

Colorado AFNR Course Scope and Sequence

Course Name	Ag. Engine & Equipment Technology A		Course Details	Level 3 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 will consist of the basic theory, operation and maintenance of the internal combustion engine primarily small engines. Students will gain basic understanding and interpretation of technical manuals. This course will also offer career opportunities in the equipment technician field. The course focuses on engines in compact equipment utilized in agriculture, construction, and the green industry. Class time is divided between hands-on activities in the lab and classroom instruction.				
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
Unit 1: Careers in Ag Equipment Industry/Tech	2%	CRP.10. Plan education and career path aligned to personal goals.	CRP.10.02. Examine career advancement requirements (e.g., education, certification, training, etc.) and create goals for continuous growth in a chosen career.	CRP.10.02.01.b. Analyze the steps to meet career advancement requirements for potential careers	
Unit 2: Workplace Safety	2%	PST.02. Operate and maintain AFNR mechanical equipment and power systems.	PST.02.02. Operate machinery and equipment while observing all safety precautions in AFNR settings.	PST.02.02.02.a. Examine and identify safety hazards associated with equipment, machinery and power units used in AFNR power, structural, and technical systems (e.g., caution, warning, danger, etc.).	
Unit 3: Theory of Engine Operation	2%	PST.03. Service and repair AFNR mechanical	PST.03.01 Troubleshoot, service and repair	PST.03.01.02.a. Distinguish the characteristics of	

Combustion & Why engines work (thermodynamics)		equipment and power systems.	components of internal combustion engines using manufacturers' guidelines.	spark-and- compression internal combustion engines used in AFNR power, structural and technical systems.	
Unit 4: Review (content from level 2 PSTS Principles) - Engine types 2 stroke vs 4 stroke - Multiple cylinder engines - Gas vs. Diesel - Engine Systems- Purpose and operation	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.01.a Identify and classify components of internal combustion engines used in AFNR power, structural and technical systems. PST.03.01.02.a. Distinguish the characteristics of spark-and- compression internal combustion engines used in AFNR power, structural and technical systems.	
Unit 5: Fuel Systems - Fuel Types - Carburetor Function - Fuel Delivery methods	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.01.b. Analyze and explain how the components of internal combustion engines interrelate during operation.	
Unit 6: Electrical Systems - Ignition - Components & Design - Spark Plug function - Charging and starting systems	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 7: Governor Systems	2%	PST.03. Service and repair AFNR mechanical	PST.03.01 Troubleshoot, service and repair components of internal	PST.03.01.01.b. Analyze and explain how the components of internal combustion	

- Mechanical function - Electrical Function		equipment and power systems	combustion engines using manufacturers' guidelines.	engines interrelate during operation.	
Unit 8: Lubrication Systems - Function & Operation - Oils	2%	PST.02. Operate and maintain AFNR mechanical equipment and power systems.	PST.02.01 Perform preventative maintenance and scheduled service to maintain equipment, machinery, and power units used in AFNR settings	PST.02.01.02.a Examine operator's manuals to determine recommendations for servicing filtration systems and maintaining fluid levels on equipment, machinery, and power units used in AFNR power, structural, and technical systems.	
Unit 9: Cooling systems - Air cooled systems - Liquid cooled systems - Coolant	2%	PST.02. Operate and maintain AFNR mechanical equipment and power systems.	PST.02.01 Perform preventative maintenance and scheduled service to maintain equipment, machinery, and power units used in AFNR settings	PST.02.01.02.a Examine operator's manuals to determine recommendations for servicing filtration systems and maintaining fluid levels on equipment, machinery, and power units used in AFNR power, structural, and technical systems.	
Unit 10: Engine Components, ID, Purpose, & Specialty Tools - Key engine components - Basic engine tools - Specialty Tools - Measurement tools	4%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.01.a Identify and classify components of internal combustion engines used in AFNR power, structural and technical systems.	
Unit 11: Intake, exhaust, & emissions systems	5%	PST.03 Service and repair AFNR mechanical	PST.03.01 Troubleshoot, service and repair components of internal	PST.03.01.01.b. Analyze and explain how the components of internal combustion	

- Emission standards - Intake & exhaust operations		equipment and power systems.	combustion engines using manufacturers' guidelines.	engines interrelate during operation.	
Unit 12: Engine Troubleshooting - Isolation of problem techniques - Application of engine operation knowledge to solve issue	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.01.c. Evaluate service and repair needs for internal combustion engines using a variety of performance tests (e.g., manuals, computer-based diagnostics, etc.).	
Unit 13: Reading engine resource & manuals - Determination of engine model data - Navigation of technical manuals	2%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.02.b. Utilize technical manuals and diagnostic tools to determine service and repair needs of spark-and-compression internal combustion engines used in AFNR power, structural and technical systems.	
Unit 14: Measurement & Part Analysis - Measurement tools - Measurement Tolerance - Recording measurement data	3%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.01.a Identify and classify components of internal combustion engines used in AFNR power, structural and technical systems.	
Unit 15: Engine disassembly procedure & Evaluation	14% (flexible)	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal	PST.03.01.02.c. Inspect, analyze and repair spark-and- compression	

- Disassembly procedure - Evaluation of wear & clearances - Parts storage			combustion engines using manufacturers' guidelines.	internal combustion engines used in AFNR power, structural and technical systems.	
Unit 16: Engine Assembly - Assembly procedures - Torque Sequence - Settings & Adjustments	14% (flexible)	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.02.c. Inspect, analyze and repair spark-and- compression internal combustion engines used in AFNR power, structural and technical systems.	
Unit 17: Diesel Fuel Systems & Operations - Difference from gas engines - Fuel Delivery - Ignition	5%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.01.b. Analyze and explain how the components of internal combustion engines interrelate during operation.	
Unit 18: Engine Maintenance and service intervals Identifying and following service recommendations	2%	PST.03. Service and repair AFNR mechanical equipment and power systems	PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.	PST.03.01.01.c. Evaluate service and repair needs for internal combustion engines using a variety of performance tests (e.g., manuals, computer-based diagnostics, etc.).	

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 inspect equipment, diagnose engine problems, safely service mechanical systems, and perform maintenance procedures while following industry safety practices and technical procedures.

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

Students communicate engine operation, maintenance procedures, diagnostic findings, and equipment safety practices through demonstrations, technical discussions, and career readiness activities 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 technical manuals, service guides, equipment specifications, safety information, and manufacturer documentation to understand the operation, maintenance, and repair of agricultural engines and equipment.

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 service manuals, identifying engine components, following maintenance procedures, and communicating equipment diagnostics and repairs.

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 maintenance records, equipment inspection reports, service documentation, and technical summaries that explain engine 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 maintenance records, technical documentation, and career planning materials that accurately communicate equipment service procedures and diagnostic results.

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 engine systems, manufacturer specifications, maintenance procedures, equipment safety requirements, and career pathways to diagnose mechanical problems, perform effective equipment maintenance, and make informed technical decisions.

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