Arkansas CTE

Agricultural Power, Structural, & Technical Systems: Agricultural Mechanics (2020)

Examine Career and FFA Opportunities associated with Agricultural Mechanics 1

1 **Evaluate and implement the steps and requirements to pursue a career opportunity in Agricultural Mechanics.** 1.1

1 Examine the educational, training and experiential requirements to pursue a career in Agricultural Mechanics (e.g., degrees, certifications, training, internships, etc.). 1.1.1

2 Analyze personal skillset and create a plan for obtaining the required education, training and experiences to obtain a career in Agricultural Mechanics. 1.1.2

2 **Assess the opportunities in Agricultural Mechanics available through Career Development Events, Supervised Agricultural Experiences and other FFA activities.** 1.2

1 Examine the Agricultural Mechanics and Agricultural Electricity Career Development Event for opportunities to exhibit skills needed in Agricultural Mechanics. 1.2.1

2 Research ways that Agricultural Mechanics or the skills needed may be implemented as a Supervised Agricultural Experience, and other FFA activities that might involve Agricultural Mechanics. 1.2.2

Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems. 2

1 **Apply physical science and engineering principles to design, implement and improve safe and efficient mechanical systems in AFNR situations.** 2.1

1 Compare and contrast applications of simple machines in AFNR related mechanical systems. 2.1.1

2 Identify the tools, machines and equipment needed to construct and/or fabricate a project in AFNR. 2.1.2

3 Examine owner's manuals to classify the types of safety hazards associated with different mechanical systems used in AFNR (e.g., caution, warning, danger, etc.). 2.1.3

2 **Apply physical science principles to metal fabrication using a variety of welding and cutting processes (e.g., SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch, etc.).** 2.2

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1 Compare and contrast the principles and procedures of different welding and cutting processes (e.g., SMAW, GMAW, fuel-oxygen and plasma arc torch, etc.). 2.2.1

2 Analyze the situation and determine the best welding and cutting process to be used in metal fabrication. 2.2.2

3 Compare and contrast the properties of different metals used in AFNR power, structural and technical systems (e.g., malleability, conductivity, optical properties, chemical composition, etc.). 2.2.3

Operate and maintain AFNR mechanical equipment and power systems. 3

1 **Perform preventative maintenance and scheduled service to maintain equipment machinery and power units used in AFNR settings.** 3.1

1 Maintain the cleanliness and appearance of equipment, machinery and power units used in AFNR power, structural and technical systems to assure proper functionality. 3.1.1

2 Develop a preventative maintenance schedule for equipment, machinery and power units used in AFNR power, structural and technical systems. 3.1.2

2 **Operate machinery and equipment while observing all safety precautions in AFNR settings.** 3.2

1 Research and summarize the use of equipment, machinery and power units for AFNR power, structural and technical systems. 3.2.1

2 Examine and identify safety hazards associated with equipment, machinery and power units used in AFNR power, structural and technical systems (e.g., caution, warning, danger, etc.). 3.2.2

3 Apply safety principles and applicable regulations to operate equipment, machinery and power units used in AFNR power, structural and technical systems. 3.2.3

4 Adjust equipment, machinery and power units for safe and efficient operation in AFNR power, structural and technical systems. 3.2.4

Service and repair AFNR mechanical equipment and power systems. 4

1 **Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.** 4.1

1 Identify and classify components of internal combustion engines used in AFNR power, structural and technical systems. 4.1.1

2 Analyze and explain how the components of internal combustion engines interrelate during operation. 4.1.2

3 Distinguish the characteristics of spark-and-compression internal combustion engines used in AFNR power, structural and technical systems. 4.1.3

2 **Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.** 4.2

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1. Compare and contrast basic units of electricity (e.g., volts, amps, watts, and ohms) and the principles that describe their relationship (e.g., Ohm's Law, Power Law, etc.). 4.2.1
2. Assess the tools used to measure the basic units of electrical circuits in AFNR power, structural and technical systems, and perform the measurements. 4.2.2
3. Analyze and design electrical circuits for AFNR power, structural and technical systems using knowledge of the basic units of electricity. 4.2.3
4. Compare and contrast the characteristics of electronic components used in AFNR power, structural and technical systems (e.g., battery, resistor, diode, transistor, capacitator, etc.). 4.2.4

3. **Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, etc.).** 4.3
   1. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems. 4.3.1
   2. Compare and contrast operation principles and features of mechanical transmission systems used in AFNR power, structural and technical systems (e.g., belts, chains, gears, bearings, seals, universals, drive, shafts, etc.). 4.3.2

Plan, build and maintain AFNR structures. 5

1. **Create sketches and plans for AFNR structures.** 5.1
   1. Read and interpret the parts and/or views of plants for agricultural structures. 5.1.1

2. **Determine structural requirements, specifications and estimate costs for AFNR structures.** 5.2
   1. Summarize and categorize the information needed to complete a bill of materials and cost estimate for an AFNR structure. 5.2.1
   2. Research and summarize sources of industry construction and material standards and their importance (e.g., American National Standards Institute, ANSI, Underwriters' Laboratories, UL, etc.). 5.2.2

3. **Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation, and/or layout, plumbing, concrete/masonry, etc.).** 5.3
   1. Compare and contrast the characteristics of wood and/or metal products used in AFNR structures. 5.3.1
   2. Compare and contrast the characteristics of materials used in plumbing and water systems (e.g., copper, PVC, PEX, etc.). 5.3.2
   3. Summarize the characteristics of the components found in concrete. 5.3.3

4. **Apply electrical wiring principles in AFNR structures.** 5.4
   1. Compare and contrast direct and alternating current. 5.4.1
   2. Assess and analyze the electrical requirements of an AFNR structure. 5.4.2

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3 Distinguish electrical circuits and the components of each. 5.4.3

Use control, monitoring, geospatial and other technologies in AFNR power, structural and technical systems. 6

1 **Apply computer and other technologies (e.g., robotics, CNC, UAS, etc.) to solve problems and increase the efficiency of AFNR systems.** 6.1

1 Research and categorize computer technologies used to solve problems and increase efficiency in AFNR systems. 6.1.1

2 Examine and summarize the specific intent of technologies used to solve problems and increase the efficiency of AFNR systems (e.g., robotics, UAS, CNC, etc.). 6.1.2

2 **Apply geospatial technologies to solve problems and increase the efficiency of AFNR systems.** 6.2

1 Research and summarize the impact of utilizing geospatial technologies (i.e., GPS, GIS, remote sensing, telematics, etc.) in AFNR systems. 6.2.1