Biology – Advanced Academic Course (AAC)
Overview
2025 – 2026

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. This document supports families in understanding the learning goals for the course, and how students will demonstrate what they know and are able to do. The overview offers suggestions or possibilities to reinforce learning at home.

Included at the end of this document, you will find:

- A glossary of curriculum components
- The content area instructional model
- Parent resources for this content area

To advance to a particular grading period, click on a link below.

The process standards describe ways in which students are expected to engage in the content. The Scientific and Engineering Practices (SEPs) describe practices that students need to do in the classroom in order to learn the content. The Recurring Themes and Concepts (RTCs) describe how students need to think about the content in order to learn it.

Scientific and Engineering Practices

B.1A ask questions and define problems based on observations or information from text, phenomena, models, or investigations

B1.B use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems

B.1C use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency approved safety standards

B.1D use appropriate tools such as microscopes, slides, Petri dishes, laboratory glassware, metric rulers, digital balances, pipets, filter paper, micropipettes, gel electrophoresis and polymerase chain reaction (PCR) apparatuses, microcentrifuges, water baths, incubators, thermometers, hot plates, data collection probes, test tube holders, lab notebooks or journals, hand lenses, and models, diagrams, or samples of biological specimens or structures

B.1E collect quantitative data using the International System of Units (SI) and qualitative data as evidence

B.1F organize quantitative and qualitative data using scatter plots, line graphs, bar graphs, charts, data tables, digital tools, diagrams, scientific drawings, and student-prepared models

B.1G develop and use models to represent phenomena, systems, processes, or solutions to engineering problems

B.1H distinguish among scientific hypotheses, theories, and laws

B.2A identify advantages and limitations of models such as their size, scale, properties, and material

B.2B analyze data by identifying significant statistical features, patterns, sources of error, and limitations

B.2C use mathematical calculations to assess quantitative relationships in data

B.2D evaluate experimental and engineering designs

B.3A develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories

B.3B communicate explanations and solutions individually and collaboratively in a variety of settings and formats

B.3C engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence

B.4A analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student
B.4B relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content
B.4C research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers

Recurring Themes and Concepts
Patterns
Systems and System Models
Cause and Effect

Grading Period 1

Unit 1: Biomolecules and Cells

Estimated Date Range: August 12 – September 18 (27 total school days)
Instructional & Re-engagement Days in Unit: 26 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window:
N/A	N/A	Unit 1, Concept 2 (1 day) **Sept. 3 – Sept. 9**

Unit Overview:
This unit explores the fundamental building blocks of life and cellular processes. Students will begin by examining the structure and function of key biomolecules, including carbohydrates, lipids, proteins, and nucleic acids. They will then investigate the organization and components of cells, comparing prokaryotic and eukaryotic cells. The unit will cover cell membrane structure and various mechanisms of cellular transport, including diffusion, osmosis, and active transport. Students will also study energy conversion in cells, focusing on photosynthesis and cellular respiration. Throughout the unit, students will engage in laboratory activities, data analysis, and scientific modeling to reinforce their understanding of these core biological concepts. By the end of the unit, students should be able to explain how the structure of biomolecules relates to their functions, describe cellular organization and transport processes, and understand how cells capture, store, and use energy to sustain life **.**

At home connections:
Biomolecules and Cells

- Food Analysis Activity: Have students examine nutrition labels on various food items at home to identify carbohydrates, proteins, and fats. Create a chart comparing the biomolecule content of different foods.
- Biomolecule Modeling: Use household items like marshmallows, toothpicks, or modeling clay to build 3D models of carbohydrates, lipids, proteins, and nucleic acids.
- Cell Membrane Simulation: Create a model of the cell membrane using household materials like plastic wrap, cooking oil, and water to demonstrate its phospholipid bilayer structure.

Cell Transport

- Egg Osmosis Experiment: Place a raw egg in vinegar to dissolve the shell, then observe how it changes size in different solutions (water, salt water, corn syrup) to demonstrate osmosis.
- Potato Osmosis: Cut potato slices and place them in different concentrations of salt water. Observe how they change in firmness/flexibility to show osmosis effects.
- Tea Bag Diffusion: Place a tea bag in hot water and observe how the color spreads, demonstrating diffusion of particles.

Energy Conversions in Cells

- ATP Energy Model: Use paper clips or beads to represent phosphate groups and demonstrate ATP synthesis and breakdown.
- Mitochondria Model: Create a 3D model of a mitochondrion using clay or craft materials to visualize the site of cellular respiration.
- Energy Transfer Diagram: Create a visual representation of energy flow from the sun through photosynthesis to cellular respiration.

