

Colorado CTE Course – Scope and Sequence

Course Name	Industrial Design I		Course Details	Credit= 1.0 Prerequisite: Introduction to Technical Drawing and Design CTE Credential: CTE Manufacturing	
			Course = 0.50 Carnegie Unit Credit		
Course Description	Industrial design is the professional practice of creating products that enhance the function, usability, value, and appearance of products with the goal of benefiting the user, manufacturer, community, and the environment. Also known as product design, industrial design education prepares students to design systems and tangible artifacts including, consumer and recreational products, medical and computer equipment, and transportation and environments. Both generalist and specialist, industrial designers tend to be part artist, part entrepreneur and engineer. This course is designed for students interested in careers in Industrial Design, Packaging Design, or Design Arts industry sector. Students will be introduced to industry-standard tools, skills, and materials that they can manipulate as the primary means of manufacturing and package design. Students will explore basic applications of various tools to create projects in both digital and 3d format.				
Note:	This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.				
SCED Identification #	5191	Schedule calculation based on 60 calendar days of a 90-day semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics.			
All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at https://www.cde.state.co.us/standardsandinstruction/essentialskills					
Instructional Unit Topic	Suggested Length of Instruction	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Career Development		<p>Develop an education and career plan aligned with personal goals.</p> <p>Understand and develop industry-desired employability skills.</p> <p>Work productively in teams while integrating cultural and global competence.</p>	<p>The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:</p> <p>(A) determine advanced knowledge and skills</p>	<p>Research various industrial design job responsibilities (such as research product engineer, development engineer, testing engineer, design engineer, analysis engineer, systems engineer, manufacturing engineer, sales engineer, and engineering manager) and present the characteristics of each. Also, describe how these job</p>	<p>Updates to ICAP</p> <p>SkillsUSA</p> <p>Personal and Employability Skills Framework</p>

			<p>required to gain industry-recognized certifications;</p> <p>(B) identify employers' work expectations;</p> <p>(C) demonstrate the standards required in the workplace such as interviewing skills, flexibility, willingness to learn new skills and acquire knowledge, self-discipline, positive attitude, promptness, attendance, and integrity in a work situation;</p> <p>(D) evaluate personal career goals; and</p> <p>(E) investigate career opportunities in industrial design and manufacturing.</p> <p>The student describes the importance of teamwork, leadership, integrity, honesty, work habits, and organizational skills. The student is expected to:</p> <p>(A) use teamwork to solve problems; and</p>	<p>responsibilities are applied in industry. Use a variety of sources to gather data, cite each source, and briefly explain why each source is reliable.</p> <p>Identify effective communication strategies. Give a scenario, discuss how various members of the team communicate and analyze how effective strategies could be used by each team member. Discuss how teams interact in virtual meeting and virtual design environments.</p> <p>Discuss the global influence on industrial design and the manufacturing of products. Examine how product design is modified in different countries or cultures.</p>	
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			(B) demonstrate effective communication skills with individuals from varied cultures such as fellow workers, management, and customers.		
Safety		<p>Interpret policies, procedures, and regulations for the workplace environment, including employer and employee responsibilities.</p> <p>Identify regulations and safety standards that are implemented within manufacturing professions.</p>	<p>Comply with standard industry and classroom safety requirements. Student is expected to:</p> <p>(A) understand and apply operational safety precautions for tools, equipment, and materials;</p> <p>(B) apply Personal Protective Equipment (PPE) precautions;</p> <p>(C) use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies; and</p> <p>(D) demonstrate skills related to health and safety in the workplace as specified by the Occupational Safety and Health Administration and other appropriate agencies.</p>	<p>Assess a given situation requiring the use of tools, equipment, and materials. Explain the applicability of various safety standards and procedures, and then safely demonstrate the use of the tools, equipment, and materials.</p>	

