

# FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



## Careers in Advanced Manufacturing and the Trades

<b>Board Approval Date:</b> January 19, 2023	<b>Course Length:</b> 2 Semesters
<b>Grading:</b> A-F	<b>Credits:</b> 5 Credits per Semester
<b>Proposed Grade Level(s):</b> 9, 10, 11, 12	<b>Subject Area:</b> Elective <b>Elective Area (if applicable):</b> Career Technical Education
<b>Prerequisite(s):</b> None	<b>Corequisite(s):</b> None
<b>CTE Sector/Pathway:</b> Manufacturing & Product Development / Product Innovation & Design	
<b>Intent to Pursue 'A-G' College Prep Status:</b> Yes	
<b>A-G Course Identifier:</b> (g) College-preparatory elective	
<b>Graduation Requirement:</b> No	
<b>Course Intent:</b> Site Specific <b>Program (if applicable):</b> CTE	
<p>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 <b>Title IX Coordinator(s) and Equity Compliance Officer(s): Donald Ogden, Associate Superintendent – Human Resources</b> <a href="mailto:kmorales@fcusd.org">kmorales@fcusd.org</a> 916-294-9000 ext. 104410; <b>Jim Huber, ED. D., Assistant Superintendent of Instruction</b> <a href="mailto:jhuber@fcusd.org">jhuber@fcusd.org</a> 916-294-9000 ext. 104625; <b>Shannon Diaz, Director of Compliance (Investigator)</b> <a href="mailto:sdiaz@fcusd.org">sdiaz@fcusd.org</a> 916-294-9000 ext. 104620, 1965 Birkmont Drive, Rancho Cordova, CA 96742</p>	

### COURSE DESCRIPTION:

The Careers in Advanced Manufacturing and the Trades course provides students with the opportunity to focus on one or more areas of industrial technology, creatively pursuing new knowledge and information on careers in Advanced Manufacturing and the Trades. Students will use advanced manufacturing processes in the areas of forming, joining, assembly, mechanics, construction and the trades. Best practices for operating hand tools. specific equipment and safety.

## **DETAILED UNITS OF INSTRUCTION:**

<b>Unit Number/Title</b>	<b>Unit Essential Questions</b>	<b>Examples of Formative Assessments</b>	<b>Examples of Summative Assessment</b>
<b>1. Career Planning &amp; Management</b>	<p>How to identify the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers in advanced manufacturing, construction and the trades?</p> <p>What are the opportunities and requirements for education, training, and licensure?</p> <p>What is the role and function of professional organizations, industry, associations, and organized labor in a productive society?</p> <p>How do you create a career plan?</p> <p>What are the past, present and future career trades in the industry sector?</p> <p>How do you create an employment portfolio containing a resume, cover letter and job application?</p> <p>What are successful interviewing techniques?</p>	<p>*Online personality, aptitude and interest surveys using (<a href="http://www.cacareerzone.org">www.cacareerzone.org</a>, <a href="http://www.californiacareers.info">www.californiacareers.info</a>)</p> <p>*Complete a webquest of careers in the industry sector, professional and industry organizations and organized labor organizations</p> <p>*Complete online job searches</p>	<p>*Employment portfolio including a Career Plan, Cover Letter, Resume and Job Application</p> <p>*Research Project: PowerPoint presentation or webpage regarding careers and education and training require including professional, industry and labor organizations</p> <p>*Mock job interviews</p>
<b>2. Safety</b>	<p>What are safety policies, OSHA, PPE and employer and employee responsibilities?</p> <p>What are the general shop safety practices and expectations?</p> <p>What are the occupational safety rules in different fields?</p> <p>What are key factors that facilitate safe and effective</p>	<p>*Activities demonstrating knowledge of a safe attitude and behaviors</p> <p>*Answer questions concerning occupational safety</p>	<p>*Students identify safety policies, procedures, and regulations in regards to the workplace and present the safety information in a PowerPoint presentation (including: employer's/employees' responsibilities, proper storing and cleaning of tools, and proper</p>

	group/team operation?		maintenance of equipment, tools, and supplies) *Safety test
<b>3. Lean Manufacturing</b>	<p>*What are the basic concepts of the manufacturing processes used to minimize waste and maximize efficiency using the 5S principles (Sort, Set In Order, Shine, Standardize, Sustain)?</p> <p>*How would you identify the various styles of manufacturing processes by either observation or description?</p> <p>*What are the benefits and constrictions of both additive and subtractive manufacturing processes?</p> <p>*What are the areas of inefficiency of time and materials during the manufacturing process?</p> <p>*How can the 5S principles apply to other academic and career endeavors?</p>	*Quiz: Identify different manufacturing processes	*Design a manufacturing process for the Bird House project
<b>4. Precision Measurement</b>	<p>What are the basic measurement techniques in both US customary units and metric units? - How are rulers and measuring tapes able to measure down to 1/64 of an inch or .55mm?</p> <p>How do you convert between metric and imperial units?</p> <p>How are calipers and micrometers used to measure down to .001 inch?</p>	*Using measurement tools to measure various items using metric and imperial units of measurement	*Project: Students are given an item, take accurate measurements and record their findings
<b>5. Mechanical Fabrication</b>	How do you use basic hand tools and threaded	*Identify difference in screwdrivers, wrenches and	*Project: Assembly of items using various types

