

Colorado CTE Course – Scope and Sequence

Course Name	Fundamentals of Manufacturing		Course Details	.5 (middle school- level 2)	
Course Description This course provides students with opportunities to become familiar with related careers and develop fundamental technological literacy as they learn about the history, systems, and processes of manufacturing. In addition, the course will provide an overview of the safe use of tools and equipment used in the industry. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials, and technology appropriate to the course content and in accordance with current practices.					
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 competencies are covered.					
SCED Identification #	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	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration	
Societal Impact of Manufacturing	Demonstrate an understanding of the societal impact of manufacturing.	Demonstrate an understanding of the societal impact of manufacturing	Skills USA use throughout		
			Track the evolution of manufacturing and its impact on society.		
			Explain the educational requirements and professional expectations associated with a career in manufacturing.		
			Describe the impact of governmental and political systems on manufacturing.		

				Explain the interaction between manufacturing industries and social change	
				Explain how manufacturing made the United States a world leader.	
				Describe the relationship between manufacturing and the environment	
				Explain the importance of a technologically literate workforce to the manufacturing industry.	
History of Manufacturing			Demonstrate an understanding of the history of manufacturing		
				Identify key historical events and their impact on manufacturing.	
				List key persons who have contributed to change in manufacturing.	
				Describe the Industrial Revolution and its impact on manufacturing.	
				Identify pioneers of the manufacturing industry.	
				Describe/debate the affect that automation has had on manufacturing.	
Safe work practices in manufacturing			Demonstrate an understanding of safe work practices while performing tasks		
				Identify safety equipment.	
				Recognize immediate, potential, and hidden hazards.	
				Perform housekeeping tasks related to maintaining a safe work environment.	
				Pass a safety test with a perfect score prior to operating equipment.	

				Demonstrate the proper safe use of tools and equipment	
				Identify safety color codes	
			Identify materials and resources used in manufacturing		
				Describe the seven basic technological resources.	
				Describe the properties of manufacturing materials.	
				Explain how materials are classified.	
				List, measure, and compare common mechanical properties of select materials.	
				List sources and costs where materials may be obtained	
				Create a bill of materials	
				Calculate production cost analysis	
Systems and processes in manufacturing			Describe the essential systems and processes involved in manufacturing		
				Compare and contrast custom, intermittent, and continuous manufacturing systems	
				Demonstrate fundamentals of producing technical sketches.	
				Create simple two- and three-dimensional drawings using CAD software.	
				List common hand tools used in the maintenance, installation, and repair of equipment.	
				Identify commonly used power tools.	
				Describe primary manufacturing processes.	

				List secondary manufacturing processes.	
				Define the terms separating and forming as it relates to manufacturing.	
				Identify separating processes – traditional and non-traditional.	
				Identify forming processes including casting, molding, compression, stretching, and conditioning.	
				Differentiate between combining processes such as mixing, bonding, coating, and mechanical filtering	
				Produce a simple part applying computer assisted production equipment.	
				Program a robot to perform a repetitive task.	
				Create a device that will perform a task using a computer-controlled program.	
				Describe the advantages/disadvantages of the separation processing of materials using manual versus computer-controlled machinery.	
				Describe assembling processes.	
				Explain the importance of finishing processes.	
				Describe the role of quality control in the manufacturing process.	
				Explain the importance of quality control within a manufacturing system.	
Introduction to manufacturing processes			Perform a pre-planned introductory manufacturing activity applying correct safety procedures, appropriate use of materials, and processing operations--		

				Use hand and power tools safely.	
				Demonstrate fundamentals of reading technical sketches.	
				Use English and/or metric measurement effectively in order to properly lay out a part for manufacturing	
				Follow a production flow chart to produce a teacher-selected product	
				Apply appropriate problem solving to improve an existing manufacturing system	
Employment and Career Opportunities in Manufacturing			Use visual and verbal communication to present employment and career opportunities in manufacturing	Present a technical report to an audience regarding a researched manufacturing related career using multimedia.	
				Prepare and produce a portfolio representing experiences throughout the course of study.	
Demonstration of techniques, skills and tools of manufacturing			Students will select and demonstrate techniques, skills, tools, and understanding related to manufacturing		
				Use common tools correctly and safely.	
				Describe strategies for selecting materials and processes necessary for developing a technological system or artifact	
				Demonstrate fundamental materials processing and assembly techniques.	
				Evaluate the interdependence of components in a technological system	

				and identify those elements that are critical to correct functioning.	
				Apply analytical tools to the development of optimal solutions for technological problems.	
Leadership development			Students will develop leadership and interpersonal problem-solving skills through participation in co-curricular activities.		
				Demonstrate effective communication skills.	
				Participate in teamwork to accomplish specified organizational goals.	
				Demonstrate cooperation and understanding with persons who are ethnically and culturally diverse.	