

Aquatic Science Overview 2022 - 2023

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.

- [Grading Period 1](#)
- [Grading Period 2](#)
- [Grading Period 3](#)
- [Grading Period 4](#)

Process Standards

The process standards describe ways in which students are expected to engage in the content. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use knowledge learned efficiently and effectively in daily life.

1(A) demonstrate safe practices during laboratory and field investigations, including chemical, electrical, and fire safety, and safe handling of live and preserved organisms; and

1(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

2(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;

2(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;

2(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;

2(D) distinguish between scientific hypotheses and scientific theories;

2(E) plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting, handling, and maintaining appropriate equipment and technology;

2(F) collect data individually or collaboratively, make measurements with precision and accuracy, record values using appropriate units, and calculate statistically relevant quantities to describe data, including mean, median, and range;

2(G) demonstrate the use of course apparatuses, equipment, techniques, and procedures;

2(H) organize, analyze, evaluate, build models, make inferences, and predict trends from data;

2(I) perform calculations using dimensional analysis, significant digits, and scientific notation; and

- 2(J) communicate valid conclusions using essential vocabulary and multiple modes of expression such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.
- 3(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
- 3(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;
- 3(C) draw inferences based on data related to promotional materials for products and services;
- 3(D) evaluate the impact of research and technology on scientific thought, society, and the environment;
- 3(E) describe the connection between aquatic science and future careers; and
- 3(F) research and describe the history of aquatic science and contributions of scientists.

Grading Period 1

Unit 1: Introduction to Aquatic Science

Estimated Date Range: August 10 – August 30

Estimated Time Frame: 15 days

Unit Overview: In this unit the student will learn and demonstrate knowledge of safety responsibilities in the aquatics classroom. Students will learn how to create a sustainable aquatic ecosystem in an aquarium, and will build their ecosystem. This unit will also provide a history of aquatic science and introduce the students to the study of oceanography and marine biology.

At home connections:

- Discuss general lab safety and the importance of being safe.

Concepts within Unit #1 Link to TEA High School Science TEKS	Success Criteria for this concept
Concept #1: Safety 1A, 1B	<ul style="list-style-type: none"> • list/describe all of the general safety rules regarding conduct, clothing, accidents, glassware, heating/fire, animals, etc... • follow all the safety rules of the time during laboratory/field investigations. • 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. • Explain the proper time and dosage amount of chemical to add to the amount of water in the aquarium • Calculate the dose of chemical required based on the gallons of water in the aquarium • Diagnose a chemical imbalance using water test kit
Concept #2: Introduction to Aquatic Science 2F, 2J, 2H, 3A	<ul style="list-style-type: none"> • Identify the necessary parts of an aquarium and describe their function • Set up a functioning aquarium (salt or freshwater) with fish and justify choice based on data

	<ul style="list-style-type: none"> Explain how fish compatibility impacts the aquarium ecosystem
Unit 2: Water Chemistry and Properties Estimated Date Range: August 31 – September 14 Estimated Time Frame: 10 days	
<p>Unit Overview: In this unit, students will use appropriate tools to measure water chemistry in order to determine the health of an ecosystem. Students will explore how water chemistry and water properties affect aquatic ecosystems. Students will have the opportunity to apply their knowledge of water chemistry and water properties to their tank ecosystem.</p>	
<p>At home connections:</p> <ul style="list-style-type: none"> Look up or request a water quality report from your local water company. 	
Concepts within Unit # 2 Link to TEA High School Science TEKS	Success Criteria for this concept
Concept #1: Water Chemistry and Properties 4A, 2H, 5B,8A	<ul style="list-style-type: none"> Be able to explain what change in the tank may have caused there to be a change in the water quality of the tank using qualitative and quantitative data Explain how chemical and physical properties of water aid in the survival of aquatic organisms Determine the quality of water in an aquarium by testing the following: <ul style="list-style-type: none"> Nitrate Nitrite PH Temperature ammonia Observe the effect salinity has on an organism by conducting an osmosis lab
Unit 3: Aquatic Cycles Estimated Date Range: September 15 – October 7 Estimated Time Frame: 16 days	
<p>Unit Overview: In this unit, students will explore how the biogeochemical cycles (water cycle, phosphorous cycle, carbon cycle, and the nitrogen cycle) affect the aquatic environment. Student will analyze water quality data using their aquariums to evaluate the proper cycling of nutrients and elements within the ecosystem. Students will also explore how humans have impacted the cycling of nutrients in the aquatic ecosystem.</p>	
<p>At home connections:</p> <ul style="list-style-type: none"> Discuss how the water cycle happens in and around your home. If you can visit a lake or pond, discuss the biogeochemical cycles as they happen there. 	
Concepts within Unit # 3 Link to TEA High School Science TEKS	Success Criteria for this concept
Concept #1: Aquatic Cycles 4A, 5A, 2F, 2H	<ul style="list-style-type: none"> Collect data from tanks and use systems thinking to predict what would happen to the tank if changes in feeding and lighting occur

