§123.82. Principles of Technology I (One Science Credit).

(a) General requirements. The prerequisites for this course are one course in science and Algebra I. To receive credit in science, students must meet the 40% laboratory and fieldwork requirement identified in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum). This course is recommended for students in Grades 10-12.

(b) Introduction.

(1) 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 that science may not answer all questions.

(2) 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.

(3) Investigations are used to learn about the natural world through questioning, observing and drawing conclusions. Students should understand that certain types of questions can be answered by investigations, and that conclusions and models 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 changed to more closely reflect the physical world.

(c) Knowledge and skills.

(1) The student uses a systems approach to investigate mechanical, fluid, electrical, and thermal systems. The student is expected to:

(A) apply the universal systems model to technological activities; and

(B) identify the inputs, processes, outputs, and feedback associated with each of the systems.

(2) The student works safely with mechanical, fluid, electrical, and thermal technology.

The student is expected to:

(A) master relevant safety tests;

(B) follow safety manuals, instructions, and requirements; and

(C) make prudent choices in the conservation and use of resources and the disposal of materials.

(3) The student solves problems, thinks critically, and makes decisions related to technology. The student is expected to:

(A) use specified problem-solving strategies;

(B) apply critical-thinking strategies;

(C) apply decision-making techniques to the selection of technological solutions; and

(D) evaluate the impact of technology on scientific thought, society, and the environment.

(4) The student applies communication, science, and mathematics knowledge and skills to technological activities. The student is expected to:

(A) prepare technical reports and presentations;

(B) solve algebraic equations;

(C) solve problems in English and System International (SI) units; and

(D) perform unit conversions.

(5) The student knows the laws governing motion. The student is expected to:

(A) analyze examples of uniform and accelerated motion, including linear, projectile, and circular motion;

(B) generate and interpret graphs describing motion, including the use of real time technology;

(C) formulate the effects of forces on the motion of objects;

(D) develop and interpret a free-body diagram for force analysis; and

(E) identify and describe motion relative to different frames of reference.

(6) The student knows the concept of force. The student is expected to:

(A) apply examples of complex technological devices where force must be controlled, measured or applied;

(B) analyze the relationship among force, pressure, voltage and temperature;

(C) evaluate and predict what happens to an object when forces on it are balanced and when forces on it are unbalanced; and

(D) measure force in mechanical, fluid, electrical, and thermal systems.

(7) The student knows the concept of work. The student is expected to:

(A) relate mechanical, fluid, and electrical systems to force and movement; and

(B) identify and measure the effects of work done in mechanical, fluid and electrical systems.

(8) The student knows the concept of rate. The student is expected to:

(A) analyze rate in mechanical, fluid, electrical, and thermal systems; and

(B) measure, verify, and analyze rate in mechanical, fluid, electrical and thermal systems.

(9) The student knows the concept of resistance. The student is expected to:

(A) identify resistance in mechanical, fluid, electrical, and thermal energy systems;

(B) relate the principle of force divided by rate to resistance in each energy system; and

(C) measure, verify, and analyze resistance in mechanical, fluid, electrical, and thermal energy systems.

(10) The student knows the concept of energy. The student is expected to:

(A) identify the nature of energy;

(B) relate potential energy, kinetic energy and heat energy to the conservation of energy;

(C) distinguish between work and energy;

(D) measure, verify, and analyze energy in each system; and

(E) evaluate different methods of energy transfer that result in an increasing amount of disorder.

(11) The student knows the concept of power. The student is expected to:

(A) define power in mechanical, fluid, electrical and thermal systems; and

(B) relate the principle of work divided by time to each energy system.

(12) The student knows the concept of energy transformation. The student is expected to:

(A) observe and describe examples of kinetic and potential energy in mechanical, fluid, and electrical systems; and

(B) compare examples of energy transformations in mechanical, fluid, and electrical systems.

Source: The provisions of this §123.82 adopted to be effective September 1, 1998, 22 TexReg 5079.