

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



Advanced Careers in Advanced Manufacturing and the Trades

Board Approval Date: January 19, 2023	Course Length: 2 Semesters
Grading: A-F	Credits: 5 Credits per Semester
Proposed Grade Level(s): 9, 10, 11, 12	Subject Area: Elective Elective Area (if applicable): Career Technical Education
Prerequisite(s): Careers in Advanced Manufacturing and the Trades	Corequisite(s): None
CTE Sector/Pathway: Manufacturing & Product Development / Product Innovation & Design	
Intent to Pursue ‘A-G’ College Prep Status: Yes	
A-G Course Identifier: (g) College-preparatory elective	
Graduation Requirement: No	
Course Intent: Site Specific Program (if applicable): CTE	
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COURSE DESCRIPTION:

The Advanced Careers in Advanced Manufacturing and the Trades course provides intermediate-level training in Advanced Manufacturing, Industrial Technology and the Trades. Building on previous knowledge and skills acquired in Careers in Advanced Manufacturing and the Trades course, students will gain the skills to earn industry credentials. Instruction covers the following areas: safety in the workplace, precision measurement, layout and design, grinding/finishing, tool making and sharpening, sawing/cutting, threading, drill presses, sheet metal, fabrication, technical math instruction and Computer Numeric Controlled (CNC) machining.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Workplace Safety	What are the safety and use policies, procedures and practices in Manufacturing? How do you examine work spaces for safety and/or health concerns?	*Quiz: Review safety procedures and practices	*Test: Identify unsafe scenarios in the shop
2. Materials and Measurement	What were the technical drawing components learned in the Product Innovation & Design and the Trades class? How do you perform various precision measurements? How do you select and illustrate appropriate project parameters for jobs to scale?	*Group Measurement Project	*Project: Measure items within 0.005 tolerance
3. Job Planning, Benchwork and Layout	What are the elements of engineering drawings? How do you create a layout utilizing hand tools? How do you use both hand and power saws to perform secondary operations on a workpiece after cutting to size?	*Identify components of industry standard drawings	*Project: Create an engineering drawing from a given item
4. Turning	What are the safety principles and what knowledge do you need to pass an industry-approved safety test? How do you operate a lathe at both intermediate and advanced levels? How do you use turning skills to create two	*Accurate set-up of lathe for an assigned project	*Project: Create a product using a lathe

	<p>measured spindles utilizing two work-holding methods (chucking and between centers) as well as an engineered bushing?</p> <p>How do you create a hex nut according to ANSI standards?</p>		
5. Laser Cut Game	<p>How do you accurately use calipers and rulers in metric and standard units?</p> <p>Which level of precision is needed and what tool is most appropriate?</p> <p>What is the difference between vector cut, vector engrave, and raster engrave lines?</p> <p>How do you prepare files for the laser cutter?</p> <p>What safety and maintenance procedures does the laser cutter require?</p>	<p>*Sample ruler and caliper work</p> <p>*Practice laser cut keychain</p>	<p>*A unique laser cut board game</p>
6. Laser and Lights	<p>How is a soldering iron used safely?</p> <p>What is a proper solder joint?</p> <p>How do you read the resistance of a resistor using its colored bands?</p> <p>How do you choose a current limiting resistor for an LED?</p> <p>How do you create a 2 simple circuit on a breadboard?</p> <p>What are the considerations when cutting and engraving acrylic versus wood?</p> <p>How do I make improvements to an existing design?</p>	<p>*Solder a wire bracelet</p> <p>*Resistor reading practice</p> <p>*Resistor sorting activity</p> <p>*Light up 1-3 LEDs on a breadboard</p>	<p>*An acrylic sign lit with LEDs in a unique wooden base</p>
7. Advanced 3D Printing	<p>How are parts assembled using constraints in 3D</p>	<p>*Create and assemble a five-part puzzle to form a</p>	<p>*Measure, model and assemble a real life</p>

	modeling software? When do tolerances matter and how is this included in the 3D model?	3x3x3 cube	multi-part product *Create a new, improved part that fits the assembly
8. Machines and Mechanisms	What are the six simple machines? How do you combine simple machines to create complex machines? What is a 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
9. Machine Project	How do you correctly identify blueprints, blue lines, and CAD prints? What information do you need to use from a schematic or working drawing? How do you develop a bill-of-materials?	*Demonstrate ability to identify blueprints and its components *Create a bill-of-materials	*Project: Build a three-dimensional object based upon two-dimensional drawings

ESSENTIAL STANDARDS:

- D1.0 Understand the basic product design and development process as it relates to the design of a product, line of products, system design, or services.
- D2.0 Understand and apply research methodologies as a means to identify a need, problem, or opportunity for a new product, product line, system design, or service.
- D3.0 Understand and apply various ideation techniques to develop ideas and concepts.
- D4.0 Applies various two-dimensional (2-D) graphic and/or three-dimensional (3-D) modeling techniques to development concepts.
- D5.0 Develop the concept into a well-defined product for prototyping.
- D6.0 Produce a prototype of a product.
- D7.0 Evaluate the prototype to determine if it meets the requirements and objectives.
- D10.0 Produce a presentation of the product, product line, system design, or service.

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/finaelacssstandards.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.

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

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

Link to Program Content Area Standards (if applicable):

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

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

TEXTBOOKS AND RESOURCE MATERIALS:**Textbooks**

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

Other Resource Materials

Groover, Mikell. Fundamentals of Modern Manufacturing. Wiley, 2019. Autodesk. Fundamentals of CNC Machining. Autodesk, 2014. -SkillsUSA Career Essentials

Supplemental Materials

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

N/A