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 electrical 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 soldering

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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

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**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

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**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
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