

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



PRODUCT INNOVATION AND DESIGN

Board Approval Date: June 20, 2019	Course Length: 2 Semesters
Grading: A-F	Credits: 5 Credits per Semester
Proposed Grade Level(s): 11, 12	Subject Area: Elective Elective Area (if applicable): Career Technical Education
Prerequisite(s): N/A	Corequisite(s): N/A
CTE Sector/Pathway: Manufacturing & Product Development/Product Innovation and Design	
Intent to Pursue 'A-G' College Prep Status: Yes	
A-G Course Identifier: (g) Elective	
Graduation Requirement: No	
Course Intent: District Course Program (if applicable): CTE	

COURSE DESCRIPTION:

In this course, students will explore product innovation and design focuses including infrastructure, machines and mechanisms, and manufacturing. Each focus will include career related information, guest speakers, and/or field trips to meet designers and technicians in the field and complete one to two major design project(s) related to that field. Students will learn new content, and build upon and practice the skills developed in previous pathway courses.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Machines and Mechanisms	What are the six simple machines? How do you combine simple machines to create complex machines? What is mechanical advantage and how can it make the job easier?	*Practice with each simple machine, building out of everyday materials. *Practice calculating mechanical advantage.	*Project: build a machine to help a disabled person.
2. Infrastructure	What ethical responsibilities are involved when building bridges? What characteristics make a bridge strong? How are the forces on a bridge calculated and how does this make a better bridge?	*Fabrication of a truss. *Calculations and computations for design.	*Final bridge project portfolio and entrance into local design competition.
3. Sustainability	Why is sustainability important? What are the alternative power systems and what are their advantages and disadvantages?	*Design and construction of a fuel cell boat.	*Design an energy efficient house with sustainable properties.
4. Manufacturing	What is manufacturing? How has manufacturing evolved and what are the current issues in manufacturing? What is lean manufacturing and how can it save money?	*Labs testing with lean manufacturing principles.	*Six Sigma - 5S cleanup activity in a classroom on campus or an off campus organization.

ESSENTIAL STANDARDS:

<https://www.cde.ca.gov/ci/ct/sf/documents/manproddev.pdf>

C1.0 Understand historical and current events related to engineering design and their effects on society.

C1.1 Know historical and current events that have relevance to engineering design.

C1.2 Interpret the development of graphic language in relation to engineering design.

C2.0 Understand the effective use of engineering design equipment.

C2.1 Employ engineering design equipment using the appropriate methods and techniques.

C2.2 Apply conventional engineering design equipment procedures accurately, appropriately, and safely.

C2.3 Apply the concepts of engineering design to the tools, equipment, projects, and procedures of the Engineering Design Pathway.

C3.0 Understand the sketching process used in concept development.

C3.1 Apply sketching techniques to a variety of architectural models.

C3.2 Produce proportional two- and three-dimensional sketches and designs.

C3.3 Present conceptual ideas, analysis, and design concepts using freehand, graphic, communication techniques.

C4.0 Understand measurement systems as they apply to engineering design.

C4.1 Know how the various measurement systems are used in engineering drawings.

C4.2 Understand the degree of accuracy necessary for engineering design.

C5.0 Use proper projection techniques to develop orthographic drawings.

C5.1 Understand the concepts and procedures necessary for producing drawings.

C5.2 Develop multiview drawings using the orthographic projection process.

C5.3 Understand the various techniques for viewing objects.

C5.4 Use the concepts of geometric construction in the development of design drawings.

C5.5 Apply pictorial drawings derived from orthographic multiview drawings and sketches.

C6.0 Understand the applications and functions of sectional views.

C6.1 Understand the function of sectional views.

C6.2 Clarify hidden features of an object using a sectional view and appropriate cutting planes.

C7.0 Understand the applications and functions of auxiliary views.

C7.1 Understand the function of auxiliary views.

C7.2 Use auxiliary views to clarify the true shape and size of an object.

C8.0 Understand and apply proper dimensioning standards to drawings.

C8.1 Know a variety of drafting applications and understand the proper dimensioning standards for each.

C8.2 Apply dimension to various objects and features.

C9.0 Understand the tolerance relationships between mating parts.

C9.1 Understand what constitutes mating parts in engineering design.

C9.2 Interpret geometric tolerancing symbols in a drawing.

C9.3 Use tolerancing in an engineering drawing.

- C10.0 Understand the methods of applying text to a drawing.
- C10.1 Describe the processes of lettering and/or text editing.
 - C10.2 Implement standard methods of title block creation and use.
 - C10.3 Develop drawings using notes and specifications.
 - C10.4 Plan, prepare, and interpret drawings and models through traditional drafting or computer-aided design (CAD) techniques.
- C11.0 Understand the methods of creating both written and digital portfolios.
- C11.1 Develop a binder or digital portfolio representative of completed work for presentation.
 - C11.2 Give an effective oral presentation of a portfolio.

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.

<https://www.cde.ca.gov/be/st/ss/documents/finalelaccssstandards.pdf>

Link to Framework (if applicable):

Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

Link to Subject Area Content Standards (if applicable):

Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

Standards for Career Ready Practice <https://www.cde.ca.gov/ci/ct/sf/documents/ctescrpflyer.pdf> and Product Innovation and Design Pathway Standards (pages 17-20)

<https://www.cde.ca.gov/ci/ct/sf/documents/manproddev.pdf>

Link to Program Content Area Standards (if applicable):

Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
		<i>N/A</i>				

Other Resource Materials

Teacher recommended resource materials

Supplemental Materials

Board approved supplemental materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, software programs (Pebble Creek, DBQ, etc.)

The Folsom Cordova Unified School District prohibits discrimination, intimidation, harassment (including sexual harassment) or bullying based on a person's actual or perceived ancestry, color, disability, race or ethnicity, religion, gender, gender identity or gender expression, immigration status, national origin, sex, sexual orientation, or association with a person or group with one or more of these actual or perceived characteristics. **For concerns/questions or complaints, contact the Title IX Coordinator(s) and Equity Compliance Officer(s): Curtis Wilson, cmwilson@fcusd.org (grades K-5) and Jim Huber, ED. D., jhuber@fcusd.org (grades 6-12), 1965 Birkmont Drive, Rancho Cordova, CA 96742, 916-294-9000 ext.104625**