CareerClusters®
PATHWAYS TO COLLEGE & CAREER READINESS
Agriculture, Food & Natural Resources

Learning that works for Colorado CTE®

Colorado AFNR Course Scope and Sequence

Course Name	**Structure Design and Fabrication**	**Course Details** **Course = 0.50 Carnegie Unit Credit**	Level 3 course in the Power, Structure, & Technology pathway. This is the first course in the structural systems stand.
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 • 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. *SCIENCE: SC.HS.1.6* *SC.HS.1.7* *SC.HS.1.9*	**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	2%	**PST.01**. Apply physical science principles and engineering applications to solve problems and improve	**PST.01.03** Apply physical science principles to metal fabrication using a variety of welding and cutting processes (e.g. SMAW,	**PST 01.03.01.c.** Evaluate the quality of metal fabrication procedures (e.g. SMAW,	

• Entry level training necessary • Post-secondary opportunities • Job Opportunities		performance in AFNR power, structural and technical systems. **CRP.10.** Plan education and career path aligned to personal goals.	GMAW, GTAW, fuel-oxygen, and plasms arch torch, etc) **CRP.10.01** Identify career opportunities within a career cluster that match personal interests, talents, goals, and preferences.	GMAW, GTAW, fuel-oxygen, and plasma arch torch, etc) **CRP.10.01.02.a** Examine career clusters and identify potential career opportunities based on personal interests, talents, goals, and preferences.	
Unit 3: Building design, blueprints, & reading prints	3%	**PST.04.** Plan, build and maintain AFNR structures.	**PST.04.01.** Create sketches and plans for AFNR structures.	**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.	
Unit 4: Tool ID, usage, & Safe operation	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. *SCIENCE: SC.HS.1.6* *SC.HS.1.7* *SC.HS.1.9*	**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.	

Unit 5: Building materials, identification, & applications	3%	**PST.04.** Plan, build and maintain AFNR structures.	**PST.04.02.** Determine structural requirements, specifications and estimate costs for AFNR structures	**PST.04.02.01.a.** Summarize and categorize the information needed to complete a bill of materials and cost estimate for an AFNR structure. **PST.04.02.01.b.** Analyze a project plan to prepare a bill of materials and an estimate of material costs. **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)	
Unit 6: Understand and identifying building components ● 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.	
Unit 7: Site Preparation ● 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.).	**PST.04.03.02.a.** Summarize the characteristics needed for an ideal building site. **PST.04.03.02.b.** Complete a building site analysis checklist to	

				select an ideal building site. **PST.04.03.02.c.** Assess site characteristics, identify adjustments, and demonstrate procedures for preparing a building site.	
Unit 8: Foundations, Concrete, & Masonry • Foundation design • Construction requirement for locations • Concrete ingredients • Concrete mixes • Pouring, forming, finishing, calculating mounts, curing process	5%	**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.04.03.06.a.** Summarize the characteristics of the components found in concrete. **PST.04.03.06.b**. Calculate volume for concrete projects. **PST.04.03.06.c.** Construct, maintain and/or repair AFNR structures with concrete, brick, stone or masonry.	
Unit 9: Measurement & Layout • Wall construction • Setting posts & alignment • OC measurements	2%	**PST.04.** Plan, build and maintain AFNR structures.	**PST.04.01.** Create sketches and plans for 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.04.01.01.b.** Apply scale measurement and dimension to develop sketches of agricultural structures. **PST.04.03.03.c.** Construct AFNR structures using wood and/or metal materials.	
Unit 10: Fasteners, Hardware & Component Construction (Truss)	2%	**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,	**PST.04.03.01.a.** Examine the criteria in selecting materials for constructing, maintaining, and/or repairing AFNR structures.	

			site preparation and/or layout, plumbing, concrete/masonry, etc.).	**PST.04.03.01.b.** Analyze and assess samples of materials or products for quality and efficiency of workmanship. **PST.04.03.01.c.** Select materials for a project based upon an analysis of the project and the quality of the materials.	
Unit 11: Building Processes ● 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.	

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)

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.

Students collaborate to interpret construction plans, safely use tools and equipment, complete site preparation, construct structural components, and solve problems throughout the building process.

Prepared Graduate 2: Deliver effective oral presentations for varied audiences and varied purposes.

Students communicate construction plans, safety procedures, project progress, and technical decisions during classroom discussions, demonstrations, and project-based learning activities.

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.

Students interpret construction drawings, blueprints, building codes, material specifications, industry standards, and technical documents to plan and construct agricultural structures.

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.

Students apply construction and engineering terminology while interpreting technical drawings, following safety procedures, documenting construction processes, and communicating project information.

Prepared Graduate 3 (literary texts) is not directly addressed by this course.

Standard 3: Writing and Composition

Prepared Graduate 7: Craft informational/explanatory texts using techniques specific to the genre.

Students prepare bills of materials, cost estimates, project plans, site analyses, and technical documentation that explain construction processes and support the design and fabrication of agricultural structures.

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

Students produce organized construction documentation, project plans, material estimates, and technical records that accurately communicate structural design and fabrication procedures.

Prepared Graduate 6 (argument writing) and Prepared Graduate 8 (narrative writing) are not explicitly supported by the course standards.

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.

Students research construction materials, industry standards, building codes, site characteristics, and structural requirements to develop plans, estimate costs, select appropriate materials, and construct safe and effective agricultural structures.

***Note**: Mathematics and Science standards will be added in the future. Visit the Colorado Academic Standards page for the most current version.*