§112.46. Aquatic Science.

(a) General requirements. Students shall be awarded one credit for successful completion of this course. Suggested prerequisite: one unit of high school science. This course is recommended for students in Grades 10, 11, or 12.

(b) Introduction.

(1) In Aquatic Science, students conduct field and laboratory investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study a variety of topics that include: components of an aquatic ecosystem; relationships among aquatic habitats and ecosystems; roles of cycles within an aquatic environment; adaptations of aquatic organisms; changes within aquatic environments; geological phenomena and fluid dynamics effects; and origin and use of water in a watershed.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods,

models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

(c) Knowledge and skills.

(1) Scientific processes. The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during field and laboratory investigations; and

(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.

(2) Scientific processes. The student uses scientific methods during field and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;

(B) collect data and make measurements with precision;

(C) express and manipulate quantities using mathematical procedures such as dimensional analysis, scientific notation, and significant figures;

(D) organize, analyze, evaluate, make inferences, and predict trends from data; and

(E) communicate valid conclusions.

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;

(B) make responsible choices in selecting everyday products and services using scientific information;

(C) evaluate the impact of research on scientific thought, society, and the environment;

(D) describe the connection between aquatic science and future careers; and

(E) research and describe the history of aquatic science and contributions of scientists.

(4) Science concepts. The student knows the components of aquatic ecosystems. The student is expected to:

(A) differentiate among freshwater, brackish, and saltwater ecosystems;

(B) research and identify biological, chemical, geological, and physical components of an aquatic ecosystem; and

(C) collect and analyze baseline quantitative data such as pH, salinity, temperature, mineral content, nitrogen compounds, and turbidity from an aquatic environment.

(5) Science concepts. The student knows the relationships within and among the aquatic habitats and ecosystems in an aquatic environment. The student is expected to:

(A) observe and compile data over a period of time from an established aquatic habitat documenting seasonal changes and the behavior of organisms;

(B) observe and evaluate patterns and interrelationships among producers, consumers, and decomposers in an aquatic ecosystem;

(C) identify the interdependence of organisms in an aquatic environment such as a pond, river, lake, ocean, or aquifer, and the biosphere; and

(D) evaluate trends in data to determine the factors that impact aquatic ecosystems.

(6) Science concepts. The student knows the roles of cycles in an aquatic environment. The student is expected to:

(A) identify the role of various cycles such as carbon, nitrogen, water, and nutrients in an aquatic environment;

(B) interpret the role of aquatic systems in climate and weather; and

(C) collect and evaluate global environmental data using technology.

(7) Science concepts. The student knows environmental adaptations of aquatic organisms. The student is expected to:

(A) classify different aquatic organisms using dichotomous keys;

(B) compare and describe how adaptations allow an organism to exist within an aquatic environment;

(C) predict adaptations of an organism prompted by environmental changes; and

(D) compare differences in adaptations of aquatic organisms to fresh water and marine environments.

(8) Science concepts. The student knows that aquatic environments change. The student is expected to:

(A) predict effects of chemical, organic, physical, and thermal changes on the living and nonliving components of an aquatic ecosystem;

(B) analyze the cumulative impact of natural and human influence on an aquatic system;

(C) identify and describe a local or global issue affecting an aquatic system; and

(D) analyze and discuss human influences on an aquatic environment including fishing, transportation, and recreation.

(9) Science concepts. The student knows that geological phenomena and fluid dynamics affect aquatic systems. The student is expected to:

(A) demonstrate the principles of fluid dynamics including Archimedes' and Bernoulli's Principles and hydrostatic pressure;

(B) identify interrelationships of plate tectonics, ocean currents, climates, and biomes; and

(C) research and describe fluid dynamics in an upwelling.

(10) Science concepts. The student knows the origin and use of water in a watershed. The student is expected to:

(A) identify sources and determine the amounts of water in a watershed including groundwater and surface water;

(B) research and identify the types of uses and volumes of water used in a watershed; and

(C) identify water quantity and quality in a local watershed.

Source: The provisions of this §112.46 adopted to be effective September 1, 1998, 22 TexReg 7647.