

Agricultural Systems and Technology II

Levels:	Grades 10–12
Units of Credit:	1.00
CIP Code:	01.0221
Core Code:	30-01-00-00-040
Prerequisite:	Agricultural Systems and Technology I
Skill Test:	# 113

COURSE DESCRIPTION

Students will develop knowledge and skills in the application of principles and techniques of power, structural, and technical systems used in the agricultural industry. Emphasis will be on selecting, operating, maintaining, servicing, and using agricultural power units and equipment. The course also includes agricultural uses of concrete and electricity. Safety and the proper use of safe practices will be integrated throughout the instruction. The instructional methods will involve applications of concepts being taught through classroom and laboratory instruction and supervised agricultural experience. Note: This course builds on knowledge and skills developed in Agricultural Systems and Technology I.

CORE STANDARDS, OBJECTIVES, AND INDICATORS

STANDARD 1

Students will develop personal, leadership, and career skills through FFA participation.

Objective 1: Assess the role of FFA participation in developing personal and leadership skills.

- a. Identify important personal skills and the strategies to use in developing the skills.
- b. Identify important leadership skills and the role of FFA participation in developing the skills.

Objective 2: Assess the role of FFA participation in developing career skills.

- a. List and describe proficiency awards appropriate in agricultural systems and technology.
- b. List and describe career development events appropriate in agricultural systems and technology.
- c. Relate the importance of supervised agricultural experience to FFA achievement.
- d. Utilize FFA and supervised agricultural experience participation to gain advanced degrees of FFA membership.

STANDARD 2

Students will explain the maintenance and expansion of supervised agricultural experience (SAE) programs in agricultural education.

Objective 1: Maintain and use SAE records.

- a. Explain how SAE records are maintained from year to year.
- b. Explain how to summarize and analyze SAE records.

Objective 2: Devise long-range plans for expanding SAE programs.

- a. Evaluate the overall quality of a current SAE, and determine how to make it more productive or profitable.
- b. Explain factors that should be considered in expanding an SAE program.
- c. Explain how placement SAE and ownership SAE programs may be expanded.

STANDARD 3

Students will describe the role of agricultural education in advanced agricultural systems and technology.

Objective 1: Investigate the importance of agricultural power, structural, and technical systems and the available career opportunities.

- a. Explain the meaning and importance of agricultural power units, machinery, and equipment.
- b. Identify and describe career opportunities in agricultural power units, machinery, and equipment.

Objective 2: Review the importance of safety in agricultural power, structural, and technical systems.

- a. Identify safety hazards and the actions needed to minimize risk with agricultural power units, machinery, and equipment.
- b. Select and properly use appropriate personal protective equipment (PPE).
- c. Maintain neat, well-organized, well-ventilated, and safe work areas.
- d. Identify appropriate safety responses in accidents or emergencies, including the use of first aid and contact of emergency services.
- e. Properly dispose of waste materials to assure minimum environmental impact.

STANDARD 4

Students will apply physical science laws and principles with agricultural power units, machinery, and equipment.

Objective 1: Identify and explain the functions of power units, machinery, and equipment used in agriculture.

- a. Distinguish sources of power, including internal combustion engines and electric motors.
- b. Explain the functions of equipment used in agriculture, including tillage equipment, planting equipment, application equipment, cutting equipment, and harvesting equipment.

Objective 2: Identify and distinguish the components and systems of internal combustion engines.

- a. Classify engines by fuel used, kind of ignition, and cycle of operation.
- b. Explain the functions of engine systems, including air, fuel, exhaust, ignition, lubrication, and cooling.
- c. Identify the major components or structure of an engine, including engine block, cylinders, pistons, connecting rods, and crankshaft.
- d. Describe the strokes of a four-stroke-cycle engine, including the role of combustion and heat.

STANDARD 5

Students will provide preventive maintenance in the care and operation of internal combustion engines.

Objective 1: Assess the importance of proper preventive maintenance of internal combustion engines.

- a. Relate proper preventive maintenance to engine life and efficiency of operation.
- b. Explain preventive maintenance in terms of environmental responsibilities, including reduced emissions, more efficiency, and disposal of wastes.
- c. Utilize operators' manuals to determine preventive maintenance schedules and practices for specific engines.
- d. Identify, select, properly use, and maintain tools needed in preventive maintenance of internal combustion engines.

Objective 2: Perform preventive maintenance on engine systems.

