

Colorado CTE Course – Scope and Sequence

Course Name	Introduction to Drafting and Design Concepts		Course Details	Credit = 1.0 Prerequisites- None	
			Course = 0.50 Carnegie Unit Credit		
Course Description	This course offers students the opportunity to combine design principles with technology to produce authentic projects. The initial focus will be on developing an understanding of the visual elements and the principles of design. Students will study both two and three-dimensional applications and problems. Students will explore areas such as: graphic design, architectural design, landscaping design, manufacturing design and interior design. Students will use drafting skills to produce detailed working drawings, sectionals, auxiliary, fasteners, and simple architectural floor plans. Students will also work in design teams to create pattern development and design and produce prototypes. They will be introduced to computer design software such as Google Sketch, SolidWorks, AutoCAD, and ArchiCad.				
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 #	21102	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
Careers in Drafting and Design		<p>Explores the professional standards and employability skills required by business and industry in a multitude of industries that employ drafters and designers.</p> <p>Understand the evolution of design drafting, including its technological progression and emerging trends.</p>	<p>The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:</p> <p>(A) describe how teams function;</p>	<p>Evaluate jobs data and employment projections in the transportation industry from sources such as O*Net OnLine, synthesizing findings from each source.</p> <ul style="list-style-type: none"> Determine areas of largest growth within the drafting occupations as they 	<p>SkillsUSA Personal Skills</p> <p>SkillsUSA 4 Pillars</p> <p>TSA notes</p> <p>Updates to Student ICAP</p>

			<p>(B) explain employers' work expectations; and</p> <p>(C) demonstrate knowledge of the concepts and skills related to health and safety in the workplace as specified by appropriate industry sector</p> <p>Describe the evolution of design drafting, including its technological progression and emerging trends.</p>	<p>relate to multiple industries.</p> <ul style="list-style-type: none"> Report job requirements and characteristics for selected careers and compare personal interests and aptitudes with job requirements and characteristics of the career selected. <p>Define employment expectations of entry-level employees in local employment situations (hiring requirements, basic job expectations, etc.)</p> <p>Discuss industry certification opportunities and their requirements.</p> <p>Research and present on an emerging design trend or application.</p>	
<p>Designing Processes</p>		<p>Understand elements of the design process and its application to industry design processes.</p>	<p>ate understanding of processes and principles as y to multiple industries. ill be able to:</p>	<p>Complete a simple design activity and apply the engineering design process to produce a model that an engineer would test. Define criteria for determining an effective design, describe</p>	

			<p>the principles of design ate uses such as: harmony, roportion, scale, contrast, e, opposition, principality, ubordination, transition, color, light, material, texture.</p> <p>ch the factors of function, , client needs, ental sustainability, cs, safety, availability, and t could impact a design.</p> <p>ic examples of the ies of the design planning nd demonstrate ding of those principles. ple, examine the following k endorsed by the nal Technology and ng Educators Association</p>	<p>constraints on the design, and document each step in an engineering notebook. At the completion of the design process, present the model to the class and critique the design of other classmates. Citing examples of design process framework and compare and contrast what is involved at each step of the design process. Explain why it is an iterative process and always involves refinement. Evaluate an existing large- scale engineering design using the engineering design process. Produce a report on the chosen design, from the perspective of the engineering design team that produced the design. Document constraints that may have been faced by the design team, criteria for measuring the effectiveness of the design, and progress through each step of the engineering design process. Report out on various applications of the design process by a specific industry. For example, an interior design report would include information that indicates a student can:</p>	
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<p>Design and Drawing Basics</p>			<p>Define the differences in technique among freehand sketching, manual drafting, and computer-aided drafting (CAD), and describe the skills required for each. Apply basic dimensioning rules and properly use different types of lines (e.g., object, hidden, center). The orthographic</p>	<p>Create a two-dimensional orthographic (multi-view) drawing incorporating labels, notes, and dimensions, using sketching/geometric construction techniques. Create simple isometric (3-D pictorial) drawings, properly using lines (e.g., object, hidden, center), labels, and dimensioning techniques.</p>	

			projections should include principle views of a simple object from top, front, and right sides.	Use traditional technical architectural drafting techniques to create drawings, demonstrate through drawings the development of maximum efficiency of circulation within areas or rooms, and develop a site plan using maximum orientation of the building.	
Applications of mathematics and measurements		Apply standard mathematical conventions to the application and use of design and drafting tools.	Describe and apply mathematical concepts as they relate to design drafting. Use physical measurement devices typically employed in engineering to collect and build a dataset.	Measure scaled lengths on technical drawings with the use of architectural and mechanical engineering scales, including: <ul style="list-style-type: none"> • Add, subtract, multiply, and divide fractions, decimals, feet, and inches. • Identify equivalent forms of fractions (e.g., $1/8" = 2/16"$, lowest common denominator) • Identify standard drafting scales (e.g., relationship between ratios and fractions). • Calculate the length of geometric shapes 	

				<ul style="list-style-type: none"> • Verify dimensions using estimation. 	
Computer Aided Drafting Software		<p>Operate common computer hardware and identify basic software programs used within the industry.</p> <p>Identify file management systems and practices (e.g., file organization, network navigation).</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>Demonstrate ability to use CAD software. Examples of assignments include:</p> <ul style="list-style-type: none"> • Prepare isometric, pictorial drawings of machine parts utilizing AutoCAD. • Prepare auxiliary views of machine parts with AutoCAD that comply with the ASME Y14.3-2003 standard. • Create, insert and edit blocks with AutoCAD or SolidWorks. • Utilize AutoCAD or SolidWorks to prepare multi-sheet working drawings for machine assemblies that comply with the ASME Y14.34-2008 standard. • Utilize AutoCAD or SolidWorks (or Revit) to prepare multi-sheet working drawings 	

