



CTSO Course Alignments: Agricultural Power and Equipment

Below you will find standards for the Agricultural Power and Equipment course aligned with competitive events from appropriate career and technical student organizations (CTSOs). Knowing the aligned events for your organization will allow you to have additional tools for teaching course standards, as well as increase student engagement and preparation in your CTSO activities. The final column recommends potential tools from other CTSO organizations. Even if your students are not participating in these organizations, available rubrics, tools, and materials can also add to the instructional resources at your disposal for best teaching your content.

Important to note: While the aligned activities below can be important tools in teaching course standards, it is important to note that events may not cover a standard in its entirety and should not be the sole instructional strategy used to address a standard.

	STANDARD	ALIGNED FFA COMPETITIVE EVENTS/PROGRAMS	OTHER POTENTIAL CTSO TOOLS & RESOURCES
1	Consult industry manuals to ascertain the specific safety prevention and control standards governing the agricultural engineering industry. Demonstrate adherence to recognized standards, and apply occupational safety concepts across all coursework, such as but not limited to procedures surrounding general safety, personal safety (such as the use of personal protective equipment), lifting, transporting, alerting, and reporting. (TN Reading 3)		<ul style="list-style-type: none"> • SkillsUSA: Occupational Health and Safety
2	Review common laboratory safety procedures for tool and equipment operation in the agricultural and biosystems engineering laboratories, including but not limited to accident prevention and control procedures. Demonstrate the ability to follow safety and operational procedures in a lab setting and complete a safety test with 100 percent accuracy. (TN Reading 3; ARNR CS)		<ul style="list-style-type: none"> • SkillsUSA: Occupational Health and Safety
3	Use local news media, organizational websites, and real-time labor market information to investigate occupations in agricultural power and equipment. Compare and contrast the knowledge, skills, and abilities necessary for employment, as well as the typical level of education required. (TN Reading 2, 9; TN Writing 4, 7, 9)	<ul style="list-style-type: none"> • FFA: Job Interview 	<ul style="list-style-type: none"> • FCCLA: Job Interview, Career Investigation, Entrepreneurship • HOSA: Job Seeking Skills • SkillsUSA: Job Interview, Entrepreneurship, Employment Application Process • TSA: Career Preparation

4	Gather and analyze information from multiple authoritative sources such as the United States Bureau of Labor Statistics (BLS) to develop a written projection of the occupational trends related to agriculture power and equipment. Supplement the narrative with relevant and properly cited charts, graphs, and other visual representations. (TN Reading 1, 9; TN Writing 2, 9)		<ul style="list-style-type: none"> • FCCLA: Job Interview, Career Investigation, Entrepreneurship • HOSA: Researched Persuasive Speaking • SkillsUSA: Job Interview, Entrepreneurship, Employment Application Process • TSA: Essays on Technology
5	Investigate opportunities to expand and diversify a Supervised Agricultural Experience (SAE) program as related to agriculture power and equipment. Accurately maintain an activity recordkeeping system and apply proper financial recordkeeping skills to summarize records by completing SAE related applications and reports. (TN Reading 9; TN Writing 2)	<ul style="list-style-type: none"> • FFA: Job Interview 	
6	Compare and contrast the first and second laws of thermodynamics as applied to the study of combustion engines. Analyze the theory of operation and efficiency of internal combustion engines with regard to fuels, engine displacement, ignition, lubrication, and cooling. (TN Reading 1)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	<ul style="list-style-type: none"> • HOSA: Researched Persuasive Speaking
7	Evaluate and optimize engine performance under load and no-load operation, considering the effects of air temperature, humidity, fuel quality, and engine tuning. (TN Reading 4; TN Math F-IF, S-ID)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	
8	Citing technical data and documentation of prior work, develop a written recommendation outlining a specific task or procedure for a given engine or motor (such as using a three-phase 5 hp electric motor in order to drive a 125-foot conveyor belt for lifting grain to a 60-foot silo). (TN Reading 1; TN Writing 1, 4; TN Math N-Q, A-SSE, F-IF, F-LE)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	<ul style="list-style-type: none"> • HOSA: Researched Persuasive Speaking • TSA: Essays on Technology
9	Demonstrate the ability to troubleshoot single-cylinder engines and electric motors. Create a written estimate of repairs, including parts, labor, time, and total cost. (TN Reading 1, 3, 4; TN Writing 2, 4)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	
10	Recommend the appropriate machinery for a given agricultural application by matching the mechanical need to the scale and magnitude of the specific task. Using clear and coherent writing, justify the recommendation based on availability of parts, operational costs, maintenance, safety, and total cost. For example, recommend the appropriate tractor for a specified task based on power ratings, engine and transmission systems, hydraulic capabilities, hitching, and ballasting. (TN Reading 1, 3, 4, 7, 9; TN Writing 1, 2, 4)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance, Farm Business Management 	

