Colorado AFNR Course Scope and Sequence

Course Name	Ag. Engine & Equipment Technology C	Course Details Course = 0.50 Carnegie Unit Credit	Level 4 course in the Power, Structure, & Technology pathway. This course aligns with the Equipment Technician Strand.
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	**PST.03.03.01.a.** Research and summarize the applications of common types of hydraulic and pneumatic systems used	

			and 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	**PST.03.03.** Utilize manufacturers' guidelines	**PST.03.03.01.a.** Research and summarize the	

		equipment and power systems	to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).	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 (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 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 systems using a variety of troubleshooting and/or diagnostic methods.	**PST.03.02.02.b.** Analyze and interpret electrical system symbols and diagrams.	
Unit 17: Electrical Components	3%	**PST.03.** Service and repair AFNR mechanical	**PST.03.02.** Service electrical systems and	**PST.03.02.02.a.** Compare and contrast the	

•		equipment and power systems	components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.	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.	

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

No alignment at this time.

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.