

Agricultural Power Systems, Advanced (8020 - 36 weeks)

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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
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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
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)
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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](#)