

§112.44. Environmental Systems.

- (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 Environmental Systems, 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: biotic and abiotic factors in habitats; ecosystems and biomes; interrelationships among resources and an environmental system; sources and flow of energy through an environmental system; relationship between carrying capacity and changes in populations and ecosystems; and changes in environments.
 - (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) organize, analyze, evaluate, make inferences, and predict trends from data; and
- (D) 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 environmental science and future careers; and
- (E) research and describe the history of environmental science and contributions of scientists.

(4) **Science concepts.** The student knows the relationships of biotic and abiotic factors within habitats, ecosystems, and biomes.

The student is expected to:

- (A) identify indigenous plants and animals, assess their role within an ecosystem, and compare them to plants and animals in other ecosystems and biomes;
- (B) make observations and compile data about fluctuations in abiotic cycles and evaluate the effects of abiotic factors on local ecosystems and biomes;
- (C) evaluate the impact of human activity such as methods of pest control, hydroponics, organic gardening, or farming on ecosystems;
- (D) predict how the introduction, removal, or reintroduction of an organism may alter the food chain and affect

existing populations; and

- (E) predict changes that may occur in an ecosystem if biodiversity is increased or reduced.

- (5) **Science concepts.** The student knows the interrelationships among the resources within the local environmental system.

The student is expected to:

- (A) summarize methods of land use and management;
- (B) identify source, use, quality, and conservation of water;
- (C) document the use and conservation of both renewable and non-renewable resources;
- (D) identify renewable and non-renewable resources that must come from outside an ecosystem such as food, water, lumber, and energy;
- (E) analyze and evaluate the economic significance and interdependence of components of the environmental system; and
- (F) evaluate the impact of human activity and technology on land fertility and aquatic viability.

- (6) **Science concepts.** The student knows the sources and flow of energy through an environmental system.

The student is expected to:

- (A) summarize forms and sources of energy;
- (B) explain the flow of energy in an ecosystem;
- (C) investigate and explain the effects of energy transformations within an ecosystem; and
- (D) investigate and identify energy interactions in an ecosystem.

- (7) **Science concepts.** The student knows the relationship between carrying capacity and changes in populations and ecosystems.

The student is expected to:

- (A) relate carrying capacity to population dynamics;
- (B) calculate exponential growth of populations;
- (C) evaluate the depletion of non-

renewable resources and propose alternatives; and

- (D) analyze and make predictions about the impact on populations of geographic locales, natural events, diseases, and birth and death rates.

- (8) **Science concepts.** The student knows that environments change.

The student is expected to:

- (A) analyze and describe the effects on environments of events such as fires, hurricanes, deforestation, mining, population growth, and municipal development;
- (B) explain how regional changes in the environment may have a global effect;
- (C) describe how communities have restored an ecosystem; and
- (D) examine and describe a habitat restoration or protection program.

Source: The provisions of this §112.44 adopted to be effective September 1, 1998, 22 TexReg 7647.