Concepts within Unit #1 Link to HS Science TEKS	**Success Criteria for this concept** *Students will…*
Concept #1: Safety (ongoing; embedded throughout the course) B.1A, B.1B, B.1G, B.2A, and B.3A	• Identify the safety equipment in the classroom. • Explain how and when to use the safety equipment in the classroom • Explain the procedures for an injury • Explain the procedures for broken glass/equipment
Concept #2: Biomolecules and Cells B.5A, B.5B **CFA B.5B** **Sept. 3 – Sept. 9**	• List the hierarchy of cell specialization (cell → tissue → organ → organ system → organism) • Recognize the difference in plant and animal cells • Explain the specific functions of each type of biomolecule within the context of cellular activities • Understand that carbohydrates are made of subunits • Understand how the structure of each biomolecule relates to its function • Explain the significance of starch, glycogen, cellulose, and glucose in living things • Construct physical models or utilize digital tools to represent the molecular structures of carbohydrates, lipids, proteins, and nucleic acids
Concept #3: Cellular Processes B.5C, B.11B	• Identify examples of active and passive transport • Demonstrate an understanding of the different types of cellular transport mechanisms, including passive diffusion, facilitated diffusion, active transport, and endocytosis/exocytosis. • Explain how cellular transport contributes to maintaining homeostasis in the body. • Demonstrate critical thinking skills by evaluating experimental results, identifying sources of error, and proposing improvements to experimental design
Concept #4: Energy Conversions in Cells	• Accurately write the balanced chemical equations for photosynthesis and cellular respiration, including the reactants and products involved in each process.

B.11A	• Create models that illustrate the key steps and components of photosynthesis and cellular respiration, such as diagrams, flowcharts, or physical models. • Explain how matter is conserved during photosynthesis and cellular respiration by tracing the movement of atoms through the chemical reactions involved. • Compare and contrast the processes of photosynthesis and cellular respiration in terms of their inputs, outputs, and energy transformations. • Apply the understanding of photosynthesis and cellular respiration to explain how these processes support life on Earth, including their roles in producing oxygen, capturing carbon dioxide, and providing energy for cellular activities

Unit 2: Nucleic Acids and Protein Synthesis
Estimated Date Range: September 10 – October 9
Estimated Time Frame: 20 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window:
N/A	NWEA MAP Growth Biology (9/16 – 9/18)	Unit 2, Concept 1 (1 day) **Oct. 3 – Oct. 9**

Unit Overview:
This unit explores the structure and function of nucleic acids (DNA and RNA) and the process of protein synthesis. Students will examine the molecular structure of DNA and RNA, including their nucleotide components and the double helix model. The unit will cover DNA replication, the central dogma of molecular biology, and the steps of transcription and translation. Students will learn about the genetic code, codons, and how the sequence of nucleotides in DNA determines the amino acid sequence of proteins. The unit will also introduce concepts of gene regulation and mutations. Through laboratory activities, models, and data analysis, students will gain a deeper understanding of how genetic information is stored, transmitted, and expressed in cells. By the end of the unit, students should be able to explain the relationship between DNA, RNA, and proteins, and understand the fundamental processes that allow cells to produce the proteins necessary for life.

At Home Connections:

- **Protein from Genes to Meals**: Ask students to choose a meal they ate and research the proteins in it (e.g., chicken = actin/myosin; beans = enzymes). This activity reinforces the idea that proteins come from genes and play essential roles in the foods we eat.
- **Traits in the Family**: Have students ask family members about inherited traits (e.g., eye color, dimples, ability to roll tongue). This activity demonstrates how DNA and gene expression influence physical traits.
- **Protein Synthesis Song or Skit**: Create a fun song, rap, or short skit about transcription and translation. Helps reinforce steps of protein synthesis through creativity and repetition.
- **Genetic Diseases and Real-World Impact:** Research a genetic disorder (e.g., sickle cell anemia, cystic fibrosis) and how a single gene mutation affects protein structure/function. Shows how small changes in DNA lead to big effects in the body.
- **Media Watch: DNA & Genetics in Pop Culture:** Watch a movie or show that features DNA/genetics (e.g., *GATTACA*, *Jurassic Park*) and discuss what's real vs. fiction.

