

Colorado AFNR Course Scope and Sequence

Course Name	Structure Design and Fabrication		Course Details	Level 3 course in the Power, Structure, & Technology pathway. This is the first course in the structural systems stand.		
			Course = 0.50 Carnegie Unit Credit			
Course Description	Students will gain knowledge and skills needed to enter the workforce or to prepare for a postsecondary degree in construction management, architecture, or engineering. Students will acquire knowledge and skills in safety, reading/creating construction drawings, tool ID and usage, building material ID and usage, building codes, and framing.					
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 #	18401	Schedule calculation based on 60% of a semester instructional time. 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						
Unit Number, Title and Brief Description	Suggested % of Instructional Time	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration	
Unit 1: Lab & Workplace Safety <ul style="list-style-type: none"> Review lab safety Expansion of Workplace safety expectations 	2%	PST.01. Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems.	PST.01.02. Apply physical science and engineering principles to design, implement, and improve safe and efficient mechanical systems in AFNR situations. <i>SCIENCE: SC.HS.1.6</i> <i>SC.HS.1.7</i> <i>SC.HS.1.9</i>	PST.01.02.02.c. Devise and document processes to safely implement and evaluate the safe use of AFNR related tools, machinery and equipment. PST.01.02.03.c. Conduct a safety inspection of tools, machines and equipment used in different AFNR related mechanical systems.		
Unit 2: Construction careers & Understanding Certifications <ul style="list-style-type: none"> Entry level training necessary 	2%	PST.01. Apply physical science principles and engineering applications to solve problems and improve performance in	PST.01.03 Apply physical science principles to metal fabrication using a variety of welding and cutting processes (e.g. SMAW, GMAW, GTAW, fuel-	PST 01.03.01.c. Evaluate the quality of metal fabrication procedures (e.g. SMAW, GMAW, GTAW, fuel-oxygen, and plasma arc torch, etc)		

<ul style="list-style-type: none"> • Post-secondary opportunities • Job Opportunities 		<p>AFNR power, structural and technical systems. CRP.10. Plan education and career path aligned to personal goals.</p>	<p>oxygen, and plasms arch torch, etc) CRP.10.01 Identify career opportunities within a career cluster that match personal interests, talents, goals, and preferences.</p>	<p>CRP.10.01.02.a Examine career clusters and identify potential career opportunities based on personal interests, talents, goals, and preferences.</p>	
<p>Unit 3: Building design, blueprints, & reading prints</p>	<p>3%</p>	<p>PST.04. Plan, build and maintain AFNR structures.</p>	<p>PST.04.01. Create sketches and plans for AFNR structures.</p>	<p>PST.04.01.01.a. Interpret and explain the meaning of symbols used in sketches of agricultural structures. PST.04.01.01.b. Apply scale measurement and dimension to develop sketches of agricultural structures. PST.04.01.02.a. Read and interpret the parts and/or views of plans for agricultural structures.</p>	
<p>Unit 4: Tool ID, usage, & Safe operation</p>	<p>2%</p>	<p>PST.01 Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural, and technical systems.</p>	<p>PST.01.02. Apply physical science and engineering principles to design, implement, and improve safe and efficient mechanical systems in AFNR situations. SCIENCE: SC.HS.1.6 SC.HS.1.7 SC.HS.1.9</p>	<p>PST.01.02.02.a. Identify the tools, machines and equipment needed to construct and/or fabricate a project in AFNR. PST.01.02.03.b. Select, maintain and demonstrate the proper use of tools, machines and equipment used in different AFNR related mechanical systems.</p>	
<p>Unit 5: Building materials, identification, & applications</p>	<p>3%</p>	<p>PST.04. Plan, build and maintain AFNR structures.</p>	<p>PST.04.02. Determine structural requirements, specifications and estimate costs for AFNR structures</p>	<p>PST.04.02.01.a. Summarize and categorize the information needed to complete a bill of materials and cost</p>	