11	Research the basic types of fuel and lubricants; differentiate their chief components, characteristics and applications as related to agricultural equipment in an explanatory essay. (TN Writing 2, 4, 7, 8, 9)		
12	Demonstrate the ability to maintain, troubleshoot, and repair agricultural equipment and create a written estimate of repairs including itemization of parts, labor, time, and total cost. (TN Reading 3; TN Writing 2, 4; TN Math N-Q)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	
13	Compose an informational text comparing and contrasting the types and functions of precision and advanced technologies (such as geographic information systems [GIS], global positioning systems [GPS], and unmanned aerial vehicles [UAV]) available to the agriculture industry, citing technical data where appropriate. (TN Reading 1, 9; TN Writing 2, 4, 8, 9)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	<ul style="list-style-type: none"> • HOSA: Researched Persuasive Speaking • TSA: Desktop Publishing
14	Demonstrate in a live setting or in a presentation the ability to safely operate agriculture equipment, including precision-operated equipment if available. (TN Reading 3)		<ul style="list-style-type: none"> • HOSA: Prepared Speaking • TSA: Prepared Presentation
15	Write an explanatory text to summarize the components and operational theory of a basic hydraulic system used in an agriculture setting. (TN Writing 2, 7, 9)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	<ul style="list-style-type: none"> • HOSA: Researched Persuasive Speaking, Extemporaneous Writing
16	Design a hydraulic system to perform a specific task, applying the principles of fluid kinematics and hydrostatics to outline how the system functions. The design should include specifications for pumps, pipes, and flow rates. (TN Writing 2, 4; TN Math G-GMD)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	
17	Troubleshoot and repair hydraulic power and control systems used in agricultural equipment such as piston-driven lifts and compression devices (such as shears, crushers). Document the parts and labor involved and draft a repair bill for suitable compensation. (TN Reading 3; TN Writing 2, 8, 9; TN Math N-Q)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	
18	Explain how agricultural enterprises employ geographic information systems (GIS) and global positioning systems (GPS) in their work, including GIS software, GPS receivers, data acquisition, and spatial analysis of data. Debate the legal, ethical, and economic implications of the use of these emerging technologies with regard to maximizing the efficiency and efficacy of agricultural processes, citing specific textual evidence from case studies and news media. (TN Reading 1, 9; TN Writing 2, 8, 9)	<ul style="list-style-type: none"> • FFA: Agricultural Issues 	<ul style="list-style-type: none"> • FCCLA: Advocacy • HOSA: Biomedical Debate • TSA: Debating Technological Issues
19	Correctly and safely use precision surveying instruments to make measurements of large acreages. Compile a written survey report for use by a lay reader, supplementing the narrative with charts, graphs, and other visual representations to aid comprehension. (TN Reading 3; TN Writing 2, 7; TN Math N-Q)	<ul style="list-style-type: none"> • FFA: Land Evaluation 	

ALL	CAN BE USED WITH ALL/MOST STANDARDS	<ul style="list-style-type: none">• FFA: Agriscience Fair, Agricultural Technology and Maintenance	<ul style="list-style-type: none">• FCCLA: Illustrated Talk, Chapter in Review Display, Chapter in Review Portfolio• SkillsUSA: Career Pathways Showcase, Job Skills Demonstration A, Job Skills Demonstration O, Prepared Speech, Extemporaneous Speaking, Chapter Display, Power Equipment Technology
------------	--	---	--