Concepts within Unit #2 Link to HS Science TEKS	Success Criteria for this concept *Students will…*
Concept #1: DNA, RNA, and Protein Synthesis B.7A, B.7C	• Understand the components of DNA, including nucleotides, sugar-phosphate backbones, and nitrogenous bases. • State the molecules in a DNA nucleotide and identify them in a diagram • State the molecules in an RNA nucleotide and identify them in a diagram

CFA B.7C **Oct. 3 – Oct. 9**	• Explain and demonstrate the processes of transcription and translation by using a model • Transcribe a strand of mRNA when given a strand of DNA, using base pairing rules • Describe the base pairing rules for DNA bases • Describe the stages of DNA replication • Describe the role of hydrogen bonds in the DNA structure • Describe the role of hydrogen bonds in the DNA structure
Concept #2: Gene Expression B.7B	• Explain the mechanism by which different proteins can be expressed from one gene • Define a gene mutation • Describe two possible effects of nucleotide insertions and deletions • Articulate the importance of gene expression in cellular function, development, and response to environmental stimuli. • Understand that gene expression involves the transcription of DNA into RNA and the translation of RNA into proteins, and the student can explain how these processes enable cells to synthesize the proteins needed for various biological functions. • Recognize that gene expression is regulated to ensure that genes are activated or repressed in specific cell types, at developmental stages, or in response to internal and external signals.

Grading Period 2

Unit 3: Cell Cycle

Estimated Date Range: October 21 – November 17 (20 total school days)
Instructional & Re-engagement Days in Unit: 19 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window:
N/A	N/A	Unit 3, Concept 2 (1 day) **Nov. 17 – Nov. 21**

Unit Overview:

This unit explores the cell cycle, a fundamental process in the growth, development, and reproduction of living organisms. Students will examine the stages of the cell cycle, including interphase (G1, S, and G2 phases) and mitosis (prophase, metaphase, anaphase, and telophase), as well as cytokinesis. The unit will cover the regulation of the cell cycle, including checkpoints and the role of cyclins and cyclin-dependent kinases. Students will also learn about cell differentiation and the importance of stem cells. The unit will address abnormalities in the cell cycle, such as cancer, and explore current research in cell biology. Through microscopy observations, modeling activities, and data analysis, students will gain a deeper understanding of how cells divide and maintain genetic stability. By the end of the unit, students should be able to explain the stages of the cell cycle, describe the mechanisms that regulate cell division, and understand the implications of cell cycle disruptions in various diseases.

At home connections:

Cell Growth

- Students can explore cell growth through various hands-on activities at home. They can observe cell growth directly by cultivating yeast cells in different sugar solutions and measuring population changes over time. To visualize the concept of surface area to volume ratio, which limits cell size, students can create models using different sized cubes or spheres made from clay or household materials. They can also conduct a simple experiment using agar cubes of different sizes soaked in colored water to demonstrate how larger cells have difficulty absorbing materials efficiently. To understand factors affecting cell growth, students can research and discuss how common household items like antibacterial soaps or fertilizers impact cell growth. Additionally, they can use online simulations to manipulate cell growth parameters and observe the outcomes. These activities can help reinforce classroom learning about cell growth limitations, factors influencing cell size, and the importance of cell division in multicellular organisms.

Disruptions to the Cell Cycle

- Students can explore disruptions to the cell cycle through various activities at home. They can research and create informational posters or digital presentations on different types of cancer, highlighting how these diseases result from cell cycle dysregulation. To visualize the concept of uncontrolled cell division, students can use modeling clay or paper cutouts to demonstrate normal cell growth versus cancerous growth. They can conduct a simple experiment using yeast cells exposed to different household substances (e.g., caffeine, alcohol) to observe how these might affect cell division rates. Students can also analyze and graph real cancer statistics from reputable online sources to understand the prevalence and impact of cell cycle disruptions. Additionally, they can create analogy games or storyboards that illustrate how mutations in genes controlling the cell cycle can lead to diseases. These activities can help reinforce classroom learning about the

