

Colorado AFNR Course Scope and Sequence

Course Name	Ag. Engine & Equipment Technology C		Course Details	Level 4 course in the Power, Structure, & Technology pathway. This course aligns with the Equipment Technician Strand.		
			Course = 0.50 Carnegie Unit Credit			
Course Description	This course continues to build on previous learning of equipment system operation. Focus will be on electrical/electronic systems and the hydraulic system. Content includes understanding of system design, reading schematics, and troubleshooting of system operations along with identification of electrical and hydraulic components and their application of equipment and implements.					
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 #	18402	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	
Hydraulic Systems						
Unit 1: Theory of Hydraulic Operations Thermodynamic Laws	2%	PSTS .08 Understand and operate power and mechanical systems for agriculture use PST.03. Service and repair AFNR mechanical equipment and power systems.	PSTS .08.04 Apply theory & operation of hydraulic systems PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PSTS.08.04.a Understand the theory and principle of operation of hydraulic systems PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.		
Unit 2: Hydraulic Vocabulary & Terms	1%	PST.03. Service and repair AFNR mechanical equipment and power systems.	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used		

			power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	in AFNR power, structural and technical systems.	
Unit 3: Understand basic hydraulic system components & function • Pumps • Cylinders • Flow Controls • Connectors • Hoses • Piping	3%	PST.03. Service and repair AFNR mechanical equipment and power systems.	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Unit 4: Hydraulic Schematics	2%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.b. Analyze and interpret hydraulic and pneumatic system symbols and diagrams used in AFNR power, structural and technical systems.	
Unit 5: Differentiate between open and closed systems	2%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Unit 6: Application of Hydraulic Systems	2%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	

Unit 7: Principles of Hydrostatic Systems	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Unit 8: Application of Hydrostatic Systems	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Unit 9: Understanding difference between fixed, variable positive and non-positive pumps • Identification by pumps	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Unit 10: Swash Plate Control	1%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Unit 11: Flow, Directional & Pressure Control Valves	1%	PST.03. Service and repair AFNR mechanical equipment and power systems.	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used	

			(e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	in AFNR power, structural and technical systems.	
Unit 12: Hydraulic Motors Application & Design	2%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Unit 13: Hydraulic Calculations	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.03. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.	
Electrical Systems					
Unit 14: Ohms Law	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	PST.03.02.01.a Compare and contrast basic units of electricity (e.g., volts, amps, watts, and ohms) and the principles that describe their relationship (e.g., Ohm's Law, Power Law, etc.).	
Unit 15: DC Current Circuits	2%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	PST.03.02.01.c. Analyze and design electrical circuits for AFNR power, structural and technical systems using knowledge of the basic units of electricity.	
Unit 16: Electrical Schematics/Diagrams	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power	PST.03.02.02.b. Analyze and interpret electrical system symbols and diagrams.	

			systems using a variety of troubleshooting and/or diagnostic methods.		
Unit 17: Electrical Components •	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	PST.03.02.02.a. Compare and contrast the characteristics of electronic components used in AFNR power, structural and technical systems (e.g., battery, resistor, diode, transistor, capacitor, etc.).	
Unit 18: DC Electrical Systems • Starting Accessories • Lighting & control • Charging	10%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	PST.03.02.01.c. Analyze and design electrical circuits for AFNR power, structural and technical systems using knowledge of the basic units of electricity.	
Unit 19: Controls & Sensing Devices	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	PST.03.02.03.a. Classify the uses of electrical sensors and controls in AFNR power, structural and technical systems.	
Unit 20: Can-Buss Systems	1%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	PST.03.02.01.c. Analyze and design electrical circuits for AFNR power, structural and technical systems using knowledge of the basic units of electricity.	
Unit 21:Electrical Troubleshooting	6%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	PST.03.02.01.c. Analyze and design electrical circuits for AFNR power, structural and technical systems using knowledge of the basic units of electricity.	

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 during laboratory activities to diagnose hydraulic and electrical system malfunctions, interpret schematics, troubleshoot equipment, and safely repair agricultural machinery while working effectively as members of a technical team.

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

Students communicate diagnostic procedures, troubleshooting strategies, repair recommendations, and system operation through technical discussions, demonstrations, and project presentations using appropriate industry terminology.

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 hydraulic and electrical schematics, manufacturer service manuals, technical specifications, equipment documentation, and safety information to diagnose, maintain, and repair agricultural equipment systems.

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 technical vocabulary while interpreting hydraulic and electrical system documentation, following manufacturer guidelines, documenting repairs, and communicating diagnostic 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 diagnostic reports, maintenance records, repair documentation, troubleshooting summaries, and technical service records that explain equipment system operation, diagnostic procedures, and repair processes.

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

Students produce organized service documentation, maintenance logs, inspection records, and technical reports that accurately communicate equipment conditions, repairs, and system performance.

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 hydraulic and electrical system designs, manufacturer specifications, technical schematics, diagnostic procedures, and equipment technologies to troubleshoot malfunctions, select appropriate repair methods, and improve equipment performance and reliability.

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