	<ul style="list-style-type: none"> • Compare how natural seasonal change in an aquatic environment affect organisms differently than how an unusual change in an aquatic environment affect organisms using evidence • Compare how natural seasonal change in an aquatic environment affect
<p>Grading Period 2 Unit 4: Water Dynamics Estimated Date Range: October 11 – October 28 Estimated Time Frame: 14 days</p>	
<p>Unit Overview: In this unit, students will explore the availability of water resources, and evaluate the impact of the movement of water on the geography of an area. Waves and tides will be examined to connect how the movement of water impacts the living and nonliving components of an aquatic ecosystem. This unit will also explore how humans impact aquatic ecosystems and the natural geography of the coast. Finally, the students will evaluate the effectiveness of the Clean Water Act and how we can continue to conserve our aquatic resources.</p> <p>At home connections:</p> <ul style="list-style-type: none"> • Research any local attempt to protect water resources in your area. • Identify human impacts to water quality in your neighborhood or region. 	
<p>Concepts within Unit # 4 Link to TEA High School Science TEKS</p>	<p>Success Criteria for this concept</p>
<p>Concept #1: Movement of Water 8A, 8B, 12E, 7A, 7B, 7C, 12A</p>	<ul style="list-style-type: none"> • Using evidence, determine if the Clean Water Act supports or refutes solving water resource problems • Communicate the cause and effects of water resource problems as well as provide solutions for these problems • Use systems thinking and data analysis to describe the relationship between human impact on a water resource and the aquatic organisms • Explain how positive and negative feedback cycles play in the lack or abundance of water • Communicate the cause and effects of water resource problems as well as provide solutions for these problems • Use systems thinking and data analysis to describe the relationship between human impact on a water resource and the aquatic organisms • Using evidence, determine if the Clean Water Act supports or refutes solving water resource problems
<p>Unit 5: Meteorology and Geology Estimated Date Range: November 1 – November 15 Estimated Time Frame: 11 days</p>	
<p>Unit Overview: In this unit, students will explore how weather and climate are related to aquatic systems. Students will explore how geological features and ocean currents affect the distribution of aquatic organisms. Students will also use data to explore and analyze hurricane patterns.</p> <p>At home connections:</p> <ul style="list-style-type: none"> • Watch weather forecasts together. Discuss how your local weather may affect various organisms. 	
<p>Concepts within Unit # 5 Link to TEA High School Science TEKS</p>	<p>Success Criteria for this concept</p>

<p>Concept #1: Meteorology and Geology</p>	<ul style="list-style-type: none"> • Explain how a change in atmospheric conditions will cause a change in oceanic conditions dictating the distribution of the organisms in the ocean • Predict how ocean currents and geological activity dictate organism distribution in the ocean • Use data and evidence to explain how hurricane frequency and intensity are related to climate change
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Unit 6: Aquatic Ecology
Estimated Date Range: November 16 – December 16
Estimated Time Frame: 18 days

Unit Overview: In this unit, students will examine how energy flows within an aquatic ecosystem, and explore how the biotic and abiotic factors in an aquatic ecosystem are interrelated.

At home connections:

- Identify biotic and abiotic factors in your neighborhood. Discuss differences between the biotic and abiotic factors that would be in an aquatic ecosystem compared to your neighborhood.

<p style="text-align: center;">Concepts within Unit # 6 Link to TEA High School Science TEKS</p>	<p style="text-align: center;">Success Criteria for this concept</p>
<p>Concept #1: Aquatic Ecology 10B, 11A, 2H, 5C, 5D, 9A, 9C, 10C, 11B</p>	<ul style="list-style-type: none"> • Investigate why some organisms have more advantageous adaptations than other organisms • Compare and contrast how energy flows within a fresh water system versus a salt water system • Use data to describe and explain how some adaptations would be favorable in one ecosystem but not another ecosystem. • Use qualitative data to explain how the ecosystem affects the adaptations that organisms have.