importance of proper cell cycle regulation and the consequences of its disruption, making abstract concepts more tangible and relatable to students' lives	
Concepts within Unit # 3 Link to HS Science TEKS	**Success criteria for this concept** *Students will…*
Concept #1: Cell Growth B.6A, B.6B	• Use a model or graphic organizer to identify the stages of the cells cycle • Explain what is happening during each state of the cell cycle & mitosis • Plan and carry out an investigation that will conclude with a drawing of the stages of mitosis and DNA replication • Ask questions to understand the underlying mechanisms of the cell cycle • Plan and carry out investigations that uses microscopes to visualize different stages of the cell cycle • Construct an explanation that identifies known or observed patterns of the behavior of chromosomes during mitosis and how the cytoplasmic reticulum divides during cytokinesis • Explain when and why DNA replication must occur, and model DNA replication through base pairing • Develop or use a model to describe and explain the structure of DNA as a double helix • Use models to identify and describe the three parts of a nucleotide (sugar, phosphate group, nitrogenous base), and explain the patterns expressed in base pairing • Compare processes of DNA replication and cell division in prokaryotes to determine how the system benefits the formation of new organisms. • Compare processes of DNA replication and cell division in eukaryotes to determine how the system benefits the formation of new organisms.
Concept #2: Disruptions to the Cell Cycle B.6A, B.8A **CFA B.6C** **Nov. 17 – Nov. 21**	**Disruptions to the cell cycle** • Construct an explanation that includes cells differentiate because specific genes are activated during embryonic development which leads to cell types with specialized functions. • Identify and describe the causes of disruptions in the cell cycle including genetic mutations and environmental factors • Use a model or drawing to provide an explanation for how unregulated cell division leads to cancer. • Understand that some genes are always “on” and being expressed, and others are only “on” and being expressed some of the time.

	• Construct an explanation that outlines the normal stages of the cell cycle and explain how disruptions in this process can lead to uncontrolled cell growth and the development of cancer • Communicate understanding of the relationship between disruptions in the cell cycle and cancer development in a clear and organized manner using appropriate scientific terminology **Viruses** • Ask questions about the structure of viruses and cells such as "How do the sizes of viruses and cell compare? Or "What is the function of the envelope on some viruses"? • Use models and construct an explanation to describe the basic structure of viruses, including their genetic material, protein coat, and other structures • Plan and carry out investigations to determine how the structure of viruses and cells are related to their functions, such as how viruses use their structures to infect host cells, or how the structures of cell support their metabolic processes • Construct an explanation for how viruses and cells operate as systems, with various components working together to achieve a particular function • Investigate patterns in the structures of viruses and cells, such as the recurring shapes and structures that are found across different types of viruses or cells • Analyze data related to viral outbreaks and epidemics, and explain how factors such as population density, travel patterns, and vaccination rates can influence the spread of a disease

Unit 4: Genetic Diversity

Estimated Date Range: November 18 – December 19 (19 total school days)
Instructional & Re-engagement Days in Unit: 11 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window:	Final Exam Review: / Final Exam Schedule:
N/A	**N/A**	N/A	Dec. 10 – 15 Dec. 16 - 19

Unit Overview:

This unit explores the concept of genetic diversity and its importance in biological systems. Students will examine the sources of genetic variation, including mutations, sexual reproduction, and genetic recombination. The unit will cover key concepts such as alleles, genotypes, phenotypes, and how these contribute to diversity within populations. Students will learn about the role of genetic diversity in evolution, adaptation, and species survival. The unit will also address how genetic diversity is measured and its implications for conservation biology and agriculture. Through case studies, simulations, and data analysis, students will investigate real-world examples of genetic diversity and its impacts. By the end of the unit, students should be able to explain the mechanisms that generate genetic diversity,

understand its significance in various biological contexts, and appreciate its role in shaping the diversity of life on Earth.

At home connections:

Inherited Traits

- Students can explore inherited traits through various hands-on activities at home. They can create a family tree to trace and identify inherited traits such as eye color, hair color, or earlobe attachment, discussing how these traits are passed down through generations. Using online tools or simple Punnett squares, students can predict the probability of inheriting specific traits based on parental genotypes. They can also conduct a survey of family members to gather data on common genetic traits and analyze the results to understand patterns of inheritance. Additionally, students can use household items to model DNA structure and replication, reinforcing the molecular basis of inheritance. Exploring online resources, such as virtual labs and simulations, can help students visualize genetic processes like meiosis and recombination. These activities make the abstract concepts of genetics more tangible and relatable, enhancing students' understanding of how traits are inherited and expressed.

Molecular Technologies

- Students can explore molecular technologies through various hands-on activities at home. They can extract DNA from fruits like strawberries or bananas using household items such as dish soap, salt, and rubbing alcohol, demonstrating basic DNA isolation techniques. Creating paper models of DNA and RNA can help visualize their structures and practice transcription/translation processes. Online simulations and virtual labs can be used to explore techniques like PCR, gel electrophoresis, and DNA sequencing. Students can model CRISPR gene editing using household items like pipe cleaners and beads. Free online bioinformatics tools allow students to analyze DNA sequences, compare genomes, or explore protein structures. Engaging in family discussions on the ethical implications of genetic technologies like GMOs or gene therapy can deepen understanding of real-world applications. These activities can make abstract molecular biology concepts more tangible and engaging, reinforcing students' understanding of cutting-edge technologies used in modern biology research and applications.

