

# Agricultural Power Systems, Advanced (8020 - 36 weeks)

## Agricultural Power Systems, Advanced (8020 - 36 weeks) APSA

### **A Demonstrating Personal Qualities and Abilities** APSA.1

- 1 Demonstrate creativity and innovation. APSA.1.1
  - 2 Demonstrate critical thinking and problem solving. APSA.1.2
  - 3 Demonstrate initiative and self-direction. APSA.1.3
  - 4 Demonstrate integrity. APSA.1.4
  - 5 Demonstrate work ethic. APSA.1.5
- 

### **B Demonstrating Interpersonal Skills** APSA.2

- 6 Demonstrate conflict-resolution skills. APSA.2.6
  - 7 Demonstrate listening and speaking skills. APSA.2.7
  - 8 Demonstrate respect for diversity. APSA.2.8
  - 9 Demonstrate customer service skills. APSA.2.9
  - 10 Collaborate with team members. APSA.2.10
- 

### **C Demonstrating Professional Competencies** APSA.3

- 11 Demonstrate big-picture thinking. APSA.3.11
- 12 Demonstrate career- and life-management skills. APSA.3.12
- 13 Demonstrate continuous learning and adaptability. APSA.3.13
- 14 Manage time and resources. APSA.3.14
- 15 Demonstrate information-literacy skills. APSA.3.15
- 16 Demonstrate an understanding of information security. APSA.3.16
- 17 Maintain working knowledge of current information-technology (IT) systems. APSA.3.17
- 18 Demonstrate proficiency with technologies, tools, and machines common to a specific occupation. APSA.3.18
- 19 Apply mathematical skills to job-specific tasks. APSA.3.19
- 20 Demonstrate professionalism. APSA.3.20
- 21 Demonstrate reading and writing skills. APSA.3.21
- 22 Demonstrate workplace safety. APSA.3.22

---

**D Examining All Aspects of an Industry** [APSA.4](#)

- 23 Examine aspects of planning within an industry/organization. [APSA.4.23](#)
- 24 Examine aspects of management within an industry/organization. [APSA.4.24](#)
- 25 Examine aspects of financial responsibility within an industry/organization. [APSA.4.25](#)
- 26 Examine technical and production skills required of workers within an industry/organization. [APSA.4.26](#)
- 27 Examine principles of technology that underlie an industry/organization. [APSA.4.27](#)
- 28 Examine labor issues related to an industry/organization. [APSA.4.28](#)
- 29 Examine community issues related to an industry/organization. [APSA.4.29](#)
- 30 Examine health, safety, and environmental issues related to an industry/organization. [APSA.4.30](#)

---

**E Addressing Elements of Student Life** [APSA.5](#)

- 31 Identify the purposes and goals of the student organization. [APSA.5.31](#)
- 32 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult. [APSA.5.32](#)
- 33 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs, and projects. [APSA.5.33](#)
- 34 Identify Internet safety issues and procedures for complying with acceptable use standards. [APSA.5.34](#)

---

**F Exploring Work-Based Learning** [APSA.6](#)

- 35 Identify the types of work-based learning (WBL) opportunities. [APSA.6.35](#)
- 36 Reflect on lessons learned during the WBL experience. [APSA.6.36](#)
- 37 Explore career opportunities related to the WBL experience. [APSA.6.37](#)
- 38 Participate in a WBL experience, when appropriate. [APSA.6.38](#)

---

**G Exploring Leadership Opportunities through FFA** [APSA.7](#)

- 39 Identify the role of supervised agricultural experiences (SAEs) in agricultural education. [APSA.7.39](#)
- 40 Participate in an SAE. [APSA.7.40](#)
- 41 Identify the benefits and responsibilities of FFA membership. [APSA.7.41](#)
- 42 Describe leadership characteristics and opportunities APSA they relate to agriculture and FFA. [APSA.7.42](#)
- 43 Apply for an FFA degree and/or an agricultural proficiency award. [APSA.7.43](#)

---

## **H Applying Safety Practices in the Agricultural Mechanics Lab** APSA.8

- 44 Demonstrate safe practices in the agricultural mechanics lab. APSA.8.44
  - 45 Identify marked safety areas and posted evacuation routes. APSA.8.45
  - 46 Explain the use of eye wash stations. APSA.8.46
  - 47 Demonstrate knowledge of SDS. APSA.8.47
  - 48 Use protective clothing and equipment. APSA.8.48
  - 49 Demonstrate the use, storage, and disposal of chemicals. APSA.8.49
  - 50 Explain the use of fire protection equipment. APSA.8.50
  - 51 Demonstrate the safe use of standard and metric hand tools. APSA.8.51
  - 52 Demonstrate the safe use of power tools and equipment. APSA.8.52
  - 53 Use standard and metric precision measuring tools. APSA.8.53
- 