Grading Period 3
Unit 7: Aquatic Ecosystems
Estimated Date Range: January 5 – January 31
Estimated Time Frame: 18 days

Unit Overview: In this unit, students will explore the biotic and abiotic factors of Freshwater and Marine Ecosystems, and their influence on the organisms living in the ecosystems. Students will investigate symbiotic relationships, explore the importance of each ecosystem, and investigate environmental issue affecting freshwater and marine ecosystems.

At home connections:

- Research environmental issues that are affecting freshwater and marine ecosystems. Discuss these environmental issues with your child and what impact they may have on those ecosystems.

<p style="text-align: center;">Concepts within Unit # 7</p>	<p style="text-align: center;">Success Criteria for this concept</p>
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Link to TEA High School Science TEKS	
<p>Concept #1: Aquatic Ecosystems 9C, 10B, 5A, 8C, 9A, 9C, 10A, 10C</p>	<ul style="list-style-type: none"> • Explain how biological, chemical, physical, and geological properties of a freshwater ecosystem affects the freshwater organism adaptations • Explain how the biological, chemical, physical, and geological properties of the Tropical Marine systems affect organisms that live in Tropical Marine Ecosystems • Explain how lake succession affects organism population and distribution • Compare and contrast the adaptations of lotic organism to lentic organisms

Unit 8: Coastal and Wetland Ecosystems

Estimated Date Range: February 1 - February 16

Estimated Time Frame: 12 days

Unit Overview: In this unit, students will explore the differences between and different types of Coastlands and Wetlands. Students will explore the biotic and abiotic factors of these ecosystems and investigate how the biotic and abiotic factors affect the organisms living in these ecosystems. Students learn about the importance of Coastlands and Wetlands and investigate environmental issues these ecosystems experience.

At home connections:

- Research environmental issues that are affecting coastal wetland ecosystems. Discuss these environmental issues with your child and what impact they may have on those ecosystems.

Concepts within Unit # 8 Link to TEA High School Science TEKS	Success Criteria for this concept
Concept #1: Coastal and Wetland Ecosystems 9C, 10B, 5A, 8C, 9A, 9C, 10A, 10C	<ul style="list-style-type: none"> • Compare and contrast rocky intertidal, sandy intertidal, mudflats, mangroves, and salt marsh ecosystems and organism • Explain how the biological, chemical, physical, and geological properties of the Coastal and Wetland systems affect organisms that live in the Coastal and Wetland ecosystems. • Explain the causes and effects of environmental issues that are plaguing coastlands and wetlands

Unit 9: Temperate Marine Ecosystems

Estimated Date Range: February 21 – March 10

Estimated Time Frame: 14 days

Unit Overview: In this unit, students will explore the abiotic and biotic factors of the different Temperate Marine Ecosystems, and how they influence the organisms who live in the ecosystem. Students will investigate kelp forests, the open ocean, and the deep sea and explore the differences in the food webs in each ecosystem. Students will also investigate the importance of Temperate Marine Ecosystems and the environmental issues that impact them.

At home connections:

- Research environmental issues that are affecting temperate marine ecosystems. Discuss these environmental issues with your child and what impact they may have on those ecosystems.

Concepts within Unit # 9 Link to TEA High School Science TEKS	Success Criteria for this concept
Temperate Marine Ecosystems 9C, 10B, 5A, 8C, 9A, 9C, 10A, 10C	<ul style="list-style-type: none"> • Describe how the environment of the kelp forest, open ocean, and deep sea affect the adaptations of the different organisms that live there • Describe how dogfish adaptations make them successful in their ecosystem • Explain how energy is obtained differently by organisms at the surface compared to those in the deep sea • Explain how regulations and laws help to keep the oceans healthy • Explain how kelp is used in our everyday lives

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Grading Period 4
Unit 10: Tropical Marine Ecosystems
Estimated Date Range: March 20 – April 5
Estimated Time Frame: 13 days

Unit Overview: In this unit, students will explore the biotic and abiotic factors of Freshwater and Marine Ecosystems, and their influence on the organisms living in the ecosystems. Students will investigate symbiotic relationships, explore the importance of each ecosystem, and investigate environmental issue affecting freshwater and marine ecosystems.

At home connections:

- Research environmental issues that are affecting tropical marine ecosystems. Discuss these environmental issues with your child and what impact they may have on those ecosystems.