Concepts within Unit #4 Link to HS Science TEKS	**Success Criteria for this concept** *Students will…*
Concept #1: Inherited Traits B.8B	• Plan and carry out investigations to observe the cause and effect of crossing-over and independent assortment on the inheritance of traits in offspring • Use mathematical models to simulate the effects of meiosis and the distribution of alleles in offspring • Use stability and change to evaluate the stability of genetic diversity in populations over time • Construct explanations by using structure and function to determine how meiosis generates genetic diversity, and design solutions for increasing genetic diversity in populations through selective breeding or genetic engineering • Use energy and matter to engage in argumentation based on evidence to support their explanations for the role of meiosis in generating genetic diversity and evaluate the strengths and weaknesses of different arguments • Explore how different factors such as the frequency of crossing-over or the number of chromosomes can affect genetic diversity

	• Recognize patterns in the distribution of alleles in offspring and use the patterns to make predictions about genetic diversity

Grading Period 3

Unit 4 cont'd: Genetic Diversity

Estimated Date Range: January 8 – January 26 (12 total school days)
Instructional & Re-engagement Days in Unit: 11 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window:
N/A	**N/A**	Unit 4, Concept 1 (1 day) **Jan. 12 – Jan. 16**

Unit Overview: (see above for Unit 4)

At home connections: (see above for Unit 4)

Concept #2: Molecular Technologies B.B.7D **CFA 8.8B** **Jan 12 – Jan 16**	• Understand the steps of PCR and its purpose in amplifying DNA sequences • Understand the steps of PCR and its purpose in amplifying DNA sequences • Describe the basic principles of DNA sequencing technologies, such as Sanger sequencing and next-generation sequencing • Set up and run a PCR experiment, understanding the importance of primers, DNA template, and thermal cycling • Prepare agarose gels, load DNA samples, run electrophoresis, and interpret the resulting band patterns • Interpret DNA sequencing results, identifying sequences, mutations, and their potential implications • Explain how molecular technologies are used in medical diagnostics, such as identifying genetic disorders and infectious diseases • Describe the role of molecular technologies in developing genetically modified organisms (GMOs) and improving crop traits • Identify patterns in DNA sequences and relate them to genetic traits and diseases

Unit 5: Evolution

Estimated Date Range: January 27 – February 24 (19 total school days)
Instructional & Re-engagement Days in Unit: 15 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window: N/A
TELPAS (2/16 – 3/27)	NWEA MAP Growth Biology (2/3 – 2/5)	

Unit Overview:

This unit explores the fundamental concept of evolution, one of the cornerstones of modern biology. Students will examine the evidence for evolution, including fossil records, comparative anatomy, embryology, and molecular biology. The unit will cover key principles such as natural selection, genetic variation, and adaptation. Students will learn about Darwin's theory of evolution and how it has been supported and refined by subsequent scientific discoveries. The unit will also address the mechanisms of speciation, the concept of common ancestry, and the use of

phylogenetic trees to represent evolutionary relationships. Through case studies, simulations, and data analysis, students will investigate real-world examples of evolution in action. By the end of the unit, students should be able to explain how evolution occurs, understand its significance in shaping the diversity of life on Earth, and appreciate its relevance to contemporary issues in biology and society

At home connections:

- Students can explore evolution through various hands-on activities at home. They can create models of fossils using clay or plaster to understand how fossilization occurs and what fossils can tell us about past life forms. Using online resources, students can construct and analyze phylogenetic trees to visualize evolutionary relationships between species. They can also conduct simple experiments to demonstrate natural selection, such as using different colored candies to represent prey items and observing how "predator" preferences change populations over time. Examining household items or foods can reveal examples of artificial selection, like different dog breeds or varieties of fruits and vegetables. Students can research and create presentations on famous evolutionary case studies, such as Darwin's finches or peppered moths. Additionally, they can use online simulations to explore concepts like genetic drift and speciation. These activities can help make the abstract concepts of evolution more tangible and relatable, reinforcing students' understanding of how life on Earth has changed over time

