

§112.48. Astronomy.

- (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 11 or 12.
- (b) Introduction.
 - (1) In Astronomy, students conduct field and laboratory investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study the following topics: information about the universe; scientific theories of the evolution of the universe; characteristics and the life cycle of stars; exploration of the universe; role of the Sun in our solar system; planets; and the orientation and placement of the Earth.
 - (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 skills 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) draw inferences based on data related to promotional materials for products and services;
- (C) evaluate the impact of research on scientific thought, society, and the environment;
- (D) describe the connection between astronomy and future careers; and
- (E) research and describe the history of astronomy and contributions of scientists.

(4) **Science concepts.** The student knows scientific information about the universe.

The student is expected to:

- (A) observe and record data about lunar phases and uses that information to model the earth, moon, and sun system; and
- (B) describe characteristics of galaxies.

(5) **Science concepts.** The student knows the scientific theories of the evolution of the universe.

The student is expected to:

- (A) research and analyze scientific empirical data on the estimated age of the universe;
- (B) research and describe the historical development of the Big Bang Theory; and
- (C) interpret data concerning the formation of galaxies and our solar system.

- (6) **Science concepts.** The student knows the characteristics and the life cycle of stars.
- The student is expected to:
- (A) describe nuclear reactions in stars;
 - (B) identify the characteristics of stars such as temperature, age, relative size, composition, and radial velocity using spectral analysis; and
 - (C) identify the stages in the life cycle of stars by examining the Hertzsprung-Russell diagram.
- (7) **Science concepts.** The student knows how mathematical models, computer simulations, and exploration can be used to study the universe.
- The student is expected to:
- (A) demonstrate the use of units of measurement in astronomy such as light year and Astronomical Units;
 - (B) research and describe the historical development of the laws of universal gravitation and planetary motion and the theory of special relativity;
 - (C) analyze a model that simulates planetary motion and universal gravitation;
 - (D) identify the historical origins of the perceived patterns of constellations and their role in ancient and modern navigation; and
 - (E) analyze the impact of the space program on the collection of data about the Earth and the universe.
- (8) **Science concepts.** The student knows the role of the Sun in our solar system.
- The student is expected to:
- (A) identify the approximate mass, size, motion, temperature, structure, and composition of the Sun;
 - (B) identify the source of energy within the Sun and explain that the Sun is the major source of energy for the Earth; and
 - (C) describe the Sun's effects on the Earth.
- (9) **Science concepts.** The student
- The student is expected to:

knows that planets of different size, composition, and surface features orbit around the Sun.

- (A) observe the night-time sky to determine movement of the planets relative to stars;
- (B) compare the planets in terms of orbit, size, composition, rotation, atmosphere, moons, and geologic activity;
- (C) identify objects, other than planets, that orbit the Sun; and
- (D) relate the role of gravitation to the motion of the planets around the Sun and to the motion of moons and satellites around the planets.

- (10) **Science concepts.** The student knows how life on Earth is affected by its unique placement and orientation in our solar system.

The student is expected to:

- (A) compare the factors essential to life on Earth such as temperature, water, mass, and gases to conditions on other planets;
- (B) determine the effects of the Earth's rotation, revolution, and tilt on its environment; and
- (C) identify the effects of the moon on tides.

Source: The provisions of this §112.48 adopted to be effective September 1, 1998, 22 TexReg 7647.