

**Text of Adopted 19 TAC**

**Chapter 130. Texas Essential Knowledge and Skills for Career and Technical Education**

**Subchapter O. Science, Technology, Engineering, and Mathematics**

**§130.361. Implementation of Texas Essential Knowledge and Skills for Science, Technology, Engineering, and Mathematics.**

The provisions of this subchapter shall be implemented by school districts beginning with the 2010-2011 school year.

**§130.362. Concepts of Engineering and Technology (One-Half to One Credit).**

- (a) General requirements. This course is recommended for students in Grades 9-10.
- (b) Introduction. Concepts of Engineering and Technology provides an overview of the various fields of science, technology, engineering, and mathematics and their interrelationships. Students will use a variety of computer hardware and software applications to complete assignments and projects. Upon completing this course, students will have an understanding of the various fields and will be able to make informed decisions regarding a coherent sequence of subsequent courses. Further, students will have worked on a design team to develop a product or system. Students will use multiple software applications to prepare and present course assignments.
- (c) Knowledge and skills.
  - (1) The student investigates the components of engineering and technology systems. The student is expected to:
    - (A) investigate and report on the history of engineering science;
    - (B) identify the inputs, processes, and outputs associated with technological systems;
    - (C) describe the difference between open and closed systems;
    - (D) describe how technological systems interact to achieve common goals;
    - (E) compare and contrast engineering, science, and technology careers; and
    - (F) conduct and present research on emerging and innovative technology.
  - (2) The student presents conclusions, research findings, and designs using a variety of media throughout the course. The student is expected to:
    - (A) use clear and concise written, verbal, and visual communication techniques;
    - (B) maintain a design and computation engineering notebook;
    - (C) use sketching and computer-aided drafting and design to present ideas; and
    - (D) maintain a portfolio.
  - (3) The student uses appropriate tools and demonstrates safe work habits. The student is expected to:
    - (A) master relevant safety tests;

- (B) follow safety guidelines as described in various manuals, instructions, and regulations;
  - (C) recognize the classification of hazardous materials and wastes;
  - (D) dispose of hazardous materials and wastes appropriately;
  - (E) perform maintenance and safely handle and store laboratory equipment;
  - (F) describe the implications of negligent or improper maintenance; and
  - (G) demonstrate the use of precision measuring instruments.
- (4) The student describes the factors that affect the progression of technology and the potential intended and unintended consequences of technological advances. The student is expected to:
- (A) describe how technology has affected individuals, societies, cultures, economies, and environments;
  - (B) describe how the development and use of technology influenced past events;
  - (C) describe how and why technology progresses; and
  - (D) predict possible changes caused by the advances of technology.
- (5) The student describes the importance of teamwork, leadership, integrity, honesty, ethics, work habits, and organizational skills. The student is expected to:
- (A) describe and demonstrate how teams function;
  - (B) identify characteristics of good team leaders and team members;
  - (C) work in a team face-to-face or in a virtual environment to solve problems;
  - (D) discuss the principles of ideation;
  - (E) identify employers' expectations and appropriate work habits;
  - (F) differentiate between discrimination, harassment, and equality;
  - (G) describe ethical behavior and decision making through use of examples;
  - (H) use time-management techniques to develop team schedules to meet project objectives; and
  - (I) complete projects according to established criteria.
- (6) The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects. The student is expected to:
- (A) identify and describe the fundamental processes needed for a project, including design and prototype development;
  - (B) identify the chemical, mechanical, and physical properties of engineering materials;
  - (C) use problem-solving techniques to develop technological solutions;

- (D) use consistent units for all measurements and computations; and
  - (E) assess risks and benefits of a design solution.
- (7) The student understands the opportunities and careers in fields related to biotechnology. The student is expected to:
- (A) describe the fields of biotechnology;
  - (B) describe career opportunities in biotechnology;
  - (C) apply design concepts to problems in biotechnology;
  - (D) identify fields related to biotechnology; and
  - (E) identify currently emerging issues in biotechnology.
- (8) The student understands the opportunities and careers in fields related to process control and automation systems. The student is expected to:
- (A) describe applications of process control and automation systems;
  - (B) describe career opportunities in process control and automation systems;
  - (C) apply design concepts to problems in process control and automation systems;
  - (D) identify fields related to process control and automation systems; and
  - (E) identify emerging issues in process control and automation systems.
- (9) The student understands the opportunities and careers in fields related to physical and mechanical systems. The student is expected to:
- (A) describe the applications of physical and mechanical systems;
  - (B) describe career opportunities in physical and mechanical systems;
  - (C) apply design concepts to problems in physical and mechanical systems; and
  - (D) identify emerging issues in physical and mechanical systems.
- (10) The student participates in a team-based culminating project. The student is expected to:
- (A) apply the design process in a team;
  - (B) assume different roles as a team member within the project;
  - (C) maintain an engineering notebook for the project;
  - (D) develop and test the model for the project; and
  - (E) present the project using clear and concise communication skills.