Concepts within Unit # 5 Link to HS Science TEKS	**Success Criteria for this concept** *Students will…*
Concept #1: Evidence of Common Ancestry B.9A, B.9B	• Analyze and Interpret data to evaluate the significance of the fossil record in tracing evolutionary lineages by recognizing patterns in data • Plan and carry out investigations to explain how similarities in structure indicate shared ancestry. • Use patterns recognized in the data, sample, etc, to evaluate the strength of anatomical homologies as evidence for common decent analyzing and interpreting data
Concept #2: Natural Selection B.10A, B.10B, and B.10C	• Use models to explain the concept of genetic variation within a population while examining patterns in various species. • Provide a clear and accurate definition of natural selection by asking questions and observing patterns within populations.
Concept #3: Mechanisms of Evolution B.10D	• Using mathematics and computational thinking to describe how populations change over time. • Plan and carry out an investigation to explain how random and nonrandom mechanisms cause genetic change within a population.

Unit 6: Interdependence within Ecosystems

Estimated Date Range: February 25 – March 13 (12 total school days)

Instructional & Re-engagement Days in Unit: 11 days

Assessments

State/National Assessment	**District Assessment(s)**	**Common Formative Assessment Window:**
TELPAS (2/16 – 3/27)	N/A	Unit 6, Concept 2 (1 day) **Mar 9 – Mar 13**

Unit Overview:
This unit explores the complex interactions and relationships between organisms within ecosystems. Students will examine how different species depend on each other and their environment for survival, energy flow, and nutrient cycling. The unit will cover key concepts such as food webs, symbiotic relationships, competition, and predator-prey dynamics. Students will learn about the factors that affect population growth and ecosystem stability, including limiting factors and carrying capacity. The unit will also address how changes in one part of an ecosystem can have far-reaching effects throughout the system. Through case studies, simulations, and data analysis, students will investigate real-world examples of ecosystem interdependence and disturbances. By the end of the unit, students should be able to explain how organisms interact within ecosystems, understand the importance of biodiversity for ecosystem resilience, and appreciate the delicate balance that exists in natural systems.

At home connections:
Ecological Relationships

- Students can explore ecological relationships through various activities at home. They can create simple food web models using pictures of local plants and animals, demonstrating predator-prey relationships and energy flow. To observe competition, students can plant different types of seeds close together and monitor their growth. Symbiotic relationships can be explored by examining common household examples, such as the bacteria in yogurt (mutualism) or observing how clover grows in lawns (commensalism). Students can also set up a small terrarium or aquarium to observe ecological interactions on a micro-scale. Analyzing pet care, such as how dogs interact with fleas, can demonstrate parasitism. For a hands-on experiment, students can create different "beak" tools (tweezers, clothespins, etc.) to simulate bird adaptations and competition for food resources. These activities can help make abstract ecological concepts more tangible and relatable, reinforcing students' understanding of how organisms interact and depend on each other in ecosystems.

Ecosystem Stability

- Students can explore ecosystem stability through various hands-on activities at home. They can create simple ecosystem models using household items, such as jars with plants, water, and small aquatic organisms, to observe how different components interact and maintain balance over time. To demonstrate the impact of disturbances, students can introduce changes to their model ecosystems, like altering light or nutrient levels, and document the effects. They can also conduct online research on local ecosystems and create visual representations of food webs to understand the complex interdependencies that contribute to stability. Using common household items, students can simulate population dynamics by modeling predator-prey relationships or competition for resources. Additionally, they can analyze real-world data on ecosystem changes, such as tracking seasonal variations in their backyard or local park. These activities can help make abstract concepts of ecosystem stability more tangible and relatable, reinforcing students' understanding of how diverse components work together to maintain balance in natural systems.

Concepts within Unit #6 Link to HS Science TEKS	**Success Criteria for this concept** *Students will…*
Concept #1: Ecological Relationships B.13A **CFA B.13D** **Mar 9 – Mar 13**	• Develop relevant questions about how predation, parasitism, commensalism, mutualism, and competition influence ecosystem stability. • Construct informed hypotheses regarding the impact of specific ecological relationships on ecosystem stability, supported by background research. • Design and carry out experiments or observations to gather data on ecological relationships within various ecosystems.

	• Analyze collected data to identify patterns and relationships between ecological interactions and ecosystem stability.
Concept #2: Ecosystem Stability B.13C, B.13D	• Design and execute investigations, collecting data on biodiversity, environmental conditions, and human impacts within ecosystems. • Analyze collected data, identifying patterns and trends related to ecosystem stability. • Construct clear explanations for the factors influencing ecosystem stability, integrating data and scientific principles. • Participate in scientific discussions, presenting arguments supported by evidence about the impact of various factors on ecosystem stability.