				<p>estimate for an AFNR structure.</p> <p>PST.04.02.01.b. Analyze a project plan to prepare a bill of materials and an estimate of material costs.</p> <p>PST.04.02.02.a Research and summarize sources of industry construction and materials standards and their importance (e.g. American National Standards Institute, ANSI, Underwriter's Laboratories, UL, etc)</p>	
<p>Unit 6: Understand and identifying building components</p> <ul style="list-style-type: none"> • building shapes • roof design • Commercial/ agriculture/residential 	4%	PST.04. Plan, build and maintain AFNR structures.	PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).	PST.04.03.03.a. Compare and contrast the characteristics of wood and/or metal products used in AFNR structures.	
<p>Unit 7: Site Preparation</p> <ul style="list-style-type: none"> • Survey sites • Cut/fill • Site soil characteristics • Layout of foundation or building 	3%	PST.04. Plan, build and maintain AFNR structures.	PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).	<p>PST.04.03.02.a. Summarize the characteristics needed for an ideal building site.</p> <p>PST.04.03.02.b. Complete a building site analysis checklist to select an ideal building site.</p> <p>PST.04.03.02.c. Assess site characteristics, identify adjustments, and demonstrate procedures for preparing a building site.</p>	

<p>Unit 8: Foundations, Concrete, & Masonry</p> <ul style="list-style-type: none"> • Foundation design • Construction requirement for locations • Concrete ingredients • Concrete mixes • Pouring, forming, finishing, calculating mounts, curing process 	5%	<p>PST.04. Plan, build and maintain AFNR structures.</p>	<p>PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).</p>	<p>PST.04.03.06.a. Summarize the characteristics of the components found in concrete.</p> <p>PST.04.03.06.b. Calculate volume for concrete projects.</p> <p>PST.04.03.06.c. Construct, maintain and/or repair AFNR structures with concrete, brick, stone or masonry.</p>	
<p>Unit 9: Measurement & Layout</p> <ul style="list-style-type: none"> • Wall construction • Setting posts & alignment • OC measurements 	2%	<p>PST.04. Plan, build and maintain AFNR structures.</p>	<p>PST.04.01. Create sketches and plans for AFNR structures.</p> <p>PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).</p>	<p>PST.04.01.01.b. Apply scale measurement and dimension to develop sketches of agricultural structures.</p> <p>PST.04.03.03.c. Construct AFNR structures using wood and/or metal materials.</p>	
<p>Unit 10: Fasteners, Hardware & Component Construction (Truss)</p>	2%	<p>PST.04. Plan, build and maintain AFNR structures.</p>	<p>PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).</p>	<p>PST.04.03.01.a. Examine the criteria in selecting materials for constructing, maintaining, and/or repairing AFNR structures.</p> <p>PST.04.03.01.b. Analyze and assess samples of materials or products for quality and efficiency of workmanship.</p> <p>PST.04.03.01.c. Select materials for a project</p>	

				based upon an analysis of the project and the quality of the materials.	
Unit 11: Building Processes <ul style="list-style-type: none"> • Framing • Sheathing • Setting trusses • Roofing 	30%	PST.04. Plan, build and maintain AFNR structures.	PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).	PST.04.03.01.c. Select materials for a project based upon an analysis of the project and the quality of the materials. PST.04.03.03.c. Construct AFNR structures using wood and/or metal materials.	

CAS Academic Standards Alignment: Online Version: <https://www.cde.state.co.us/apps/standards/>; Download version: <https://www.cde.state.co.us/apps/standards/>

Science:

- SC.HS.1.6 – Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system.
- SC.HS.1.7 – Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems.
- SC.HS.1.9 – Although energy cannot be destroyed, it can be converted to less useful forms as it is captured, stored, and transferred.

Essential Skills:

Problem Solver:

- Critical Thinking and Analysis: The ability to apply a deliberate process of identifying problems, gathering information, and weighing possible solutions, including: making choices rooted in understanding patterns, cause-and-effect relationships, and the impacts that a decision can have on the individual and others.
- Creativity and innovation: the ability to demonstrate curiosity and imagination through experimenting with new and emerging ideas.

Empowered Individual:

- Self-Awareness: the ability to understand one’s own emotions, thoughts, and values, and how personal actions and emotions influence behavior across contexts, including: the capacity to recognize one’s strength and limitations with a well-grounded sense of confidence and purpose.
- Career Awareness: The ability to apply the knowledge and understanding of how one’s dreams, experiences, and interests translate into career fulfillment and lifelong pursuits in local, regional, national, and global career pathways and opportunities.