## **I Performing General Mechanical Maintenance** APSA.9

- 54 Identify lab and maintenance safety procedures and protocols. APSA.9.54
  - 55 Identify hazards associated with using and servicing farm machinery and equipment. APSA.9.55
  - 56 Demonstrate safe use of maintenance tools and equipment. APSA.9.56
  - 57 Maintain equipment. APSA.9.57
- 

## **J Maintaining and Servicing Hydraulic and Pneumatic Systems** APSA.10

- 58 Explain safety considerations regarding chemical exposure (e.g., to fuels, solvents, insecticides, herbicides, fungicides, fertilizers and veterinary chemicals) when working with farm equipment and machinery. APSA.10.58
- 59 Explain safety considerations when working with hydraulic and pneumatic systems. APSA.10.59
- 60 Explain the fundamental operating principles of hydraulic and pneumatic systems. APSA.10.60
- 61 Explain the operation of open and closed center hydraulic systems. APSA.10.61
- 62 Calculate hydraulic pressure and force, using Pascal's law. APSA.10.62
- 63 Explain the importance of hydraulic system service and maintenance. APSA.10.63
- 64 Use a flow meter and test gauge to measure the performance of a hydraulic system. APSA.10.64
- 65 Repair a hydraulic component. APSA.10.65
- 66 Repair a hydraulic-assist transmission. APSA.10.66
- 67 Repair hydrostatic drives. APSA.10.67

---

**K Maintaining and Servicing Electrical Systems** [APSA.11](#)

- 68 Explain safety considerations when working with electrical systems and in proximity to electricity. [APSA.11.68](#)
  - 69 Interpret electrical schematics. [APSA.11.69](#)
  - 70 Use electrical diagrams to locate components on equipment. [APSA.11.70](#)
  - 71 Test electrical components and devices. [APSA.11.71](#)
- 

**L Maintaining and Servicing the Ignition Circuit** [APSA.12](#)

- 72 Explain the operation of the ignition circuit. [APSA.12.72](#)
  - 73 Troubleshoot the ignition switch. [APSA.12.73](#)
- 

**M Maintaining and Servicing the Starting Circuit** [APSA.13](#)

- 74 Explain the operation of the starting circuit. [APSA.13.74](#)
  - 75 Troubleshoot the safety switch. [APSA.13.75](#)
  - 76 Troubleshoot the starter solenoid. [APSA.13.76](#)
  - 77 Troubleshoot glow plugs on diesel engines. [APSA.13.77](#)
  - 78 Troubleshoot the starter. [APSA.13.78](#)
  - 79 Replace defective parts of the starting circuit. [APSA.13.79](#)
- 

**N Maintaining and Servicing the Charging Circuit** [APSA.14](#)

- 80 Explain the operation of the charging circuit. [APSA.14.80](#)
  - 81 Test the charging circuit. [APSA.14.81](#)
  - 82 Replace an amperage gauge. [APSA.14.82](#)
  - 83 Check the armature and fields of charging circuits. [APSA.14.83](#)
- 

**O Maintaining and Servicing Fuel Systems** [APSA.15](#)

- 84 Explain the operation of the components of a fuel system. [APSA.15.84](#)
- 85 Explain the importance of proper fuel storage. [APSA.15.85](#)
- 86 Explain the operating principles and maintenance of carburetors. [APSA.15.86](#)
- 87 Repair various fuel systems. [APSA.15.87](#)
- 88 Explain the operating principles and maintenance of a high-pressure fuel injector. [APSA.15.88](#)
- 89 Service diesel fuel systems. [APSA.15.89](#)
- 90 Service fuel tanks and lines. [APSA.15.90](#)

---

**P Maintaining and Servicing the Air Intake System** [APSA.16](#)

- 91 Explain the importance of servicing and maintaining air intake systems. [APSA.16.91](#)
  - 92 Explain how air filtration systems operate. [APSA.16.92](#)
  - 93 Service air cleaners (dry and oil bath). [APSA.16.93](#)
  - 94 Inspect intake and induction systems. [APSA.16.94](#)
- 

**Q Maintaining and Servicing the Cooling System** [APSA.17](#)

- 95 Follow general safety precautions when maintaining cooling systems. [APSA.17.95](#)
  - 96 Explain the operation of the cooling system. [APSA.17.96](#)
  - 97 Check coolant levels. [APSA.17.97](#)
  - 98 Test radiator coolant. [APSA.17.98](#)
  - 99 Flush radiator. [APSA.17.99](#)
  - 100 Inspect cooling system components for wear. [APSA.17.100](#)
- 