Grading Period 4

Unit 7: Processes in Plants

Estimated Date Range: March 9 – March 13 (10 total school days)
Instructional and Re-engagement Days in Unit: 10 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window:
TELPAS (2/16 – 3/27)	N/A	N/A

Unit Overview:

This unit explores the fundamental processes that enable plants to grow, survive, and reproduce. Students will examine photosynthesis, the process by which plants convert light energy into chemical energy, and cellular respiration, which allows plants to use this energy. The unit will cover plant structure and function, including the roles of roots, stems, leaves, and vascular tissues in transport and support. Students will learn about plant hormones and their influence on growth and development. The unit will also address plant reproduction, including flower structure, pollination, and seed dispersal. Through laboratory activities, microscopy observations, and data analysis, students will investigate real-world examples of plant processes and adaptations. By the end of the unit, students should be able to explain how plants carry out essential life functions, understand the importance of plants in ecosystems and agriculture, and appreciate the complex mechanisms that allow plants to respond to their environment.

At home connections:

Structure and Function in Plants

- Students can explore plant structure and function through various hands-on activities at home. They can conduct a celery experiment by placing celery stalks in colored water to demonstrate how vascular tissues transport water and nutrients through the plant. Using a magnifying glass or smartphone magnifier, students can examine leaf structures, including stomata, to understand how leaves are adapted for gas exchange and photosynthesis. Flower dissection using common flowers from home or the garden allows students to identify and label reproductive structures like stamens, pistils, and ovaries

  Growing bean seeds in clear containers enables observation of root development and how roots facilitate water and nutrient uptake. Students can also examine stem cross-sections, such as from a celery stalk, to identify different tissues including vascular bundles. To demonstrate phototropism, they can place a houseplant near a window and observe how it grows towards the light source over time. These activities can help make abstract concepts of plant structure and function more tangible and relatable, reinforcing students' understanding of how plant parts work together to carry out essential life processes.

Concepts within Unit #7 Link to HS Science TEKS	Success Criteria for this concept *Students will…*
Concept #1: Structure and Function in Plants B.12B	• Understanding how plant systems function together and how their structures contribute to overall plant health and growth by viewing or developing models. • Investigating how changes in environmental conditions or external stimuli can cause responses in plant systems, mediated by structural features. • Identify and describe the structures and functions of the transport (xylem and phloem), reproductive (flower), and response (hormonal regulation and tropisms) systems in plants.

	• Differentiate between the structural features of each system in plants and explain their roles in facilitating interactions. • Observe plant structures and analyze how their features contribute to the functions of transport, reproduction, and response. • Compare and contrast the structural adaptations of different plant species or varieties to understand how variations influence interactions among systems. • Apply their understanding of plant systems and their structural features to real-world scenarios, such as explaining how changes in environmental conditions affect plant responses and reproductive success. • Effectively communicate their explanations of how plant systems interact through written or oral presentations, using appropriate scientific terminology and concepts

Unit 8: Processes in Animals

Estimated Date Range: March 30 – May 28 (42 total school days)
Instructional & Re-engagement Days in Unit: 34 days

Assessments

State/National Assessment	District Assessment(s)	Common Formative Assessment Window:	Final Exam Review:
US History EOC, Algebra I, Biology (4/14 - 4/24)	NWEA MAP Growth Biology (5/19 – 5/21)	N/A	May 18 – 21 **Final Exam Schedule**: May 22 - 28

Unit Overview:
This unit explores the essential physiological processes that enable animals to survive, grow, and reproduce. Students will examine key systems including digestion, circulation, respiration, excretion, and nervous and endocrine systems. The unit will cover how these systems work together to maintain homeostasis, respond to environmental stimuli, and carry out life functions. Students will learn about energy acquisition and utilization through nutrition and metabolism. The unit will also address animal reproduction and development, including gametogenesis, fertilization, and embryonic stages. Through laboratory activities, dissections, and data analysis, students will investigate real-world examples of animal adaptations and physiological responses. By the end of the unit, students should be able to explain how different animal body systems function and interact, understand the importance of homeostasis, and appreciate the diverse strategies animals have evolved to thrive in various environments.

