Virginia CTE

# 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

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**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

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**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

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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

**Maintaining and Servicing the Cooling System** APSA.17

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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

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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

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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