



Program Transfer Goals

- Ask questions, recognize and define problems, and propose solutions.
- Safely and ethically collect, analyze, and evaluate appropriate data.
- Utilize, create, and analyze models to understand the world.
- Make valid claims and informed decisions based on scientific evidence.
- Effectively communicate scientific reasoning to a target audience.

PACING

First Nine Weeks (8 wks)	Second Nine Weeks (8 wks)	Third Nine Weeks (10 wks)	Fourth Nine Weeks (11 wks)	
Year Long Unit - Aquarium Biology and Chemistry				
Unit 1 6 weeks	Year Long Unit (4 week focus)	Unit 2/3/4/5 1-2 weeks each	Unit 6 11 weeks	Unit 7 9 weeks

Assurances for a Guaranteed and Viable Curriculum

Adherence to this scope and sequence affords every member of the learning community clarity on the knowledge and skills on which each learner should demonstrate proficiency. In order to deliver a guaranteed and viable curriculum, our team commits to and ensures the following understandings:

Shared Accountability: Responding to the Needs of All Learners

- High levels of learning for all students.
- The district and course formative assessments aligned to the standards for this course support educators and learners in monitoring academic achievement and leveraging interventions.

Shared Understanding: Curriculum Design

- The district curriculum design weaves together the elements of content, skills and assessments in order to adhere to curriculum design at the macro and micro level, ensuring vertical alignment.
- The district curriculum incorporates standards, scope and sequence, enduring understandings, essential questions, performance assessments, and recommended resources.

Interdependence: Curriculum Units

Members of the learning community utilize the curriculum units, plan collaboratively, and reflect on results for continuous improvement.

The district curriculum units may be found: <http://tinyurl.com/Coppell-Curriculum>

YEAR-LONG: **AQUARIUM BIOLOGY AND CHEMISTRY**

TIMELINE: **YEAR-LONG - (FOCUSED IN THE 1ST AND 2ND 9-WEEKS)**

Unit Summary: Learners will set up and maintain a closed water system (Aquarium), monitor the health of the animals, and monitor and adjust water quality. This will be a year-long assignment.

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Students will know...

- Organisms have biological, chemical and physical needs to thrive in an ecosystem.
- The health of organism's needs will be met by monitoring and adjusting
 - Salinity
 - pH
 - Temperature
 - Ammonia
 - Nitrite
 - Nitrate
- Communication between team members and tank location staff is essential to complete this task.
- Biological, mechanical, and chemical filtration aids in maintaining equilibrium in a closed water system (aquarium).

Students will be skilled at...

- Being able to problem solve when biological, chemical, or physical homeostasis is unbalanced.
- Collecting and analyzing water quality.
- Communication between group members, tank location staff, and teacher.
- Being able to manipulate and work with equipment related to biological, mechanical, and chemical filtration.
- Understanding how all equipment works in order for the closed water system to maintain equilibrium.

UNIT 1: **WATER AND WATER QUALITY**

TIMELINE: **6 WEEKS - 1ST 9-WEEKS**

Unit Summary: Learners will learn about the properties of water and how to test for chemical and biological water quality. Learners will sample local water sources to determine water quality and make recommendations on ways to improve it.

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Students will know...

- safe practices in field and lab investigations
- conservation of resources
- descriptive, comparative, and experimental investigations
- Water interacting with the environment and organisms
- Water chemistry
- Buffering capacity of soil for water quality

Students will be skilled at...

- Plan and implement investigative procedures.
- Collect data individually or collaboratively.
- Demonstrate the use of course equipment, apparatus, techniques, and procedures.
- Organize, analyse, evaluate, build models, make inferences, and predict trends from data.
- Perform calculations using dimensional analysis, significant digits, and scientific notation.
- Communicate valid conclusions using essential vocabulary and multiple modes of expression.

UNIT 2: HOW WATER AFFECTS WEATHER AND HOW WATER SHAPES THE EARTH

TIMELINE: 1.5 WEEKS - 2ND 9-WEEKS

Unit Summary: Learners will learn how water affects weather patterns, including hurricanes, El Nino and La Nina. Learners will also learn how water shapes the Earth, including glaciers, rivers, and beaches.

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Students will know...

- *Students will be able to identify the water flow through a watershed and what impacts that flow.*
- *Students will understand the connection between aquatic environments and climate and weather.*
- *Students will be able to identify different ways water is shaping the earth.*
- *Students will understand the importance of upwelling and turnovers in aquatic environments.*
- *Students will be able to understand the connection between ocean currents, climates, and geologic features.*
- *Students will be able to collect and evaluate global environmental data through the use of buoys.*

Students will be skilled at...

