

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.

§130.368. Electronics (One to Two Credits).

- (a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Concepts of Engineering and Technology.
- (b) Introduction. Students enrolled in this course will demonstrate knowledge and applications of circuits, electronic measurement, and electronic implementation. Through use of the design process, students will transfer academic skills to component designs in a project-based environment. Students will use a variety of computer hardware and software applications to complete assignments and projects. Additionally, students explore career opportunities, employer expectations, and educational needs in the electronics industry.
- (c) Knowledge and skills.
 - (1) The student demonstrates the skills necessary for success in the workplace. The student is expected to:
 - (A) identify employment and career opportunities, including differences between an engineering technician, engineering technologist, and engineer;
 - (B) investigate and work toward industry certifications;
 - (C) demonstrate the principles of teamwork related to engineering and technology;
 - (D) identify and use appropriate work habits;
 - (E) identify governmental regulations for health and safety in the workplace related to electronics;
 - (F) discuss ethical issues related to electronics;
 - (G) demonstrate respect for diversity in the workplace;
 - (H) demonstrate appropriate actions and identify consequences relating to discrimination, harassment, and equality;
 - (I) demonstrate effective oral and written communication skills using a variety of software applications and media; and
 - (J) explore career preparation learning experiences, including, but not limited to, job shadowing, mentoring, and apprenticeship training.
 - (2) The student participates in team projects in various roles. The student is expected to:

- (A) apply principles of effective teamwork;
 - (B) solve problems as part of a team;
 - (C) demonstrate proper attitudes as a team leader; and
 - (D) demonstrate proper attitudes as a team member.
- (3) The student develops skills for managing a project. The student is expected to:
- (A) use time-management techniques to develop and maintain work schedules and meet deadlines;
 - (B) complete work according to established criteria;
 - (C) participate in the organization and operation of a real or simulated engineering project; and
 - (D) develop a plan for production of an individual product.
- (4) The student practices safe and proper 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) identify and classify hazardous materials and wastes according to Occupational Safety and Health Administration regulations and industry standards;
 - (D) dispose of hazardous materials and wastes appropriately;
 - (E) perform maintenance on selected tools, equipment, and machines;
 - (F) handle and store tools and materials correctly; and
 - (G) describe the results of negligent or improper maintenance.
- (5) The student implements the concepts and skills that form the technical knowledge of electronics using project-based assessments. The student is expected to:
- (A) apply Ohm's law, Kirchoff's laws, and power laws;
 - (B) demonstrate an understanding of magnetism and induction as they relate to electronic circuits;
 - (C) demonstrate knowledge of the fundamentals of electronics theory;
 - (D) perform electrical-electronic troubleshooting assignments; and
 - (E) develop knowledge of voltage regulation devices.
- (6) The student applies the concepts and skills to simulated and actual work situations. The student is expected to:
- (A) measure and calculate resistance, current, voltage, and power in series, parallel, and complex circuits;

- (B) apply electronic theory to generators, electric motors, and transformers;
 - (C) design analog and digital circuits using common components; and
 - (D) demonstrate knowledge of common devices in optoelectronics.
- (7) The student uses engineering design methodologies. The student is expected to:
- (A) understand and discuss principles of ideation;
 - (B) think critically, identify the system constraints, and make fact-based decisions;
 - (C) use rational thinking to develop or improve a product;
 - (D) apply decision-making strategies when developing solutions;
 - (E) use an engineering notebook to record prototypes, corrections, and mistakes in the design process; and
 - (F) use an engineering notebook to record the final design, construction, and manipulation of finished projects.
- (8) The student learns the function and application of the tools, equipment, and materials used in electronics through project-based assignments. The student is expected to:
- (A) safely use tools and laboratory equipment to construct and repair circuits;
 - (B) use precision measuring instruments to analyze circuits and prototypes;
 - (C) describe and perform measurements using oscilloscopes; and
 - (D) use multiple software applications to simulate circuit behavior and present concepts.
- (9) The student designs products using appropriate design processes and techniques. The student is expected to:
- (A) interpret industry standard circuit schematics;
 - (B) identify areas where quality, reliability, and safety can be designed into a product;
 - (C) improve a product design to meet a specified need;
 - (D) produce schematics to industry standards;
 - (E) describe potential patents and the patenting process;
 - (F) use a variety of technologies to design components; and
 - (G) explore new technologies that may affect electronics.
- (10) The student builds a prototype using the appropriate tools, materials, and techniques. The student is expected to:
- (A) identify and describe the steps needed to produce a prototype;

- (B) identify and use appropriate tools, equipment, machines, and materials to produce the prototype; and
- (C) present the prototype using a variety of media.