	<p>fasteners?</p> <p>How do you distinguish between flathead and Phillips screwdrivers?</p> <p>How do you properly use adjustable and Allen wrenches?</p> <p>What are the characteristics of a bolt which include type (metric or US customary), bolt size, and thread pitch?</p> <p>When given a sample, how do you identify screw types and bolt types?</p> <p>How do you properly assemble a hinge assembly using screwdrivers, wrenches, screws, bolts, washers, and flat washers?</p>	bolts	of mechanical fasteners and hand tools
<b>6. Technical Writing</b>	<p>Why is technical writing important in the manufacturing process?</p> <p>How do you design a product and manufacturing process, and communicate how to duplicate the process?</p> <p>How do you write directions for an everyday task?</p> <p>How do you write directions for a project where you will build four products using the same methods?</p> <p>How do you write clear and concise instructions for the product's end user?</p>	*Project: Writing directions for an everyday task	*Project: Writing directions for a project that you will build in class
<b>7. Measurement</b>	<p>What are five major math disciplines used in the construction industry?</p> <p>How do you identify and correctly spell measurement terminology?</p> <p>What are proper/improper</p>	<p>*Activities in determining both standard and metric units for any given length using a tape measure</p> <p>*Calculate measurements to understand the interdependence between</p>	*Quiz on proper improper fractions, mixed numbers, least common denominator, conversion of fractions into decimals

	<p>fractions and mixed numbers?</p> <p>How do you convert improper fractions and mixed numbers back and forth?</p> <p>How do you identify the least common denominator and borrow from whole numbers in the addition and subtraction of fractions?</p> <p>How do you convert fractions into decimals?</p> <p>-How do you add any two mixed numbers using only a tape measure?</p>	<p>algebra and geometry in construction</p> <p>*Measurement activities to calculate lengths using fractions, mixed numbers, and percentages</p>	
<b>8. Scale</b>	<p>How do you define and list the meaning of the words scale, ratio, proportion, and scale factor?</p> <p>How do you measure lengths in a given scale using an architect's rule/scale?</p> <p>How do you read a scale drawing?</p> <p>How do you find a scaling factor when scaling an object?</p> <p>How do you apply measurement procedures in context and then translate those measurements to a scale drawing?</p> <p>Why is a scale drawing a two-dimensional drawing that accurately represents an object and is mathematically like the object?</p>	<p>*Vocabulary activity.</p> <p>-Measurement activities use rule and scale</p> <p>*Build a three-dimensional object based on two-dimensional drawings using Google SketchUp (3-D modeling program)</p>	<p>*Build to scale a model tiny house that includes floor, walls, windows and door</p>
<b>9. Wood Technology</b>	<p>What are tree species and how do you recognize a hard or soft wood based on the physical properties of the tree?</p> <p>How do you identify the</p>	<p>*Laboratory Activities:</p> <p>Identify five types of nails/brads (common nail, sinker, finish nail, brad nail, and the pin)</p> <p>*Identification and</p>	<p>*Interactive exam on raw materials, development, attributes and use of nails, screws and hand tools</p> <p>*Project: Build a</p>

	<p>three basic steps involved in turning a tree into lumber?</p> <p>How are wood products used in the manufacturing process?</p> <p>What are the various types?</p>	demonstration of the proper use of the major woodworking hand tools	birdhouse using wood products
<b>10. Metal Fabrication</b>	<p>What are the various types of metals available for manufacturing?</p> <p>How do you select the appropriate material for a given project?</p> <p>How do you design, shape and assemble metal products using specialty wood tools like saws, drills, grinders, brakes, shears and mechanical fasteners?</p>	*Identification and demonstration on the safe use of metal materials and tools	*Project: Tool Tray Project
<b>11. Computer Aided Manufacturing</b>	<p>What is 3D printing, Computer-Aided Design (CAD) and Computer Numerical Control (CNC) manufacturing?</p> <p>How does computer modeling play a role in the manufacturing process?</p> <p>How are prototypes created using 3D printing technology?</p> <p>How is CNC equipment used in the manufacturing process?</p>	*Complete a design project list for six different items of increased difficulty	*Project: Design and manufacture a complex product using computer aided manufacturing
<b>12. 3D Printing Basics</b>	<p>How are additive and subtractive processes used to transform real life objects into a 3D model?</p> <p>How do you interpret the information communicated about an object in a technical drawing?</p> <p>How is a simple technical drawing created in the computer showing an object's length, width and</p>	*Practice inventor models using various 2D and 3D modeling features practice technical drawings and development of a drawing template	Create a small 3D modeled object and associated technical drawing

	height? How does a 3D printer use a 3D model to create an object? When a 3D print fails, what troubleshooting techniques can be employed to resolve the issue?		
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### **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.

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