

Colorado CTE Course – Scope and Sequence

Course Name	Welding Technology IV		Course Details	Credit = 1.0-2.0 Prerequisite: Welding Technology III CTE Credential: CTE Manufacturing	
			Course = 0.50 Carnegie Unit Credit		
Course Description	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.				
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 #	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 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
Safety		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: A) Operate welding equipment according to safety standards; B) Identify and properly dispose of environmentally hazardous materials used in welding; C) Explain the importance of recycling materials used in welding;	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	

			D) Choose appropriate personal protective equipment; E) Evaluate skills related to health and safety in the workplace as specified by appropriate governmental regulations; and F) Understand the AWS certification process.	explain why certain rules apply. Complete safety test with 100 percent accuracy. 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. 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.	
Metallurgy		Describe basic metal categories, types, and uses.	Describe basic metal categories, types, and uses of metals encountered in the		

			industrial environment. Student is expected to: A) Describe the characteristics and uses for: Mild steel i. High carbon steels ii. Cast iron iii. Non ferrous metals B) Understand how different metal react to different welding techniques; and C) Explain base metal vs. weld alloy.		
Mathematics and Metrics		Apply mathematic and metric calculations and conversions to welding applications.	Student is expected to: A) Perform basic addition, subtraction, division and multiplication with whole numbers, fractions and decimals; B) Perform linear, angular, four-sided, triangular and circular measurements; C) Calculate volume and weight of weldments; D) Calculate using percentages; and E) Perform metric conversions.		
Blueprints		Investigate advanced blueprint reading skills for welding applications.	Apply advance blueprint reading skills for welding applications Student is expected to: A) Identify advanced welding symbols;		

			B) Understand views and drawing lines; C) Identify tolerances; D) Understand stock allowances; E) Read auxiliary views; and F) Apply surface & centerlines relations.		
Welding Concepts		Explain the selection of the appropriate welding process.	Explain the selection of the appropriate welding process. Student is expected to: A) Demonstrate the setup of the equipment for each weld method: - Oxy-Fuel Cutting (OFC) - Plasma Arc Welding (PAC) - Shielded Metal Arc Welding (SMAW) - Gas Metal Arc Welding (GMAW) - Gas Tungsten Arc Welding (GTAW) B) Explain electrode selection, power setting used for common metals; and C) Describe weld specifications of strength and quality for electrode.		
Welding Lab Fabrication		Differentiate and apply various types of welding assembly processes. Demonstrate increasing proficiency with welding processes and procedures.	Demonstrate advanced technical skills for various welding processes, including: - Oxy-Fuel Cutting (OFC) - Plasma Arc Welding (PAC)		

		Identify industry resources to create welding efficiencies for either skill development or for seeking information. Produce a completed fabrication, an assembly, or a repair by using appropriate joining and mechanical fastening techniques and processes.	• Shielded Metal Arc Welding (SMAW) • Gas Metal Arc Welding (GMAW) • Gas Tungsten Arc Welding (GTAW) The student is expected to: A) observe safe operating practices; B) apply safe handling of compressed gases; and C) perform cutting and welding processes according to accepted welding standards; and D) demonstrate skills required to make welds in all positions according to industry-accepted welding standards.		

Academic Standards Alignment

Colorado CTE courses are required to integrate academic and essential skills into course content. The following academic standards have been identified as aligned to this course and should be integrated throughout instruction.

[CO CTE Academic Standards Resources](#) (Rubrics, integration strategies, etc) [CDE Colorado Academic Standards Online](#) (Online standards lookup tool)

Reading, Writing, & Communicating

Standard 1: Oral Expression and Listening

- **Prepared Graduate 1:** Collaborate effectively as group members or leaders who listen actively and respectfully; pose thoughtful questions, acknowledge the ideas of others; and contribute ideas to further the group's attainment of an objective.

Standard 2: Reading for All Purposes

- **Prepared Graduate 4:** Read a wide range of informational texts to build knowledge and to better understand the human experience.
- **Prepared Graduate 5:** Understand how language functions in different contexts, command a variety of word-learning strategies to assist comprehension, and make effective choices for meaning or style when writing and speaking.

Standard 3: Writing and Composition

- **Prepared Graduate 9:** Demonstrate mastery of their own writing process with clear, coherent, and error-free polished products.

Standard 4: Research Inquiry and Design

- **Prepared Graduate 10:** Gather information from a variety of sources; analyze and evaluate its quality and relevance; and use it ethically to answer complex questions.

Note: Mathematics and Science standards will be added in the future. Visit the [Colorado Academic Standards](#) page for the most current version.