- *Students will be able to trace the flow of water through a watershed.*
- *Students will be able to describe how weather is altered during an El Nino and La Nina.*
- *Students will be able to describe how the earth is shaped by wind, waves, hurricanes. Rivers, etc.*
- *Students will be able to explain how upwelling and turnovers occur and their importance.*
- *Students will be able to explain the importance of currents (wind and water) in climate and biological distribution.*
- *Students will be able to show the connection between wind patterns through the use of live data collected from buoy.*

UNIT 3: TAXONOMY AND AQUATIC MICROORGANISMS AND PATHOGENS

TIMELINE: 1 WEEK - 2ND 9-WEEK

Unit Summary: Learners will identify microorganisms and pathogens that might be seen in their Aquarium (helpful and harmful). Learners will identify signs and symptoms of pathogens and how to treat them.

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Students will know...

- Organisms are placed into taxonomic groups based on their similarities and differences.
- Learners know how a dichotomous key works.
- Organism's evolutionary history can be charted on a phylogenetic tree.
- Pathogens can affect aquatic organisms in a negative way.
- Pathogens can be minimized in an aquarium if the the water quality is good, healthy fish are introduced into the aquarium, and the tank is well maintained.
- Beneficial bacteria is an integral part of the nitrogen cycle.

Students will be skilled at...

- Using current taxonomy to classify organisms.
- Using a dichotomous key.
- Reading and creating a phylogenetic tree.
- Identifying common pathogens in aquarium fish and know how to treat common pathogens.
- Understanding how to prevent pathogens in your fish tank.
- Understanding beneficial bacteria's role in the nitrogen cycle in aquariums.

UNIT 4: AQUATIC PROTISTS AND PLANTS

TIMELINE: 4.5 WEEKS - 2ND AND 3RD 9-WEEKS

Unit Summary: Learners will identify various adaptations of aquatic plants to life in freshwater and saltwater. Learners will determine plants that should and should not be traded in Texas based on the Red and White list created by the government. Learners will learn how non-native and invasive plant species affect our waterways. Learners will identify protists (micro-protists and macro-protists), their adaptations for life in the water and their impact on the environment and the economy.

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Students will know...

- Kingdom Protista's characteristics.
- Kingdom Protista's adaptations for living in aquatic ecosystems.
- Kingdom Protista's economic impact.
- Kingdom Protista's environmental impact.
- Plant adaptations vary depending on where they live in an aquatic ecosystem.
- Non-native and invasive plant species impact on the environment and economy.

Students will be skilled at...

- Identifying various protists - micro and macro protists.
- Understanding the economic and ecological importance of protists.
- Identify protists used in everyday household products.
- Understanding the different adaptations that Aquatic Plants have that terrestrial plants don't have.
- Understanding how non-native and invasive species have impacted our ecosystems and our economy.

UNIT 5: AQUATIC INVERTEBRATES

TIMELINE: 11 WEEKS - 3RD - 4TH 9-WEEKS

Unit Summary: Learners will identify different aquatic invertebrates and their adaptations to life in various aquatic environments. Learners will determine various organisms environmental and economic impacts.

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Students will know...

- Invertebrates are broken down into different phyla depending on their characteristics.
- Within a phyla, each group of organisms have different adaptations that allow them to survive in a specific habitat.
- Terrestrial counterparts have different adaptations than the aquatic species.
- Each group of invertebrates have an ecological and economical impact.

Students will be skilled at...

- Identifying representatives in each phyla.
- Identifying various adaptations and life cycles within each phyla.
- Identify the ecological impacts of each phyla.
- Identify the economical impact of each phyla.

UNIT 6: AQUATIC VERTEBRATES

TIMELINE: 7 WEEKS - 4TH 9-WEEKS

Unit Summary: Learners will identify different aquatic vertebrates and their adaptations to life in various aquatic environments. Learners will determine various organisms environmental and economic impacts.

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Students will know...

- There are physiological and behavioral differences among different groups of aquatic vertebrates.
- How the physiological differences allow them to live in various ecosystems.
- Humans have an impact on the populations of different aquatic vertebrates.
- Each vertebrate group has an ecological and environmental impact.

Students will be skilled at...

- Identifying representatives in each class of vertebrates.
- Identifying various adaptations (physiological and behavioral) within each class of vertebrates.
- Identify the ecological impacts of each class of vertebrates.
- Identify the economical impact of each class of vertebrates.