know how the nervous system mediates communication between different parts of the body and the body's interactions with the environment. 9c. Students know how feedback loops in the nervous and endocrine systems regulate conditions in the body. 9e. Students know the roles of sensory neurons, interneurons, and motor neurons in sensation, thought, and response. 9i. * Students know how hormones (including digestive,	***Key Vocabulary:*** • Body systems • Nervous system • Endocrine system • Immune system • Circulatory system • Respiratory system • Digestive system • Excretory system • Homeostasis • Oxygen • Nutrients • Toxic waste products • Carbon dioxide • Neurons • Electrochemical impulse • Bacteria • Virus • Growth • Replication • Primary defense • Infection • Treatment • Compromised immune system • AIDS • Microorganism • Mediating communication • Feedback loop	and negative feedback loops and their effects on the human body. • Explain how the nervous system transmits different types of message and the specific roles of sensory neurons, interneurons, and motor neurons. • Explain how the human body responds to pathogens through non-specific and specific defenses within the immune system. • Differentiate between the structure, growth, and replication of bacteria and viruses and defenses against them (vaccines, antibiotics)	

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Standards 9 and 10: Human Physiology	reproductive, osmoregulatory) provide internal feedback mechanisms for homeostasis at the cellular level and in whole organisms. 10a. Students know the role of the skin in providing nonspecific defenses against infection. 10b. Students know the role of antibodies in the body's response to infection. 10c. Students know how vaccination protects an individual from infectious diseases. 10f. * Students know the roles of phagocytes, B-lymphocytes, and T-lymphocytes in the immune system.	• Sensory neuron • Interneuron • Motor neuron • Skin • Non-specific defense • Antibodies • Vaccination • Pathogen • Infectious disease • Phagocyte • B-lymphocyte • T-lymphocyte **Key Labs** • Neuroscience Simulation • Food Energy Lab		

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Health Education	• Sexually transmitted diseases (STDs) and Reproductive Heath • HIV/AIDS Education	As a result of this unit, students will know… • Understand their developing sexuality, will choose to abstain from sexual activity, will learn about protecting their sexual health, and will treat the sexuality of others with respect.	As a result of this unit, students will be able to… • Use good judgment to recognize and avoid situations that could lead to subsequent sexual activity. • Avoid, recognize, and respond to negative social influences and pressure to become sexually active. • Demonstrate assertiveness and refusal skills and apply those skills to situations involving pressure to be sexually active. • Practice behaviors that support the decision to abstain from sexual activity. • Analyze messages about sexuality from society, including the media, and identify how those messages affect behavior. • Develop and use effective communication skills, including the ability to discuss with	

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			parents questions on sexuality. • Identify appropriate ways to show affection. • Identify ways to seek assistance if abused. • Evaluate what students can do to counteract the false norms portrayed in the media. • Receive and understand statistics based on the latest medical information citing the failure and success rates of condoms and other contraceptives in preventing pregnancy and sexually transmitted diseases.	

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Health Education	• Tobacco, Drugs, and Alcohol Prevention	As a result of this unit, students will know… • Students will practice behaviors that reduce the risk of becoming involved in potentially dangerous situations and react to potentially dangerous situations in ways that help protect their health. **Key Labs** • Daphnia Lab • Acids/Base Lab (Buffers)** **Transition into chemistry lab	As a result of this unit, students will be able to… • Exercise self-control. • Develop and use interpersonal and communication skills such as assertiveness, refusal, negotiation, and conflict resolution. • Avoid, recognize, and respond to negative social influences and pressure to use alcohol, tobacco, or other drugs. • Use positive peer pressure to help counteract the negative effects of living in an environment where alcohol, tobacco, or other drug abuse or dependency exists. • Identify ways of obtaining help to resist pressure to use alcohol, tobacco, or other drugs. • Distinguish between helpful and harmful substances. • Differentiate between the use and misuse of prescription and nonprescription drugs. • Identify and participate in positive alternative activities,	

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Health Education			such as alcohol-, tobacco-, and drug-free events. • Help to develop and support the school's no-use policy and work to support it.	

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Unit Topic	Priority Standards	Key Knowledge	Key Skills	Approximate Dates
Health Education	• Violence Prevention	As a result of this unit, students will know… • Students will practice behaviors that reduce the risk of becoming involved in potentially dangerous situations and react to potentially dangerous situations in ways that help protect their health.	As a result of this unit, students will be able to…. • Develop and use skills to identify, avoid, and cope with potentially dangerous situations. • Use skills to avoid, resolve, and cope with conflicts. • Understand and follow rules prohibiting possession of weapons at school. • Identify factors that reduce risks of accidents. • Recognize that the use of alcohol, tobacco, and other drugs plays a role in many dangerous situations. • Use thinking and decision-making skills in high-risk situations involving motor vehicles and other safety hazards. • Practice safe behavior in or near motorized vehicles, including observing basic traffic safety rules when driving,	

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			developing proficiency in handling a vehicle in difficult situations, wearing a seat belt, and ensuring that others wear seat belts. • Carry appropriate emergency equipment and use latex gloves when assisting individuals who are injured. • Practice safe behavior in recreational activities, even in the absence of adults. • Practice safe behavior in and near water. • Report or obtain assistance when faced with unsafe situations. • Identify environmental factors that affect health and safety. • Demonstrate how peers can help each other avoid and cope with potentially dangerous situations in healthy ways.	