Concepts within Unit # 10 Link to TEA High School Science TEKS	Success Criteria for this concept
Concept #1: Tropical Marine Ecosystems 9C, 10B, 5A, 8C, 9A, 9C, 10A, 10C	<ul style="list-style-type: none"> • Explain how ocean acidification affects the coral reefs • Explain how an increase in temperature affects the coral reefs • Draw and describe the structure of a coral reef • Explain adaptations that are specific to the coral reefs • Communicate the state of the coral reef and predict whether they can recover

Unit 11: Polar Marine Systems
Estimated Date Range: April 6 – April 27
Estimated Time Frame: 14 days

Unit Overview: In this unit, students will explore the biotic and abiotic factors and their influence on Polar Marine Ecosystems. Students will investigate the similarities and differences between the Arctic area and Antarctica. Students will also investigate the many environmental issues impacting Polar Marine Ecosystems, and the causes and effects of Climate Change on the ecosystem.

At home connections:

- Research environmental issues that are affecting polar marine ecosystems. Discuss these environmental issues with your child and what impact they may have on those ecosystems.

Concepts within Unit # 11 Link to TEA High School Science TEKS	Success Criteria for this concept
Concept #1: Polar Marine Ecosystems 9C, 10B, 5A, 12A, 12D	<ul style="list-style-type: none"> • Describe the adaptations needed for organisms to be able to survive the cold of the Arctic and the Antarctic • Explain the difference between the Arctic and the Antarctic • Describe how seasons in the Antarctic will dictate the abundancy of life • Explain how climate change will affect the Polar Marine Ecosystems • Explain the effects of a melting Arctic versus a melting Antarctic

Unit 12: Human Impact

Estimated Date Range: April 28 – May 25

Estimated Time Frame: 20 days

Unit Overview: In this unit, students will explore the major issues that affect aquatic environments, the human benefits, and the detriments to the environment. Students will research current environmental protections and improvements that need to be made.

At home connections:

- Research current environmental protections and any improvements that need to be made in order for humans to have minimal negative impact to the environment. Make a list of what students can do to protect aquatic environments.

Concepts within Unit # 12 Link to TEA High School Science TEKS	Success Criteria for this concept
Concept #1: Human Impact 12A, 12E, 12B, 12C, 12D	<ul style="list-style-type: none"> • Explain how humans impact aquatic ecosystems (positive/negative) and provide possible solutions • Design and carry out a citizen science project about a real world situation/problem • Present the results of my project to class in a scientific way both orally and written • Present myself in a professional manner when I communicate my results • Engage in scientific argumentation using proper protocols

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.

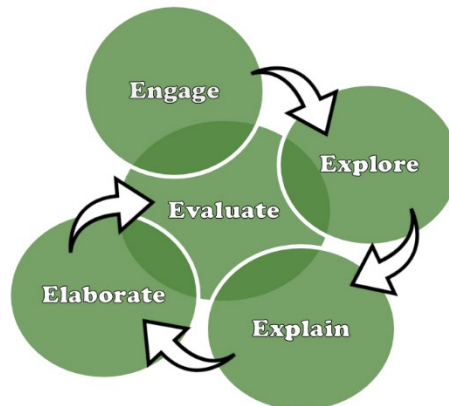
Parent Resources

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
https://www.fortbendisd.com/Page/92908	This is the state adopted textbook for Aquatic Science. Click on the link for directions on accessing the textbook.
Khan Academy	This resource contains practice exercises, instructional videos, and a personalized learning dashboard where students can learn and study at their own pace.
Texas Gateways	This online resource contains lessons, videos, and interactive activities for various science concepts.
NSTA – Science Resources for Parents	This online resource has science activities for high school students and their families to help support learning at home.
NOAA – National Oceanic and Atmospheric Administration	This resource is contains videos, images, interactive media, graphics and data related to the ocean and atmosphere.

Instructional Model

The structures, guidelines or model in which students engage in a particular content that ensures understanding of that content.



- It is based on the constructivist learning theory, which states that learners build or construct new ideas based on their experiences.
- It represents a recursive cycle of cognitive stages in inquiry-based learning.

- Stages are intended to be completed sequentially; however, you may revisit a stage more than once during the 5E process.
- It capitalizes on hands-on activities, students' curiosity, and academic discussion among students.
- Typically, **NOT** all five stages would be experienced in a single classroom period, but all five would certainly be embedded in a series of lessons that would develop a particular concept, lasting days or weeks.
- It should be used to develop conceptual understanding over time with each stage building on the previous stage, rather than serve as a series of activities.
- It should be used in conjunction with other instructional strategies such as writing in science, graphing, graphic organizers, collaboration, etc.