

APPLIED AGRICULTURAL MECHANICS (Ag IV) Curriculum

Course # 420104

Applied Agricultural Mechanics is a one-credit course that provides students with an advanced understanding of the Agriculture, Food and Natural Resources cluster, which contains five pathways—Power, Structure, and Technical Systems; Environmental and Natural Resources Systems; Animal Systems; Plant Systems; and Agribusiness Systems. Students are involved in classroom and laboratory activities in each of the five pathway areas. The emphasis for Applied Agricultural Mechanics is metal fabrication and power mechanics. Students should be allowed ample time in the laboratory to apply content in real world applications. The curriculum will provide opportunities for credentials utilizing resources from NCCER.

Content standards for this course are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources.

Applied Agricultural Mechanics is part of a four course sequence that comprises the General Agriscience Program. This course should be offered in series along with Fundamentals of Agriscience, Intermediate Agriscience, and Advanced Agriscience to 9th through 12th grade students. It is strongly encouraged that Fundamentals of Agriscience be required as a pre-requisite for this course.

Career and technical student organizations are integral, co-curricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

Students will...

Impact of Agriculture

1. Explain the impact of agriculture on a county's economy, utilizing National Agricultural Statistics Service (NASS) information.
 - Describing the impact of an abundant, inexpensive, and safe food supply
 - Examples: abundant—independence from foreign food imports
 - inexpensive—less income spent on food
 - safe—better overall health of populations
 - Comparing United States and world agricultural practices

2. Demonstrate communication skills utilized within an agribusiness.

Examples: public speaking, letter writing

- Demonstrating qualities of leadership, cooperation, and good citizenship within an agricultural organization such as the FFA and its mission by utilizing the FFA member handbook
- Demonstrating parliamentary procedures utilizing the FFA CDE booklet

Safety

3. Describe safety rules and regulations that apply to the agricultural industry.

POWER, STRUCTURAL, AND TECHNICAL SYSTEMS: CORRESPONDING NCCER MODULE

Power Equipment Technology

4. Perform routine care and maintenance on small engines.
 - Identifying preventive maintenance procedures used in checking and servicing hydraulic and pneumatic systems
 - Examples: changing fluids, changing filters, checking fluid levels, checking hoses
 - Explaining how a pneumatic system works
 - Developing lists of systems in power equipment that utilize hydraulics
 - Describing the use of compliance controls on power equipment
 - i. Examples: engine kill switch, inertia brake control
 - Demonstrating the procedure for manual starter overhaul and for repairing electric starters
 - Diagnosing cutting-deck problems in power equipment
 - Diagnosing chain saw problems
 - i. Demonstrating the procedure for correcting chain saw engine problems
 - ii. Demonstrating the procedure for correcting bar and chain problems
 - Diagnosing string trimmer problems
 - Diagnosing tiller problems

Welding

5. Properly explain, describe, and demonstrate the use of safety equipment, protective clothing, and procedures applicable to agricultural metal fabrication.
 - Identifying hazards associated with metal fabrication processes
 - Demonstrating the use of protective clothing and equipment needed when working with agricultural metals
 - Describing the some of the causes of accidents in an agricultural metal shop
 - Explaining how to avoid harmful health effects association with metal fabrication
Examples-air gas cylinder and hazardous material handling
 - Comparing uses of MSDS (Material Safety Data Sheets)
 - Discussing the classifications and treatments of burns and avoidance of electric shock

6. Identify and explain the safe use of oxyfuel cutting equipment.
 - Demonstrating how to set up oxyfuel equipment
 - i. Lighting and adjusting an oxyfuel torch
 - ii. Shutting down oxyfuel cutting equipment
 - iii. Disassembling oxyfuel equipment
 - iv. Changing cylinders
 - v. Performing oxyfuel cutting
 - vi. Cutting Straight line and square shapes
 - vii. Piercing and slot cutting

7. Explain the plasma arc cutting processes.
 - Identifying plasma arc cutting equipment
 - Preparing and setting up plasma arc cutting equipment
 - Using plasma arc cutting equipment to make various types of cuts
 - Storing equipment properly and cleaning the work area after use

8. Demonstrate techniques for preparing metal for fabrication.
 - Cleaning base metal for welding or cutting
 - Identifying joint design
 - i. Explaining joint design considerations

- ii. Selecting the proper joint design based on a welding procedure specification (WPS) or instructor direction
 - Mechanically beveling the edge of a mild steel plate
 - Thermally beveling the end of a mild steel plate
9. Analyze weld imperfections to determine corrective measures.
- Reviewing codes governing welding
 - Identifying and explain weld imperfections and their causes
 - Comparing nondestructive examination practices
 - Explaining welder qualification tests
 - Appraising the importance of quality workmanship
 - Identifying common destructive testing methods
 - Performing a visual inspection of fillet welds
10. Explain the shielded metal arc welding (SMAW) process.
- Evaluating shielded metal arc welding (SMAW) safety
 - Explaining welding electrical current
 - Locating welding power supplies and their characteristics
 - Demonstrating how to set up welding power supplies
 - Demonstrating how to set up a machine for welding
 - Identifying tools used for weld cleaning
11. Compare and contrast various types of welding electrodes used in SMAW
- Investigating factors that affect electrode selection
 - i. Explaining the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) filler metal classification system
 - Identifying and selecting the proper electrode for an identified welding task
 - Evaluating different types of filler metals
 - i. Explaining the storage and control of filler metals
 - ii. Explaining filler metal traceability requirements and how to use applicable code requirements

12. Demonstrate techniques for flat, vertical, horizontal, and overhead welding

- Demonstrating the setup of shielded metal arc welding (SMAW) equipment
- Demonstrating methods of striking an arc
- Striking and extinguishing an arc properly
- Evaluating the causes of arc blow and wander
- Performing stringer, weave, and overlapping beads
- Performing fillet welds in the following positions:
 - i. Horizontal (2F)
 - ii. Vertical (3F)
 - iii. Overhead (4F)

Painting

13. Describe the successful characteristics of a successful tradesperson e.g. painter.

- Analyzing historical milestones in the painting trade

14. Discuss and describe construction site hazards.

- Discussing and describe construction site hazards
- Discussing protection equipment and safety practices used when working on ladders scaffolds, and lifts

15. Identify Surface /Substrate Materials and Conditions.

- Identifying types of surfaces in construction that are to be painted

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NCCER MODULE CORRELATION GUIDE

Power Structural and Technical Systems: Corresponding NCCER Modules

Welding Content Standard Number	Correlated NCCER Module
5.	Welding Safety (2.5) Module ID 29101-09
6.	Oxyfuel Cutting (17.5) Module ID 29102-09
7.	Plasma Arc Cutting (7.5) Module ID 29103-09
8.	Base Metal Preparation (12.5) Module ID 29105-09
9.	Weld Quality (10) Module ID 29106-09
10.	SMAW Equipment and Setup (5) Module ID 29107-09
11.	Shielded Metal Arc Electrodes (2.5) Module ID 29108-09
12.	SMAW Beads and Fillet Welds (120) Module ID 29109-09
Painting Content Standard Number	Correlated NCCER Module
13.	Careers in the Painting Trade Module ID# 07101 (5)
14.	Safety Module ID # 07102 (10)
14.	Ladders, Scaffolds, Lifts, and Fall Protection Module ID # 07103 (10)
15.	Identify Surface /Substrate Materials and Conditions Module ID # 07104 (5)