

Engineering Design and Presentation I

Subject: Career and Technical Education

Grade: 10

Expectations: 63

Breakouts: 182

(a) Introduction.

1. Career and technical education instruction provides content aligned with challenging academic standards, industry-relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.
2. The Science, Technology, Engineering, and Mathematics (STEM) Career Clusters (CCL) are designed to provide students with the knowledge and skills necessary to succeed in the workforce. The CCL are organized into six clusters: Agriculture, Architecture and Construction, Arts and Communications, Health Science, Manufacturing, and Information Technology. Each cluster is further divided into specific career pathways.
3. Students enrolled in Engineering Design and Presentation I will demonstrate knowledge and skills of the design process as it applies to engineering fields and project management using multiple software applications and tools necessary to produce and present working drawings, solid model renderings, and prototypes. Through implementation of the design process, students will transfer advanced academic skills to component designs. Additionally, students will explore career opportunities in engineering, technology, and drafting and what is required to gain and maintain employment in these areas.
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.

(b) Knowledge and Skills Statements

- (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 appropriately, speak politely, and conduct oneself in a manner appropriate for the profession and work site;
 - (i) demonstrate knowledge of how to dress appropriately for the profession
 - (ii) demonstrate knowledge of how to speak politely for the profession
 - (iii) demonstrate knowledge of how to conduct oneself in a manner appropriate for the profession
 - (iv) demonstrate knowledge of how to dress appropriately for the work site
 - (v) demonstrate knowledge of how to speak politely for the work site
 - (vi) demonstrate knowledge of how to conduct oneself in a manner appropriate for the work site

- (B) cooperate, contribute, and collaborate as a member of a group to attain agreement and achieve a collective outcome;
- (i) cooperate as a member of a group to attain agreement
 - (ii) cooperate as a member of a group to achieve a collective outcome
 - (iii) contribute as a member of a group to attain agreement
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- (G) demonstrate respect for diversity in the workplace;
 - (i) demonstrate respect for diversity in the workplace
- (H) identify consequences relating to discrimination, harassment, and inequality;
 - (i) identify consequences relating to discrimination

(A) implement project management methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project; 5

(E) perform maintenance on selected tools, equipment, and machines;

- (H) use advanced dimensioning techniques;
 - (i) use advanced dimensioning techniques
- (I) construct and use basic 3D parametric drawings; and
 - (i) construct basic 3D parametric drawings
 - (ii) use basic 3D parametric drawings
- (J) develop and use prototype drawings for presentation.
 - (i) develop prototype drawings for presentation
 - (ii) use prototype drawings for presentation

(7) The student uses engineering design methodologies. The student is expected to:

- (A) describe principles of ideation and apply ideation techniques for an engineering project;
 - (i) describe principles of ideation
 - (ii) apply ideation techniques for an engineering project
- (B)

- (B) investigate the applications of different types of computer-aided drafting and design software for various engineering problems; and
 - (i) investigate the applications of different types of computer-aided drafting and design software for various engineering problems
 - (C) use multiple software applications for concept presentations.
 - (i) use multiple software applications for concept presentations
- (9) The student designs products using appropriate design processes and techniques. The student is expected to:
- (A) interpret engineering drawings;
 - (i) interpret engineering drawings
 - (B) identify areas where quality, reliability, and safety can be designed into a product;
 - (i) identify areas where quality can be designed into a product
 - (ii) identify areas where reliability can be designed into a product
 - (iii) identify areas where safety can be designed into a product
 - (C) modify a product design to meet a specified need;
 - (i) modify a product design to meet a specified need
 - (D) produce engineering drawings to industry standards; and
 - (i) produce engineering drawings to industry standards
 - (E)

(C) present the prototype using a variety of media.

(i) present the prototype using a variety of media

(11) The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:

(A) identify and define an engineering problem;

(i) identify an engineering problem

(ii) define an engineering problem

(B) formulate goals, objectives, and requirements to solve an engineering problem;

(i) formulate goals to solve an engineering problem

(ii) formulate objectives to solve an engineering problem

(iii) formulate requirements to solve an engineering problem

(C) determine the design parameters such as materials, personnel, resources, funding, manufacturability, feasibility, and time associated with an engineering problem;

(i) determine the design parameters associated with an engineering problem

(D) establish and evaluate constraints, including health, safety, social, environmental, ethical, political, regulatory, and legal, pertaining to a problem;

(i) establish constraints, including health, pertaining to a problem

(ii) establish constraints, including safety, pertaining to a problem

(iii) establish constraints, including social, pertaining to a problem

(iv) establish constraints, including environmental, pertaining to a problem

(v) establish constraints, including ethical, pertaining to a problem

(vi) establish constraints, including political, pertaining to a problem

(vii) establish constraints, including regulatory, pertaining to a problem

(viii) establish constraints, including legal, pertaining to a problem

(ix) evaluate constraints, including health, pertaining to a problem

(x) evaluate constraints, including safety, pertaining to a problem

(xi) evaluate constraints, including social, pertaining to a problem

(xii) evaluate constraints, including environmental, pertaining to a problem

(xiii) evaluate constraints, including ethical, pertaining to a problem

(xiv) evaluate constraints, including political, pertaining to a problem

(xv) evaluate constraints, including regulatory, pertaining to a problem

(xvi) evaluate constraints, including legal, pertaining to a problem

(E)