**R Maintaining and Servicing the Lubrication System** [APSA.18](#)

- 101 Follow safety procedures for servicing lubrication systems. [APSA.18.101](#)
  - 102 Explain the operation of lubrication systems. [APSA.18.102](#)
  - 103 Check the engine crankcase oil level. [APSA.18.103](#)
  - 104 Select appropriate lubricants based on quality and viscosity designations. [APSA.18.104](#)
  - 105 Change lubricants and filters. [APSA.18.105](#)
  - 106 Dispose of engine oils. [APSA.18.106](#)
- 

**S Testing, Servicing, and Repairing the Power Unit** [APSA.19](#)

- 107 Test the power unit. [APSA.19.107](#)
- 108 Service the power unit. [APSA.19.108](#)
- 109 Repair the power unit. [APSA.19.109](#)
- 110 Test engine compression. [APSA.19.110](#)

---

## **T Maintaining and Servicing the Powertrain** APSA.20

- 111 Explain the theory of powertrain systems. APSA.20.111
- 112 Explain the operational theory of brakes (wet and dry), torsion dampers, and torque converters. APSA.20.112
- 113 Explain the operational theory of a final drive system. APSA.20.113
- 114 Troubleshoot various powertrain systems. APSA.20.114
- 115 Troubleshoot brakes (wet and dry), torsion dampers, and torque converters. APSA.20.115
- 116 Troubleshoot final drives and differential systems. APSA.20.116
- 117 Service power take-off drives. APSA.20.117

---

## **U Maintaining and Servicing Differentials, Transmissions, and Axles** APSA.21

- 118 Follow safety procedures related to differentials, transmissions, and axles. APSA.21.118
- 119 Explain the operation of differentials, transmissions, and axles. APSA.21.119
- 120 Check the transmission or differential lubricant levels on equipment. APSA.21.120
- 121 Check tire pressure, wear, and defects. APSA.21.121
- 122 Change the differential fluid(s). APSA.21.122
- 123 Pack wheel bearings. APSA.21.123

---

## **V Maintaining and Servicing Storage Battery** APSA.22

- 124 Follow general safety when servicing batteries. APSA.22.124
- 125 Use jumper cables to jump-start or charge a battery. APSA.22.125
- 126 Service battery. APSA.22.126

---

## **W Performing Welding/Cutting Operations** APSA.23

- 127 Perform grinding operations with a pedestal/bench grinder and/or portable/hand-held disc/angle grinder. APSA.23.127
- 128 Perform welding operations. APSA.23.128
- 129 Cut metals. APSA.23.129

---

## **X Applying Protective Coatings** APSA.24

- 130 Prepare equipment for painting. APSA.24.130
- 131 Clean equipment with a steam cleaner and/or high-pressure washer. APSA.24.131
- 132 Apply protective coatings. APSA.24.132

---

**Y Performing Administrative and Customer Sales Duties** [APSA.25](#)

- 133 Maintain current inventory, using an electronic inventory system. [APSA.25.133](#)
  - 134 Place orders using available resources. [APSA.25.134](#)
  - 135 Complete work orders, invoices, and requisitions for repairs. [APSA.25.135](#)
  - 136 Maintain clean and orderly customer and parts areas. [APSA.25.136](#)
  - 137 Explain repairs and expenses to customers using written estimates. [APSA.25.137](#)
  - 138 Complete an invoice. [APSA.25.138](#)
- 

**Z Maintaining and Servicing Harvesting Machinery and Equipment** [APSA.26](#)

- 139 Explain the operating fundamentals of harvesting equipment. [APSA.26.139](#)
  - 140 Perform diagnostic, maintenance, and repair procedures on harvesting equipment. [APSA.26.140](#)
  - 141 Set up harvesting equipment prior to and during in-field use to optimize performance according to conditions. [APSA.26.141](#)
- 

**AA Maintaining and Servicing Tillage and Seeding Application Machinery and Equipment** [APSA.27](#)

- 142 Explaining the fundamentals of machine operation, including tractor/implement compatibility. [APSA.27.142](#)
- 143 Identify laws associated with tillage and seeding applications. [APSA.27.143](#)
- 144 Set up tillage and seeding application equipment. [APSA.27.144](#)
- 145 Perform diagnostic, maintenance, and repair procedures on tillage equipment. [APSA.27.145](#)
- 146 Perform diagnostic, maintenance, and repair procedures on seeding equipment. [APSA.27.146](#)