At home connections:
Structure and Function in Animals

- Students can explore animal structure and function through various hands-on activities at home. They can examine and compare different animal bones or shells to observe how structure relates to function in various species. Using household items, students can create models of different animal body systems, such as a lung model using balloons and straws to demonstrate breathing mechanics. Dissecting store-bought chicken wings or fish can provide insight into muscle and bone structure. Students can also conduct simple experiments to observe animal behaviors related to structure, such as testing a pet's sensory responses. Analyzing the structures of common household pests like insects can demonstrate adaptations. Additionally, students can research and create visual presentations on how different animal structures, like bird beaks or mammalian limbs, are adapted

for specific functions in their environments. These activities can help make abstract concepts of animal structure and function more tangible and relatable, reinforcing students' understanding of how form relates to function in the animal kingdom.

Concepts within Unit #8 Link to HS Science TEKS	**Success Criteria for this concept** *Students will…*
Concept #1: Structure and Function in Animals B.12A	• Identify the key components of the regulatory system in animals. • Explain the process of nutrient absorption in animals and its significance for survival. • Describe the reproductive strategies of different animal species and their role in ensuring species survival. • Analyze the defense mechanisms employed by animals to protect themselves from predators and environmental threats.

Student Projects

Estimated Date Range: April 14 – May 16
Estimated Time Frame: 23 days

Scientific and Engineering Practices

B.1A ask questions and define problems based on observations or information from text, phenomena, models, or investigations
B.1E collect quantitative data using the International System of Units (SI) and qualitative data as evidence
B.1F organize quantitative and qualitative data using scatter plots, line graphs, bar graphs, charts, data tables, digital tools, diagrams, scientific drawings, and student-prepared models
B.1G develop and use models to represent phenomena, systems, processes, or solutions to engineering problems
B.1H distinguish among scientific hypotheses, theories, and laws
B.2A identify advantages and limitations of models such as their size, scale, properties, and material
B.2B analyze data by identifying significant statistical features, patterns, sources of error, and limitations
B.2D evaluate experimental and engineering designs
B.3A develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories
B.3B communicate explanations and solutions individually and collaboratively in a variety of settings and formats
B.3C engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence
B.4A analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student
B.4C research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers

Glossary of Curriculum Components

Overview– The content in this document provides an overview of the pacing and concepts covered in a subject for the year.

TEKS – Texas Essential Knowledge and Skills (TEKS) are the state standards for what students should know and be able to do.

Unit Overview – The unit overview provides a brief description of the concepts covered in each unit.

Concept – A subtopic of the main topic of the unit.

Success Criteria—a description of what it looks like to be successful in this concept.

Parent Resources

The following resources provide parents with ideas to support students' understanding. For sites that are password protected, your child will receive login information through their campus.

Resource	How it supports parent and students
Texas Experience Science Grade 8	This is the state adopted textbook for grade 8 science. Students sign in through their school account in Clever.
EduSmart	This resource provides hand-on and vocabulary activities that are great to review the concepts learned in the classroom. Students sign in through their school account in Clever.
Khan Academy	This resource contains practice exercises, instructional videos, and a personalized learning dashboard where students can learn and study at their own pace.
NSTA – Science Resources for Parents	This online resource has science activities for middle school students and their families to help support learning at home.
National Geographic Kids	This resource is a fact-filled, magazine created especially for ages 6 – 14. The students go on an amazing adventure in science, nature, culture, archaeology, and space.

Supplemental Resource and Tool designation

TI-Nspire Calculator	This calculator is a standardized technology integration tool used for Science and Mathematics in FBISD.

Instructional Model

An instructional model is the structure in which students engage in a particular content that ensures understanding of that content. In science, the instructional model is the 5E Instructional Model.

The 5E Model is an inquiry-based approach to teaching and learning science concepts over time. It is research-based and emphasizes that children build conceptual understanding and make meaning through experiences. Each "E" represents a stage in a learning cycle.

- Engage: Students interact with a phenomenon that sparks curiosity and assesses prerequisite knowledge or misconceptions.
- Explore: Students begin to interact with the content through hands-on investigations.
- Explain: Students connect the hands-on experience to the instruction of the concept using grade level appropriate academic vocabulary.
- Elaborate: Students apply the concept learned to a new context through problem solving or an additional hands-on experience.
- Evaluate: Evaluation of student understanding and progress occurs throughout the learning cycle.

As students learn each concept in the curriculum, they will have the opportunity to develop conceptual understanding as the teacher navigate the content as telling a story. The graphic below summarizes each component that occurs within each of the 5E stages.