Texas CTE

Principals of Applied Engineering

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Introduction.

1 **Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.**

2 **The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing scientific research and professional and technical services, including laboratory and testing services, and research and development services.**

3 **Principles of Applied Engineering provides an overview of the various fields of science, technology, engineering, and mathematics and their interrelationships. Students will develop engineering communication skills, which include computer graphics, modeling, and presentations, by using 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 of engineering and will be able to make informed career decisions. 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.**

4 **Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.**

5 **Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.**

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Knowledge and skills.

1 **The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:**

- a demonstrate knowledge of how to dress, speak, and conduct oneself in a manner appropriate for the profession;
- b show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome;
- c present written and oral communication in a clear, concise, and effective manner;
- d demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results; and
- e demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed.

2 **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;
- f conduct and present research on emerging and innovative technology; and
- g demonstrate proficiency of the engineering design process.

3 **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 (CADD) to develop and present ideas;
- d use industry standard visualization techniques and media; and
- e use the engineering documentation process to maintain a paper or digital portfolio.

4 **The student uses appropriate tools and demonstrates safe work habits. The student is expected to:**

- a master relevant safety tests;
- b follow lab safety guidelines as prescribed by instructor in compliance with local, state, and federal regulations;
- c recognize the classification of hazardous materials and wastes;
- d dispose of hazardous materials and wastes appropriately;
- maintain, safely handle, and properly store laboratory equipment;
- describe the implications of negligent or improper maintenance; and

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g demonstrate the use of precision measuring instruments.

5 **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.

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 the design process and prototype development and initiating, planning, executing, monitoring and controlling, and closing a project;

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 the risks and benefits of a design solution.

7 **The student understands the opportunities and careers in fields related to robotics, process control, and automation systems. The student is expected to:**

a describe applications of robotics, process control, and automation systems; (

b apply design concepts to problems in robotics, process control, and automation systems;

c identify fields and career opportunities related to robotics, process control, and automation systems; and

d identify emerging trends in robotics, process control, and automation systems.

8 **The student understands the opportunities and careers in fields related to electrical and mechanical systems. The student is expected to:**

a describe the applications of electrical and mechanical systems;

b describe career opportunities in electrical and mechanical systems;

c identify emerging trends in electrical and mechanical systems; and

d describe and apply basic electronic theory.

9 **The student demonstrates the ability to function as a team member while ˉompleting a comprehensive project. The student is expected to:**

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apply the design process as a team participant;

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 demonstrate communication skills by preparing and presenting the project.

10 The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. The student is expected to:

a set up, create, and modify drawings;

b store and retrieve geometry;

c demonstrate an understanding of the use of line-types in engineering drawings;

d draw 2-D single view objects;

e create multi-view working drawings using orthographic projection;

f dimension objects using current American National Standards Institute (ANSI) standards;

g draw single line 2-D pictorial representations;

h create working drawings that include section views; and

i demonstrate a knowledge of screw thread design per ANSI standards by drawing a hex head bolt with standard, square, and acme threads.