- a. Perform air intake system maintenance on engines, including those with dry element filters, oil foam filters, and oil bath cleaners.
- b. Perform fuel system maintenance on an engine, including filter replacement.
- c. Perform lubrication system maintenance on an engine, including selecting and changing oil and replacing the filter.
- d. Perform ignition system maintenance on an engine, including battery cleaning and hydrometer testing.
- e. Perform exhaust system maintenance on an engine, including checking for leaks and replacing worn or damaged components.
- f. Perform cooling system maintenance on liquid- and air-cooled engines.
- g. Perform electrical system maintenance on engines.

STANDARD 6

Students will provide preventive maintenance and repair in the care and operation of power units and implements.

Objective 1: Perform preventive maintenance on power units and implements.

- a. Clean all components, removing trash, mud, dust, and other dirt by using pressure washing, hand wiping, or other appropriate methods.
- b. Assess the drive train for maintenance or repair.
- c. Properly inflate tires.
- d. Lubricate the steering system, as appropriate.
- e. Adjust belts and chains for proper operation.
- f. Inspect, analyze, and provide appropriate service for the clutch and brakes.
- g. Perform appropriate service on a hydraulic system, including checking fluid levels and replenishing fluids as needed, checking for leaks, and replacing or tightening faulty fluid conveyance components.
- h. Adjust covers, shields, and other safety devices.
- i. Evaluate and service vehicle traction and ballasting as needed.

Objective 2: Perform basic repair on power units and implements.

- a. Explain the meaning and importance of troubleshooting malfunctions.
- b. Select and use appropriate computer and onboard diagnostic equipment.
- c. Use technical manuals in diagnosing problems, taking corrective actions, and testing power units and implements following repair.
- d. Use metal fabrication skills in making selected repairs to power units and implements.

STANDARD 7

Students will safely operate basic power units and equipment.

Objective 1: Identify power unit controls and instruments and their functions.

- a. Locate controls on a power unit, including starter button or key, throttle, clutch, brakes, lights, and others (depending on the unit), and explain and demonstrate their functions.
- b. Locate instruments on a power unit, including oil pressure gauge, temperature gauge, tachometer, fuel gauge, and others (depending on the unit), and discuss their functions.
- c. Perform a pre-operation inspection according to the manufacturer's recommendations in the owner's manual.

Objective 2: Identify equipment controls for various agricultural power units and describe their functions.

- a. Compare and contrast various agricultural power units and equipment.
- b. Mount or attach equipment to a power unit or tractor following manufacturer's recommendations.
- c. Operate equipment following safe and approved practices.

STANDARD 8

Students will plan and construct with concrete.

Objective 1: Explain the composition and characteristics of concrete.

- a. Define concrete, and list advantages and disadvantages of its use.
- b. Identify important agricultural uses of concrete.
- c. Explain proportions and qualities of ingredients.
- d. Describe the qualities of properly placed and cured concrete.

Objective 2: Place concrete.

- a. Identify tools and equipment used in placing concrete.
- b. Explain the construction and use of forms.
- c. Calculate the amount of concrete needed for a job.
- d. Explain the use of reinforcing steel.
- e. Demonstrate the placing of concrete, including striking off, finishing the surface, and curing.

STANDARD 9

Students will plan and install basic electrical wiring systems.

Objective 1: Explain the characteristics and measurement of electricity.

- a. Define electricity, and identify the kinds of current (DC and AC) used in agriculture.
- b. Describe how electricity is measured, including ampere, watt, and volt.
- c. Discuss voltage drop and its impact on electrical devices.
- d. Describe the meaning and use of circuits.
- e. Describe safety practices with electricity.

Objective 2: Install basic electrical circuits.

- a. Distinguish between the functions and materials of insulators and conductors.
- b. Identify and use materials and tools in circuit installation.
- c. Explain and demonstrate the installation of boxes, splices, and connections.
- d. Energize a simple circuit to test its workability.
- e. Use instruments to test and validate circuits.

STANDARD 10

Students will fabricate with metal.

Objective 1: Use shielded metal arc welding (SMAW) processes.

- a. Make 3G (vertical position-groove weld) welds on carbon steel.
- b. Make 3F (vertical position-butt weld) welds on carbon steel.

Objective 2: Use plasma cutting and air carbon arc gouging processes.

- a. Perform safety inspections of equipment and accessories.
- b. Set up for manual plasma cutting operations on carbon steel.
- c. Set up for manual air carbon arc gouging on carbon steel.

Objective 3: Use gas metal arc welding (GMAW) processes.

- a. Use Short Circuit Transfer welding process to make 3G (vertical position-groove weld) welds on carbon steel.
- b. Use Short Circuit Transfer welding process to make 3F (vertical position-butt weld) welds on carbon steel.