

## Colorado CTE Course – Scope and Sequence

Course Name	Welding Technology IV		Course Details	Credit = 1.0-2.0		
			Course = 0.50 Carnegie Unit Credit	Prerequisite: Welding Technology III CTE Credential: CTE Manufacturing		
<b>Course Description</b>	Covers welding in all positions and on various joint configurations and may include multiple welding process. Student should be familiar with basic metallurgy pertaining to the weld ability of metals, structural joints, and safety in the welding industry. This course offers advanced welding students a chance to design and fabricate metal projects. Instructor approval is required before signing up for this course.					
<b>Note:</b>	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 #	13207	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 <a href="https://www.cde.state.co.us/standardsandinstruction/essentialskills">https://www.cde.state.co.us/standardsandinstruction/essentialskills</a>						
Instructional Unit Topic	Suggested Length of Instruction	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration	
<b>Safety</b>		Demonstrate and explain safe welding and shop practices.	The student <u>evaluates</u> the function and application of the tools, equipment, technologies, and materials used in welding. The student is expected to: <ul style="list-style-type: none"> <li>A) Operate welding equipment according to safety standards;</li> <li>B) Identify and properly dispose of environmentally hazardous materials used in welding;</li> <li>C) Explain the importance of recycling materials used in welding;</li> </ul>	Accurately read, interpret, and demonstrate adherence to safety rules, including rules published by the Occupational Safety and Health Administration (OSHA) guidelines, American Society for Testing Materials; ANSI Z49.1: Safety and Welding, Cutting, and Allied Processes, And state and national code requirements. Be able to distinguish between rules and		

			<ul style="list-style-type: none"> <li>D) Choose appropriate personal protective equipment;</li> <li>E) Evaluate skills related to health and safety in the workplace as specified by appropriate governmental regulations; and</li> <li>F) Understand the AWS certification process.</li> </ul>	<p>explain why certain rules apply.</p> <p>Complete safety test with 100 percent accuracy.</p> <p>Identify and explain the intended use of safety equipment available in the classroom. For example, demonstrate how to properly inspect, use, store, and maintain safe operating procedures with tools and equipment.</p> <p>Locate and assess the American Welding Society website and analyze its structure, policies, and requirements for the AWS Entry Welder qualification and certification. Explain a welder qualification document, what steps are required to obtain the certification, and how to prepare for the examination.</p>	
<b>Metallurgy</b>		Describe basic metal categories, types, and uses.	Describe basic metal categories, types, and uses of metals encountered in the		

			<p>industrial environment. Student is expected to:</p> <ul style="list-style-type: none"> <li>A) Describe the characteristics and uses for: Mild steel <ul style="list-style-type: none"> <li>i. High carbon steels</li> <li>ii. Cast iron</li> <li>iii. Non ferrous metals</li> </ul> </li> <li>B) Understand how different metal react to different welding techniques; and</li> <li>C) Explain base metal vs. weld alloy.</li> </ul>		
<b>Mathematics and Metrics</b>		Apply mathematic and metric calculations and conversions to welding applications.	<p>Student is expected to:</p> <ul style="list-style-type: none"> <li>A) Perform basic addition, subtraction, division and multiplication with whole numbers, fractions and decimals;</li> <li>B) Perform linear, angular, four-sided, triangular and circular measurements;</li> <li>C) Calculate volume and weight of weldments;</li> <li>D) Calculate using percentages; and</li> <li>E) Perform metric conversions.</li> </ul>		
<b>Blueprints</b>		Investigate advanced blueprint reading skills for welding applications.	<p>Apply advance blueprint reading skills for welding applications Student is expected to:</p> <ul style="list-style-type: none"> <li>A) Identify advanced welding symbols;</li> </ul>		

			<p>B) Understand views and drawing lines;</p> <p>C) Identify tolerances;</p> <p>D) Understand stock allowances;</p> <p>E) Read auxiliary views; and</p> <p>F) Apply surface &amp; centerlines relations.</p>		
<b>Welding Concepts</b>		<p>Explain the selection of the appropriate welding process.</p>	<p>Explain the selection of the appropriate welding process. Student is expected to:</p> <p>A) Demonstrate the setup of the equipment for each weld method:</p> <ol style="list-style-type: none"> <li>i. Oxy-Fuel Cutting (OFC)</li> <li>ii. Plasma Arc Welding (PAC)</li> <li>iii. Shielded Metal Arc Welding (SMAW)</li> <li>iv. Gas Metal Arc Welding (GMAW)</li> <li>v. Gas Tungsten Arc Welding (GTAW)</li> </ol> <p>B) Explain electrode selection, power setting used for common metals; and</p> <p>C) Describe weld specifications of strength and quality for electrode.</p>		
<b>Welding Lab Fabrication</b>		<p>Differentiate and apply various types of welding assembly processes.</p> <p>Demonstrate increasing proficiency with welding processes and procedures.</p>	<p>Demonstrate advanced technical skills for various welding processes, including:</p> <ul style="list-style-type: none"> <li>• Oxy-Fuel Cutting (OFC)</li> <li>• Plasma Arc Welding (PAC)</li> </ul>		