<p>Design Products Exploration</p>		<p>Research, synthesize, define, ideate, design, refine, and validate mass-produced products.</p> <p>Recognize and apply contemporary manufacturing methods and materials to product design proposals.</p>	<p>The student investigates emerging and innovative applications of technology in engineering. The student is expected to:</p> <p>(A) report on innovative applications of technology in engineering;</p> <p>(B) experiment with new technologies; and</p> <p>(C) experiment with different manufacturing materials such as plastic, composites, fiberglass, stone, and wood.</p>	<p>Compare and contrast various product design processes. Report on standard processes by industry or product type.</p> <p>As a team, use an online editing tool to develop an informational paper or infographic illustrating how raw materials are processed to make products and systems, and how each of these materials or products are used in society. Students should identify milestone developments (e.g., cast iron, paper, battery, and fiberglass) made possible after specific materials were developed. Metals, ceramics, polymers, and composites should be included. Select a material that is one of the most valuable materials ever discovered or manufactured, and use the online editing tool to prepare a persuasive paper supporting the claim.</p>	
<p>Manufacturing Technology</p>		<p>Use computer-aided design software to construct, evaluate, and design three-dimensional product forms and assemblies.</p> <p>Use multiple two-dimensional computer-aided design software tools to</p>	<p>The student applies design skills to manufacturing. The student is expected to:</p> <p>(A) use CAD software to create simple two-dimensional and three-dimensional drawings,</p>	<p>Define the differences in technique among freehand sketching, manual drafting, and computer-aided drafting (CAD), and describe the skills required for each. Create a two-dimensional orthographic (multiview) drawing incorporating labels, notes,</p>	

		<p>organize and design a variety of communication artifacts.</p>	<p>accurately incorporating labels, notes, dimensioning, and line types to design drawings;</p> <p>(B) perform basic operations such as creating, saving files, opening files, storing files, and printing.</p> <p>(C) analyze the results of product testing in a simulated modeling environment;</p> <p>(D) fabricate a prototype design of a mechanical part; and</p> <p>(E) use computer-integrated manufacturing techniques to simulate a manufacturing process.</p>	<p>and dimensions, using sketching/geometric construction techniques. Apply basic dimensioning rules and properly use different types of lines (e.g., object, hidden, center). The orthographic projections should include principle views of a simple object from top, front, and right sides.</p> <p>Building on the knowledge of a two-dimensional drawing, create complex isometric (3-D pictorial) drawings, properly using lines (e.g., object, hidden, center), labels, and dimensioning techniques.</p> <p>Use CAD software to create simple two-dimensional and three-dimensional drawings, accurately incorporating labels, notes, dimensioning, and line types to design drawings. Perform basic operations such as creating, saving files, opening files, storing files, and printing.</p>	
<p>Contemporary Design History</p>		<p>Identify and examine the fundamental trends of contemporary design history.</p> <p>Investigate, summarize, and present about the artifacts</p>	<p>Student understands current trends and historical impacts of manufacturing design.</p> <p>Student is expected to:</p>		

		and design principles of notable historical designers.	<p>(A) identify current trends in industrial manufacturing design;</p> <p>(B) identify significant designers and their products or impacts; and</p> <p>(C) define human-centered design.</p>		
Design Business Practices		<p>Review, examine, and discuss the fundamental elements of design-related business activities.</p> <p>Investigate and synthesize components of marketing, sales, engineering, manufacturing, servicing, and ecological needs and responsibilities and reconcile them with identified user desires and values.</p> <p>Define product-related problems, variables, and requirements; conceptualize and evaluate alternatives; and test and refine solutions.</p>	<p>The student describes the relationship between manufacturing and marketing. The student is expected to:</p> <p>(A) investigate how companies prepare a marketing plan for a product;</p> <p>(B) understand the effect of customer satisfaction on the image of a product; and</p> <p>(C) analyze how customer demands influence the design of an object.</p>	<p>Discuss product requirements and identify all of the impacts a product has in the production cycle to final delivery of the product to market including supply chain and packaging.</p> <p>Identify a company that has strong product branding. Research and report on how the company markets its products and conducts research on products it develops.</p>	
Project Planning		Apply and identify the various phases of the product design development process to an existing or new	The student applies the projecting planning process to select the appropriate tools, equipment, machines,		

		<p>product, product line, system design, or service.</p> <p>Demonstrate the project planning process to produce a product.</p>	<p>materials, and technical processes. The student is expected to:</p> <p>(A) analyze the processes needed to complete a project such as initiate, plan, execute, monitor and control, and close; and</p> <p>(B) use a variety of equipment and machines to produce an item to specification.</p>		
Prototyping		<p>Design, invent, create, and construct both digital and physical artifacts in facilities appropriate for such activities.</p> <p>Manipulate wood, polymers, metals to develop physical models.</p> <p>Explore, build, design, and render digital models.</p>	<p>The student manufactures products or packages using the appropriate tools, equipment, machines, materials, and technical processes. The student is expected to:</p> <p>(A) use appropriate manufacturing tools, processes, and equipment to create a prototype; and</p> <p>(B) explore how products are packaged for market.</p>		

