

AGRICULTURE POWER, STRUCTURE, AND TECHNOLOGY

Agriculture Power, Structure and Technology is a two semester, up to six semester, lab intensive course in which students develop an understanding of basic principles of tool selection, operation, maintenance, and management of agricultural equipment in concert with the utilization of technology. Topics covered include: safety, problem solving/troubleshooting, electricity, plumbing, concrete, carpentry, metal technology, engines, emerging technologies, leadership development, supervised agricultural experience, and career opportunities in the area of agriculture power, structure, and technology.

Agriculture Power, Structure, and Technology introduces students to many careers in agriculture, and more specifically, animal science. These careers include but are not limited to: Agriculture Engineers, Diesel Technician, Equipment and Parts Managers, Equipment Sales, GPS Technicians, Heavy Equipment Maintenance Technicians, Hydraulic/Pneumatic Technician, Machine Operators, Machinists, Remote Sensing Specialists, and Welders.

Course Specifications

- DOE Code: 5088
- Recommended Grade Level: Grade 9-12
- Recommended Prerequisites: Introduction to Agriculture, Food, and Natural Resources
- Credits: 1-3 credit(s) per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in FFA, the CTSO for this area.

Content Standards

Domain - Classroom and Tool Safety

Core Standard 1 Students analyze and implement safe work practices which apply to agricultural mechanics.

Standards

- APST-1.1 Explain the importance of safety in agricultural mechanics
- APST-1.2 Identify and differentiate between safe and unsafe shop and work safety practices
- APST-1.3 Describe the methods utilized to implement safe work and proper use of safety equipment practices
- APST-1.4 Identify and explain the purpose of signals and symbols in agricultural safety
- APST-1.5 Explain the importance and function of an operator's manual
- APST-1.6 Identify and explain the role that various agencies play in regulating shop safety
- APST-1.7 Locate and demonstrate the proper uses of the first aid and emergency equipment found in an agricultural shop
- APST-1.8 Develop proper safety skills to use for hand and power tools

Core Standard 2 Determine which hand tool, power tool, and measuring and marking devices is most appropriate for a job.

Standards

- APST-2.1 Identify the hand and power tools utilized in agricultural power, structure, and technology
- APST-2.2 Display the proper techniques to employ when utilizing hand and power tools
- APST-2.3 Identify and display the correct use of measuring and marking devices
- APST-2.4 Show the correct procedures to follow when preparing to grind, sharpen, and recondition equipment and hand tools
- APST-2.5 Demonstrate a knowledge and understanding of metric to standard measurement conversions

Domain – Electricity

Core Standard 3 Students analyze and apply the procedures used in basic electricalelectric wiring.

Standards

- APST-3.1 Define basic electrical terminology and Identify and explain the basic principles of electricity and differentiate between amps, ohms, volts, and watts
- APST-3.2 Recognize and explain schematics and construct wiring circuits
- APST-3.3 Demonstrate safe wiring practices and basic wiring skills
- APST-3.4 Show the methods used to make proper splices, connections and solderingsoldering

- APST-3.5 Explain and demonstrate the methods used to measure electrical circuits for voltage, amperage, resistance, and wattage
- APST-3.6 Solve multi-step problems to install electrical circuits, switching devices, and appliances
- APST-3.7 Justify the need to install ground-fault circuit interrupters Keep this standard as students need to know when to install one in wet locations.
- APST-3.8 Explore and utilize electric motors and controls

Core Standard 4 Students apply concepts used in basic plumbing.

Standards

- APST-4.1 Define basic plumbing terminology
- APST-4.2 Display the proper procedures utilized to connect flare and compression fittings
- APST-4.3 Perform the proper procedures to utilize when making plumbing connections for metal, PVC, CPVC, Copper, and Pex
- APST-4.4 Demonstrate the proper procedures for cutting, fitting, and assembling pipe

Domain – Hydraulic and Pneumatic

Core Standard 5 Students analyze and apply the procedures used in basic hydraulic and pneumatic systems

Standards

- APST-5.1 Understand the safety procedures required for handling hydraulic and pneumatic systems
- APST-5.2 Identify hydraulic and pneumatic symbols and components
- APST-5.3 Explain the scientific and mechanical ways in which hydraulic and pneumatic systems operate and demonstrate troubleshooting procedures
- APST-5.4 Demonstrate the proper method of measuring and calculating speed, torque, and power for hydraulic and pneumatic systems

Domain - Concrete

Core Standard 6 Students apply and adapt proper application of basic concrete principles.

Standards

- APST-6.1 Define basic concrete terminology and develop a list of necessary materials to complete the task
- APST-6.2 Demonstrate the proper methods used to construct forms and prepare a site for concrete/masonry construction
- APST-6.3 Demonstrate the proper methods used to lay out a building foundation
- APST-6.4 Calculate the cost and amounts of materials needed to formulate a concrete or mortar mix

APST-6.7 Demonstrate all of the necessary steps to place, consolidate, finish, and cure concrete

Core Standard 7 Students apply concepts in basic carpentry skills.

Standards

- APST-7.1 Define basic carpentry terminology, tools, and equipment
- APST-7.2 Identify and explain the uses for the various building materials and show the proper methods for planning a cost effective construction project
- APST-7.3 Identify, select, and apply construction fasteners
- APST-7.4 Demonstrate the proper methods for laying out, cutting, and constructing buildings or building components
- APST-7.5 Demonstrate the proper methods for construction of various forms of trusses from different building materials
- APST-7.6 Demonstrate the proper methods for the installation of various roofing materials
- APST 7.7 Reading and understanding construction blueprints and building codes

Domain - Metal Technology

Core Standard 8 Students establish metal technology skills.

Standards

- APST-8.1 Define basic metal terminology
- APST-8.2 Correctly identify various metals and how to correctly cut, file, shape, and drill metal
- APST-8.3 Explain and demonstrate the proper procedures for cutting threads with taps and dies
- APST-8.4 Explain and show the uses for arc, MIG, and TIG welding equipment, proper operation and preparation of metal to be welded
- APST-8.5 Demonstrate proficiency in the proper methods utilized to weld basic joints in all positions
- APST-8.6 Explain and show the uses for oxy-fuel equipment, proper operation and preparation specific to welding or cutting operations
- APST-8.7 Demonstrate how to prepare and finish metal
- APST-8.8 Demonstrate how to read and draw welding symbols

Domain - Engines

Core Standard 9 Students analyze operation, maintenance, and repair of engines.

Standards

- APST-9.1 Identify and explain the function and maintenance of integral engine components
- APST-9.2 Compare and contrast a 4 stroke-cycle, 2 stroke-cycle, and diesel engine

- APST-9.3 Explain and demonstrate the proper tools methods for overhauling ICB “internal combustion” engines
- APST-9.4 Explain and demonstrate proficiency in the use of measuring tools and test instrument
- APST-9.5 Select and use lubricants by proper classification
- APST-9.6 Understand basic fundamentals and troubleshooting for fuel, cooling, electrical, and intake and exhaust systems functions

Domain - Emerging Technologies

Core Standard 10 Apply concepts in emerging technologies related to agriculture power, structure and technology.

Standards

- APST-10.1 Evaluate, apply, and troubleshoot emerging technologies
- APST-10.4 Identify uses, components and setup of precision technology in agriculture, food and natural resources
- APST-10.5 Identify and understand programmable logic controllers (PLC) in agricultural production and manufacturing

Domain - Careers

Core Standard 11 Students examine the scope of career opportunities in and the importance of agriculture to the economy.

Standards

- APST-11.1 Evaluate the nature and scope of animal sciences in agriculture, society, and the economy
- APST-11.2 Describe career opportunities and means to achieve those opportunities in animal sciences
- APST-11.3 Identify how key organizational structures and processes affect organizational performance and the quality of products and services
- APST-11.4 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society

Domain - Leadership

Core Standard 12 Students validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well-rounded agricultural education.

Standards

- APST-12.1 Communicate clearly, effectively, and with reason through speaking, writing, visuals, and active listening in formal and informal settings
- APST-12.2 Explain the role of the FFA in the development of leadership, education, employability, communications and human relations skills
- APST-12.3 Examine roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- APST-12.4 Acquire the skills necessary to positively influence others

APST-12.5 Develop a skill set to enhance the positive evolution of the whole person

Domain 13: Supervised Agriculture Experience

Core Standard Students validate the necessity of a Supervised Agricultural Experience (SAE) program as a critical component to a well-rounded agricultural education.

Standards

- APST-13.1 Explain the nature of and become familiar with those terms related to an SAE program
- APST-13.2 Explore the numerous possibilities for an SAE program which a student might develop
- APST-13.3 Develop an individual SAE program and implementation plan for record keeping skills